# National Innovation System for Ghana's ICT Sector

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# Chapter 1 Executive Summary

This report is a summary of the findings of the Heinz College System Synthesis team tasked with developing a National Innovation System (NIS) strategy for Ghana's Information and Communications Technology (ICT) sector. System Synthesis is the capstone project for Carnegie Mellon University public policy graduate students. The two overarching goals of this capstone project are to analyze Ghana's current ICT sector utilizing the NIS framework and to offer practical policy solutions. This is a good

#### **Our Partner**

The project and our final white paper are meant to aid Ghana's Council of Scientific and Industrial Research - Science and Technology Policy Research Institute (CSIR-STEPRI). It is the government agency tasked with the development, transfer, utilization and management of Science, Technology and Innovation (STI) within Ghana.<sup>1</sup> We wish to help them in advising the government of Ghana in making policies that will promote the ICT sector and those sectors that depend upon ICTs for economic prosperity, by using the NIS framework.

#### Information and Communications Technology (ICT) in Developing Countries

ICT has a positive impact on the growth and economy of a nation. Recent data indicate that ICT has played a significant role in the developing world within the last decade to grow, expand output, increase productivity and spur exports, amongst other benefits. A 2007 World Bank survey of over 20,000 businesses in low- and-middle income countries found that firms that use ICT have faster sales, employment growth and higher productivity.<sup>2</sup> Deloitte, a world leading consulting firm, found ICT (mobile telephones in particular) in Serbia, Ukraine, Malaysia, Thailand, Bangladesh, and Pakistan increased productivity in both the public and private sector by reducing the time it takes to start a business, digital tax receipts, increased access to government officials and generally improving the operations of firms.<sup>3</sup>

As in developed countries, ICT investments have also increased Total Factor Productivity (TFP) amongst developing nations. One 2008 study of six West African countries (Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Mali, and Senegal) found that approximately 40 percent of change in TFP growth was attributable to IT-related growth.<sup>4</sup> ICT also spurs export-oriented jobs in developing countries. A study that analyzes the impact of Internet penetration rates in 66 developing countries found that a one percent increase in the number of Internet users is associated with 4.3 percentage point increase in exports.<sup>5</sup> This is important because export-oriented jobs pay higher average wages in developing countries and export-oriented firms in the developing world tend to grow faster than their domestic counterparts in part due to young, unstable domestic markets.<sup>6</sup>

#### **Current ICT Environment in Ghana**

Ghana's ICT sector has developed rapidly over the last decade. We reviewed the current market environment within ICT infrastructure (broadband, fixed-internet, and mobile) and the ICT services sector, and determined that the latter constitutes the largest ICT market opportunity for Ghana.

The business processing sector (here out simply BPO) focuses on informational and transactional services, such as call stations, medical transcription and other outsourced, low-to-middle knowledge level tasks that can be done abroad when the appropriate technological ecosystem is in place.

The current status of the ICT sector in Ghana is mixed. On one hand, the country has developed the necessary institutional arrangements to fully develop the sector, yet on the other hand, six years after the government and numerous development partners began supporting the industry, very few multinational outsourcing firms have set up locations in Ghana. We estimate these figures to be less than 2,000-3,000, including ACS- a large U.S. base firmed that has been in Ghana since 2004.

### National Systems Innovation (NIS) Framework

This white paper offers ICT policy recommendations based on the example of a number of peer countries to Ghana. In order to evaluate policy reforms in these peer countries and address the needs of Ghana, we draw from the National Innovation Systems (NIS) paradigm. NIS can be defined as an "analytical framework for understanding how institutions enable the diffusion of technology and knowledge for the purposes of economic growth throughout a nation."<sup>7</sup> An NIS approach deviates from much of the classic development literature in many ways as elaborated in chapter two. However, the most striking difference is that NIS places innovation at the center of economic growth.

Innovation is often used to mean anything new or relating to technology. In this paper we define innovation as, "the diffusion of technologies, knowledge—and related practices—, which are new to a given context (not in absolute terms)."<sup>8</sup> Innovation is not just about technologies or "gadgets" but also about organizing factors of production so firms can produce more efficiently. It can take non-technological forms such as organizational capacity, business models, management, marketing techniques and other process innovation.<sup>9</sup> Whatever its iteration, innovation enables economic actors to learn to use new equipment, adopt new practices and both break into higher technology industry and make existing industries more productive.

As such, while traditional infrastructure investments and economic liberalization are important for economic development, we stress that industry linkages are also vital. We have found most reports to be deficient of this analysis for developing countries and we hope that by incorporating an NIS aspect into our recommendations, policy makers in Ghana will have an additional tool to use when developing policies to promote their ICT sector.

## Methodology

In order to accurately assess the current situation in Ghana and inform policy recommendations for the ICT sector, we found that no one method sufficiently served our NIS framework, and so we adopted a mix of methodologies and an iterative approach for our actor and institution driven analysis. A brief snapshot of the methodologies is given below:

- **Domestic Policy Mapping Analysis**: An institutional map of Ghana's actors and government institutions was created to analyze what linkages exist and areas of ICT policy are most important.
- **Qualitative Analysis**: Interviews were conducted and a key informant survey created to gain the perspective of experts from the following sectors: Education, Government, Private, Development and Non Governmental Organizations (NGO).
- **Comparative Analysis**: A thorough analysis of 10 countries that are similarly positioned to Ghana in terms of ICT development was have developed as well as in-depth ICT policy research into Ghana's four peer countries in Africa to find potential recommendations.
- Quantitative Analysis: An index of 22 well-accepted technology and economic indicators was created to see how Ghana ranked against the 10 countries chosen for the Comparative Analysis. We also made comparisons taking rate of change of the 22 indicators between 2000 and 2012.

#### **Domestic Policy Mapping Analysis**

Various government ministries and their implementing agencies are prominent in the ICT landscape of Ghana. We looked at the role of the government, described its ministries and mapped their present and future activities, utilizing the National Innovation Systems approach. This was done to analyze progress in key projects and annual plans and to understand how government policies in various fields impact the use of ICT. The main sources of this information are the budget document, policies and strategy documents by various ministries. In addition to the analysis of the various Government entities, we identified key donors (World Bank, UNDP, DNIDA, Government of China) and analyzed the projects of the donors, and their associated government project partners. We were able to identify the funding and the progress made in projects through the monitoring and evaluation documents available from the donors and other funding partners. We also did a comprehensive education sector analysis by doing a literature review of the projects and activities by the Ministry of Education. We undertook a curriculum analysis by mapping the curriculum and the skill set required across jobs in the IT industry value chain and corroborated the analysis with reports on the sector and through analysis from the survey.

Most of the existing literature on ICT policy isolates the analysis to traditional ministries such as the Ministry of Communications and or the Ministry of Environment, Science, and Technology. Following an NIS approach, our domestic

policy mapping analysis showed that while the traditional ministries play a pivotal role in ICT policy, many other less traditional government agencies are also important. For example, we found that the National Youth Authority (NYA) is responsible for the Youth Leadership and Skills Training Institutes, one of the most important avenues for low-skilled new employees to receive training in Ghana. Given that workforce training is a common factor articulated by firms in the ICT sector, we view NYA as an essential enabling institution for ICT policy in Ghana. Similarly, based on our Ministerial Network Map, the Ministry of Trade and Industry (MTI), which is not often viewed as a core institution for ICT policy, plays an important role in the ICT sector.

#### **Qualitative Analysis**

In order to offer relevant policy recommendations for Ghana's ICT sector, it is important to first understand how the ICT sector "fits" into an economic growth strategy for a country like Ghana. To achieve this, we directly interviewed actors in Ghana and surveyed experts, particularly those with experience in Ghana. The purpose of our Experts Survey was to gain insights into general themes of how the ICT sector in Ghana could impact growth. We also attempted to analyze on-ground ICT conditions in Ghana and to assess how other developing economies have successfully implemented ICT-focused strategies. Experts were sought from all over the world, and represented a variety of employment sectors and special knowledge/expertise (the Ghanaian economy, ICT, and development strategies). Over 65 percent of respondents reported currently working, or having worked in Ghana. The amount of time spent working in Ghana averaged 9.7 years in country.

After analyzing survey responses, we were able to organize them under five overarching themes: enterprises, external players, ICT policy goals, barriers to growth, and human capital factors. A question-by-question analysis can be found in chapter five of the report.

The findings from the survey impacted our overall analysis in two ways. First, in many instances survey responses informed policy in their own right especially for questions that focus on ICT policy focus and goals. However, more important than the direct policy implications, the survey created a lens through which the team could analyze the successes and failures of peer countries. For example, from the survey we learned international firms might have a disproportionate role to play in the ICT sector. Knowing this, we were then able to seek policies in peer countries that created unique incentives for foreign direct investment. The overall lessons from the survey also informed our quantitative analysis by helping to identify hard data indicators that reflected the priorities survey respondents indicated were important. In this sense, we were able to not only draw from the literature to inform our comparative and quantitative analysis but also through qualitative data collected in the survey.

#### **Comparative Analysis**

We based the comparative country analysis approach on understanding the critical factors that led to ICT growth and development in countries around the world, especially those that we consider to be peers of Ghana. This was a critical step in incorporating the NIS approach to our analysis of Ghana's ICT sector development.

We initially focused on understanding the key areas on which Ghana's government can improve its ICT sector development. Next, we researched 10 peripheral countries that have consistently ranked as top performers in ICT growth to determine ICT practices that proved to be successes or failures among these countries. These 10 countries are *Botswana, India, Indonesia, Kenya, Mauritius, Philippines, South Africa, South Korea, and Thailand* and form the basis for our broad literature review and quantitative analysis. We next conducted a deeper literature review, interviews, and policy analysis on four of the ten countries that we considered to be Ghana's peers based on their regional proximity and recent ICT growth and development. These core peer countries include *Mauritius, Botswana, Kenya, and South Africa*.

The comparative country review enabled us to learn about the development in institutional linkages, human capital, infrastructure, and overall business environment encountered by Ghana's peer countries when growing their own ICT sectors. We found the specific NIS policies that helped these countries attract foreign direct investment, and how those countries incorporated those policies and specifically the partnerships they garnered to promote their ICT expansion. Analyzing the 4 peer countries and their policies allowed us to comprehend the broad successes and failures of ICT development so that we could better recommend policy changes to the government of Ghana.

However, this is not to say that we tried to recycle their exact policies for Ghana. Using the NIS approach, we understand that no policies can be exactly replicated from one country to the next, and that we must incorporate an adaption threshold to drive organic policy development specific to Ghana. Therefore, our in-depth literature review and policy analysis of the ICT innovation environments of Ghana's peer countries enabled us to decipher broad patterns of success and failures in their ICT development. We then translated those into general lessons learned to model specific policy recommendations relevant only to Ghana's ICT growth.

#### **Quantitative Analysis**

The first three methods addressed what institutions are relevant in Ghana (Ghana's Domestic Policy Mapping), what economic factors are important for Ghana's ICT sector (Expert's Survey) and what the policy environments look like in peer countries (Comparative Analysis). While these sections bore substantial fruit for our analysis they were all based on qualitative data. In this section we quantitatively analyzed the NIS and economic environment within the 10 peer countries determined by the comparative analysis.

Country	CMU NIS Ranking	Score (% of Perfect)	World Bank Ranking	WEF Ranking
South Korea	1	72.1	1	1
Mauritius	2	52.2	4	3
Botswana	3	49.2	6	9
Malaysia	4	46.6	2	2
Thailand	5	36.3	3	6
South Africa	6	29.2	5	5
India	7	26.3	10	4
Ghana	8	22.5	7	11
Indonesia	9	22	9	7
Philippines	10	17.1	11	8
Kenya	11	4.2	8	10

Table 1: CMU NIS Rankings

22 indicators were chosen based on economic and NIS literature (to see a full list of indicators, see chapter 'Quantative Analysis').<sup>10</sup> These indicators were broken into 5 sub-categories (Demographic, Financial, Institutional, Science, Technology) and were weighted based on the standard deviation from the mean to produce rankings. Table 1 shows that the NIS rankings are reasonably close to indices created by the World Bank and the WEF, with a few exceptions. Most notable are the two African countries, Mauritius and Botswana, ranked second and third. Where both Mauritius and Botswana really shine is in institutional factors: of the countries studied Botswana and Mauritius rank first and second in the World Bank's political stability index and first and third in the Corruption Perception Index, respectively.<sup>11</sup>

Country	Rate of Progress	World Bank Ranking	WEF Ranking
Indonesia	1	9	7
Ghana	2	7	11
South Korea	3	1	1
India	4	10	4
Botswana	5	6	9
Mauritius	6	4	3
Kenya	7	8	10
South Africa	8	5	5
Philippines	9	11	8
Thailand	10	3	6
Malaysia	11	2	2

Table 2: Rate of Progress 2002-20012

One of the shortcomings of traditional indices (such as those used by the WEF and the World Bank) is that they are usually static, capturing a snapshot of global competitiveness or ICT leadership. In order to address the dynamic nature of global competition in the BPO and ICT sectors, in addition to our NIS rankings, we also evaluated how much progress countries have made over the last decade (2002-

2012) across the 22 indicators. Weights are the same for the Rate of Progress index. <sup>12</sup> Table 2 indicates the rate of progress for each country between 2000 and 2012.

We found that the rate of progress rankings paint a different picture than the CMU NIS ranking. Indonesia and Ghana rank first and second amongst the countries evaluated in terms of progress made over the last decade. Both countries have rapidly increased investments in ICT infrastructure, worker training, access to credit and employment. In particular, Ghana leads the pack in rate of change in access to mobile devices, Internet penetration rates and private sector investments in ICTs. What Ghanaian policy makers can take away from the change score is that in many indicators, Ghana is moving in the right direction at a faster pace than many of its peer countries.

### Policy recommendations

After conducting detailed research and analysis and sufficiently developing a thorough understanding of the ICT environments in Ghana and its peers from the domestic policy, qualitative, quantitative, and comparative analyses, we tied the lessons learned and best practices from those analyses to match the four key pillars of strategic ICT development in Ghana: Infrastructure Development, Business Development, Institutional Development and Human Capital Development.

#### **Infrastructure Development**

#### **ICT Policy**

We recommend that the Ministry of Communication and the Ghana Investment Promotion center refine its ICT policy to include time-bound actions plans, milestones, timelines, and mechanisms for measuring projects and holding champions accountable for their success. The Ministry of Communication should also consider further developing and comprehensively utilizing public-private partnerships such as academia, trade organizations, consultants, and entrepreneurs to help achieve the overarching mission and vision on a local or regional level. The Ministry of Communication collaborates with the Ghana Telecommunications University College and the Business School of Kwame Nkrumah University of Technology, but this needs to be expanded. The government does not have the resources to incorporate large-scale ICT projects on its own, and therefore can leverage the assistance, expertise, and resources of its private sector partners. These partners can help conduct the necessary research, develop and help implement ICT policy, to achieve the goals on local levels where a true impact can be made in developing a strong ICT sector, educating the workforce, and creating regional jobs.

#### **Technology Park Development**

We recommend that the Ministries of Communications and Trade and Industry should continue to construct ICT office parks or special business zones that incorporate several of the following business environment characteristics. These attributes have proven to be successful in helping to grow the ICT sector in other developing countries, and include:

- Income tax holiday on profits from exports, higher rates of depreciation on ICT equipment and infrastructure, duty free imports, and 50% tax exemption for five on profits ploughed back into the local entity;
- 2. 100% tax exemption for ten years after initial period, 100% deduction on capital expenditures, duty free imports of multimedia equipment, and 50% cost reduction on feasibility studies and business planning expenses; and
- 100% corporate income tax exemption for the first 7 years, 100% exemption from dividend withholding tax for foreign investment in technology, and exemption from custom duties, VAT, and excise taxes for companies that were established with foreign investment.

Additionally, some of the basic infrastructure capabilities that should be consistent throughout all ICT parks include:

- 1. Reliable and stable electricity connections, including backup power sources to allow for 24/7 electrification, and possible subsidies for reduced prices;
- 2. Competitive market priced telecommunication services; and
- 3. Reliable and stable broadband Internet connections.

#### **Business Development**

#### **Ease of Doing Business**

We recommend that the Ghana Investment Promotion Center and Ghana Free Zone Board focus on two strategies for incorporating easier business practices. The first is a short-term strategy that can leverage the best practices of trade fairs in the ICT sector. These fairs are popular in the Indian state of Gujarat. The Gujarati government developed a program called Vibrant Gujarat in 2009, where many of the companies operating within the state meet for one week and sign investment deals, contracts, and negotiate terms for conducting business. These fairs permitted faster business development by permitted companies to ask each questions, understand the necessary information, and develop best practices that ultimately resulted in much faster deals than if they executed those distant from one another.

The second strategy incorporates the longer-term approach of regulatory reform in simplifying procedures for faster on shoring of foreign business operations. These procedures may include those mentioned above, as well as *tangible and achievable* tax incentives, immigration incentives, and banking incentives. Policies for consideration should include but are not limited to fewer procedures/paperwork required when initiating operations onshore, and lower corporate taxes (special tax zones for ICT companies or minimal corporate tax, dividend repatriation, in addition to the investment incentives and guarantees the government already has in place). Also, the banking incentives can be suited to attract foreign business by offering and guaranteeing larger amounts of local credit, but most importantly assisting ICT startups to grow organically by providing easier access to small amounts of local credit for ICT-specific projects, research, or development.

Additionally, the government of Ghana should consider negotiating and signing a Double Taxation Agreements (DTA) with the United States and other trading partners as well. DTAs are agreements that define how much money in taxes an international firm pays to each country it operates in. The goal is for a company to pay an equitable rate of tax based on involvement in each country and should result in a firm paying an effective tax rate of somewhere in between the tax rates of countries involved.

#### eGovernance Projects

We recommend that the National Information Technology Agency develop a timebounded national eGovernance strategy that focuses on horizontal governance, reduces government procedures and red-tape, and incorporates the World Bank style project reporting structure.

Improving the eGovernance program should also include updating government websites with current information. Government standards should be established to ensure ministries maintain their websites. Without current information a potential investor may decide to go to another country because of lack of knowledge of the advantages that Ghana already provides. For example: the Ghana Investment Promotion Centre lists countries with which it has Investment Promotion and Protection Agreements which are the UK, the Netherlands, Germany, Malaysia, China, Denmark, and Switzerland. As of July 16<sup>th</sup>, 2012 Ghana signed such an agreement, also known as a Bilateral Investment Treaty with the United States. Displaying updated and accurate information is of great importance in attracting potential business partners who are unfamiliar with Ghana.

#### Last Mile Connectivity

We recommend that the National Communications Authority and Ghana Investment Promotion Center focus on improving the national infrastructure for last mile connectivity by strengthening the national fiber optic backbone. These projects should be properly planned, and progress should be frequently reported which are two key factors for continued success and attracting FDI.

#### Institutional development

#### Transparency and consistency

We recommend that Ghana, in order to strengthen its institutional framework, push to provide transparent and accurate data, which is the backbone of Freedom of Information Act. All the government projects should consider adopting a similar project progress reporting mechanism. NITA, which has been in the forefront of eGovernance reforms, should take initiative and develop standards for information sharing across government websites and domain name registrations.

Excerpts from our survey and World Bank reports indicate that visibility of data and transparency is key to institutional development. Countries such as Mauritius and Malaysia developed standards of transparency for public organization and are encouraging data sharing through Open Government data portals. We recommend considering similar initiatives for Ghana as well.

#### **Human Capital Development**

#### **Education Policy Focus**

The Government of Ghana should utilize these institutional linkages to learn the specific business needs of its workforce. Specifically, companies competing in the BPO sector require a very specialized skillset. The government should assign a specific ministry or private sector partner to research, interview, or survey BPO sector businesses to fully understand the specific skills that these businesses demand. Then, the government can develop education policies and programs to help increase these specific skills in the workforce. These education policies can range from reforming the primary and secondary education curriculum to expose

younger children to basic ICT skills (long-term sustainable skills), or providing subsidies or other assistance to vocational/technical schools (to meet short term skills needs). If Ghana desires to build a strong ICT workforce, education and language skills are crucial to achieving these goals. However, the private sector's immediate and long-term needs should be strongly considered before drafting or implementing any policies or programs.

We suggest the creation of a special branch within the Ministry of Education focused on the ICT sector with coordination with Ministry of Youth and Employment. The special branch will authorize decisions and coordinations with private sector partner to research technology interventions.

#### **Training and Productivity**

Training and productivity play a key role in skill development especially in the knowledge sector like ICT. We recommend a focus on learning through traditional devices and strengthening on core English and math competencies. ICT skills and standard should be incorporated in educational plans as experts indicated in our survey that it is desktops and laptops that promote job training and productivity, as opposed to mobile devices.

The educational plan of South Africa is aimed at incorporating ICT skills and standards and can be considered as a model for development. In an effort to improve and restructure the education sector, the government has concentrated its efforts on primary school education through action plans. This includes the "Schooling 2025 Plan" to monitor the educational system against benchmarked standards.

NASSCOM's (India's ICT trade association) NAC-Tech training program is another useful case study. NAC-Tech is an industry standard assessment and certification program to ensure that the workforce in the ICT sector has consistent training and employable skills. NAC-Tech helps the industry through standardization of skill level among incoming students.

#### **Industry readiness**

In terms of industry readiness, Ghana has been in the forefront of reforms and the reforms have also translated to the educational sector. Recent Education Sector Policy 2010-2020 highlights ICT as an enabler for the development of ICT education. However the skills imparted are not transferable and not sufficient across the ICT value chain.

Value added industries like healthcare will provide great value compared to sectors like insurance. Industry respondents feel that the vocational training needs to be integrated with employability. With all the analysis in the backdrop, we suggest creating a forum to connect businesses with educational institutions to develop curriculum to match industry needs. Already existing partnerships and industry training programs like CISCO certification and Microsoft certifications also need to be expanded.

Government can also consider visiting Botswana's 2016 ICT Policy, which provides a framework to identify specially trained young adults to help spread the knowledge of ICTs to other citizens around the country.

# Chapter 2 NIS and the Importance of the ICT Sector

Why focus on the ICT sector? Within Ghana a number of sectors, such as agriculture, represent a larger portion of GDP and employ a greater fraction of the worker force than the ICT sector. Wouldn't it be better for the government to focus precious resources on these sectors? The reason why the Government of Ghana is trying to develop a stronger ICT sector and encourage the adoption of ICT within all segments of the economy, is because ICT leads to productivity growth throughout the economy as a whole.

The importance of ICT on productivity throughout the developed world is generally uncontested, however there is some disagreement over how much of an economic impact ICT has within developing countries. Some argue that the digital infrastructure in many developing countries is too nascent for ICT to be an important part of economic growth, while others contest ICT has the potential to play a much larger role in developing countries. For example, a report by Harvard's Corporate Social Responsibility Initiative finds that because of "geographic isolation, the lack of competition and high prices to consumers and low prices for producers because of little information, and legal exclusion for many businesses and consumers that are specific problems of many developing countries, the ICT industry in particular can have a pronounced impact on the developing world."<sup>13</sup>

Recent data indicate that ICT has played an even greater role in the developing world within the last decade. For example a 2007 World Bank survey of over 20,000 businesses in low- and-middle income countries found that firms that use ICT have faster sales, employment growth and higher productivity.<sup>14</sup> Deloitte, a world leading ICT consulting firm, found ICT (mobile telephony in particular) in Serbia, Ukraine, Malaysia, Thailand, Bangladesh, and Pakistan increased productivity in both the public and private sector by reducing the time it takes to start a business, digital tax receipts, increased access to government officials and generally improving the operations of firms.<sup>15</sup> As in developed countries, ICT investments have also increased Total Factor Productivity (TFP)-a common measurement for overall productivity growth-amongst developing nations. One 2008 study of six West African countries (Benin, Burkina Faso, Camerron, Côte d'Ivoire, Mali, and Senegal) found that approximately 40 percent of change in TFP growth was attributable to IT-related growth.<sup>16</sup> Similarly, Joseph and Abraham found ICT investment in the Indian manufacturing sector was a key factor in rapidly increases in labor productivity.<sup>17</sup> ICT also spurs export oriented jobs in developing countries. One study that analyzes the impact of internet penetration rates in 66 developing countries found that a one percent increase in the number of Internet users is associated with 4.3 percentage point increase in exports.<sup>18</sup> This is

important because export-oriented jobs pay higher average wages in developing countries and export-oriented firms in the developing world tend to grow faster than their domestic counterparts in part due to young, unstable domestic markets.<sup>19</sup>



Figure 1: Growth Effects of ICT Source: OECD (2009)

Broadband in a particular increases economic activity in the developing world by reducing transaction costs, increasing knowledge exchange, creating more informed consumers and fluid markets and generally introducing technological capabilities into areas traditionally without ICT. Indeed, the OECD found that a 10 percent increase in broadband penetration is associated with a 1.38 percentage point increase in per capita GDP growth in Iow and middle income countries, compared to a 1.21 percent increase in high income countries (Figure X).<sup>20</sup> Several studies have also analyzed the effect of ICT on the efficiency of micro-businesses in the developing world. One such study finds that ICT has substantial effects on Indian micro-firms by eliminating intermediaries between small firms and their customers, cutting prohibitively high transaction costs and decreasing regulatory burdens through e-government initiatives.<sup>21</sup>

One of the greatest impacts of ICT over the last half decade has been the spread of mobile devices. Mobile devices enable non-traditional ICT workers to enjoy the benefits of ICT. Prior to 2000 portable ICT devises such as netbooks or PDAs played a small role in the day-to-day functions of many workers, today however, they have necessary tools for many workers. And the flexibility associated with mobile IT devices has steadily led to gains in labor productivity. Finally, the ICT sector can constitute a different mix of industries based on a country's level of development. In Ghana's case, we do not advocate for ICT manufacturing, or advanced ICT services, but traditional ICT enabled services such as the business processing outsourcing sector, which is predominately comprised of call-stations. We also support the development of small-scale ICT entrepreneurs. Small-andmedium sized enterprises (SMEs) represent a major source of services for the Ghanaian economy, promoting SME ICT firms will help spread the use of ICTs throughout the economy—increasing the overall impact on economic growth.

### **Economic Perspectives**

All economic actors, whether academics, domestic policy makers, international development partners, or those in the private sector approach economic policy from a particular economic perspective. Some argue that lack of access to capital is what bottlenecks growth in developing countries, while others argue that global markets are too volatile to promote long-run, stable economic prosperity. Indeed, some contest that the position of global economies has largely been solidified, with developed countries continuing to dominate advanced production and services while developing countries remain largely resource and commodity driven. Of course, the rapid increase in advanced industries in Southeast Asia, and some parts of Latin America call into question such a deterministic perspective. In this section we review two major economic development doctrines, the "Washington Consensus" and the Industrial Policy approach, and one new, and in our view, superior, doctrine—the National Innovation Systems approach.

Over the last several decades two views of economic development have constituted the majority of the intellectual space within development policies. One view interprets governments in developing countries as part of the problemfraught with corruption, inefficiencies and cronyism, the best policy is to let the market dictate economic behavior. Moreover, economic actors do not predominately lack coordination, examples of best practices or market failures; instead, a lack of capital is the true chimera of economic stagnation. We refer to this approach as the "Washington Consensus" approach. On the other end of the spectrum, some economic observers argue the market has fundamental flaws that cannot be resolved by greater market freedom or tinkered through economic policy. For these policy makers, developing economies' advanced industries that allow a country's private sector to move up the global value chain is the only surefire method for economic prosperity. However, access to global markets in these advanced industries is restricted by insurmountable market failures that only the government can help (or indeed lead) the private sector to overcome. For developing countries to become wealthier the government must be a major economic player, picking particular industrial winners explicitly through noncompetitive government contracts, preferential lending, or state owned enterprises (SOEs). We refer to this economic doctrine as "Traditional Industrial Policy".

These two doctrines, although often referred to by different names and articulated in different ways, represent the majority of ideological disagreements within development policy. Each perspective has merits and faults but neither truly appreciates the role of innovation in economic growth. Innovation is too often considered a luxury of developed economies that comes to fruition through billion dollar R&D projects, multinational firms developing next generation products, and a plethora of PhD. researchers. These characteristics surely represent factors of innovation in some countries, but they do not represent what an "innovation economy" looks like in most countries. An innovation economy is one that creates, imitates, adopts, and disperses technologies, methods, business models, and skills that are relevant to the country's unique growth potential. Creating an innovation economy requires acknowledgement from both the public and private sector that firms face complex coordination problems when developing new techniques and markets. These coordination problems are predominately horizontal in nature—across sectors, education systems, and consumer groups—and can rarely be solved by a large "market making" firm in the same way vertical supply-chain coordination problems can be solved. To better address these coordination problems, a new approach needs to be adopted. This approach needs to take institutions and their intersections with markets seriously. Following the literature, we refer to this approach as a National Innovation Systems (NIS) approach.

#### Table 4: Economic Perspectives

	Washington Consensus	Traditional Industrial Policy	National Innovation System
Source of growth	Capital Investment	Industrial Growth	Innovation and institutional learning
Important Economic Drivers	Free trade and free markets: market forces are always superior to government intervention	Intervention led industrial growth: government forces are superior to market imperfections and externalities	Innovation drives growth. Governments and firms must coordinate to promote adoption and imitation
Role of government	Governments are often part of the problem due to cronyism and corruption. Government's key role in forcing savings and making investments	Governments are often the only domestic actor large enough to overcome barriers to entry. The government must promote select industries	Governments are needed to overcome complex coordination problems. The government must promote policies to facilitate knowledge exchange and innovation
Focus of trade	Predominately export driven growth. But exchanges rates should not be manipulated to help exporters	Import-substitution. Export oriented growth but focused on manufacturing. Exports in traditional commodities is discouraged	Imports of complex capital goods are important. Emphasis on higher productivity in both domestic and export markets
Access to Credit	Capital accumulation is most important. Encourage foreign direct investment	Capital should be invested in select industries.	Capital is often not allocated to intangible goods and this reduces innovation and growth
Role of education	This view has little to advice on education	Education should focus on advanced industries and science, despite country's development level	Near to market vocational training is essential. Basic STEM education should be provided in public sector.
Major beneficiaries	Financial sector and potentially consumers	Industrialists that get picked to be 'winners'	Workers, consumers, and domestic and export markets

### The "Washington Consensus" Approach

The term "Washington Consensus" was coined by John Williams in 1989 to describe broad economic policies for developing countries that were supported by the World Bank, the International Monetary Fund and other Washington D.C. based organizations. The overarching theme of the Washington Consensus was that developing countries were not growing because there was a lack of capital flowing to the appropriate segments of the economy. According to the doctrine, in many countries capital was tied up in inefficient state owned enterprises (SOEs) with little capital flowing to entrepreneurs, export-oriented firms and other efficient elements of the economy. Williamson defined ten primary goals of the Washington Consensus growth policies: 1) establish fiscal policy that avoids deficits 2) shift government spending from subsidies and pro-poor policies to broad-based growth policies including education, health care and infrastructure 3) reduce distortionary taxes and corporate rates 4) create market determinant interest rates 5) design floating exchange rates that reflect market realities 6) implement trade liberalization 7) promote inward foreign direct investment and capital inflows 8) privatize state enterprises 9) deregulate to reduce barriers to market entry 10) protect private property.<sup>22</sup> By implementing these ten reforms, the Washington Consensus model argues, foreign investors will have confidence in a government, inefficient former SOEs would fail, and the market would dictate which elements of the economy were most profitable-all of which increases access to capital to those firms with the most growth potential.

#### **Capital Accumulation Drives Growth**

The intellectual architects of the Washington Consensus were neoclassical economists who drew deeply from the work of Noble Prize winning economist Robert Solow. Robert Solow described economic growth as the process of capital accumulation per worker, which leads to greater output per worker. In other words, as societies increase the saving rate, and reduce spending on inefficient enterprises (such as stated owned enterprises and expensive social programs) the more investment per worker and thus the more the economy would grow. The first overarching theme of the Washington Consensus is that government policy should aim to maximize capital. In response to these policies that constituted a radical liberalization of markets, opponents argue even if access to capital is the driving force of economic growth, why can't the government just support particularly important industries through tax revenue? Doing so would reduce the capital constraint within these industries without the volatility of the market. Proponents of the Washington Consensus respond by arguing that governments (particularly in developing countries) are not able to identify the appropriate industries to invest in, and even if they could, corruption and cronyism are too great a threat to leave such decisions up to the government. The market is always the proper vehicle to filter capital to the appropriate economic actors. The second overarching theme of the Washington Consensus doctrine is that markets and prices should always dictate economic activity. The role of government is to deregulate, liberalize and stay out of the way. Indeed, any deviation from the market will lead to "deadweight loss" or a misallocation of resources when one resource becomes preferred regardless of its demand. For neoclassical economists, most taxes (the major exception is the

value-added tax (VAT)) create a deadweight loss because they create an economic incentive to invest in one activity over another. For example, if imports are taxed at a different rate than exports, making foreign goods comparatively less competitive than domestic goods, then there will be a shift from creating goods for export to creating goods that replace imported goods (the import-substitution effect). For believers in the Washington Consensus, such taxes always thwart the market and hurt the economy.

#### **Critiques of the Washington Consensus**

Over the last decade, the Washington Consensus has been exposed to significant criticism, including from some of its original proponents. In 2005, the World Bank issued a report titled "Economic Growth in the 1990s: Learning From Reform," in which the bank takes stock of some of the shortcomings of the Washington Consensus perspective. Harvard's Dani Rodrick and others have drawn from the report to offer several modern interpretations of where the Washington Consensus overemphasized capital accumulation at the expense of more institutional growth factors.

**Too great an emphasis on efficiency losses**: By worrying too much on the potential for deadweight losses from non-market policies (such as promoting certain sectors) the Washington Consensus missed many of the dynamic forces that underlie the growth process. Pursuing efficiency gains, by themselves, do not constitute economic growth strategies.<sup>23</sup> More important to growth policy than how the market would allocate resources, is where do market and government failures exist that retard productivity growth.

#### The broad objectives of the Washington Consensus do not translate into

**policy**: The overarching objectives of macroeconomic stability, domestic liberalization and openness do not always translate into the same policy options in all places at all times (although the Washington Consensus claims they do). Minimizing inflation, fiscal deficits, tariffs and maximizing privatization and liberalization of finance are only a number of policy options available. Rodrik points out, trade openness need not always be sought through lower import tariffs but also through duty drawbacks, export subsidies, or special economic zones.<sup>24</sup> Even if we accept that the broad principles of the Washington Consensus are desirable, each country still has a greater number of policy options to achieving these principles than the Washington Consensus suggests.

**Different economies require different solutions:** One of the largest problems that has become apparent with the Washington Consensus is that the doctrine assumes the same relative mix of policy prescriptions will have equal impact in all developing countries. However, there is little evidence to date to suggest this is the case. In some countries access to capital really is a binding constraint, yet in others, lack of productivity is the economic constraint. In the former countries liberal financial markets may help, however in the latter technology transfer or greater patent protection may be of upmost importance. Focusing on financial liberalization in an economy that is unproductive and does not protect property

would probably make little difference because even with access to international finance, foreign investors would still not be attracted. The bottom line is growth is far more contextual than the Washington Consensus suggests.

**Institutions are important:** The Washington Consensus was developed under the belief that economic growth was slow in developing countries because governments were making poor decisions because of corruption, bad or inept governments. The solution of course, is to constrain governments through external rules. In doing so, however, the importance of institutional relationships is often lost. How one organizes effective government agencies is often a different question than how one takes control away from ineffective agencies through strict rules. Instituting rules that mandate network liberalization in broadband does reduce inefficient government control of the market but government policy is necessary to address price collusion amongst providers which creates low penetration rates. On the other hand, an effective and independent regulatory body can promote competition by incentivizing investment and reducing barrier to competition and new firm entry.

**Market failures require government action:** The final critique that is often leveled against the Washington Consensus is the doctrine puts too great an emphasis on government failures and not market failures. The doctrine suggests that when bad governments are put in check and markets free to allocation of resources then economies will grow at similar rates. Yet, there are a variety of market failures that will likely retard growth in developing countries without government intervention. This is particularly true as economies move up the value chain. The literature generally suggests that as economies become more advanced, and by extension more complex, coordination problems become an increasing problem for growth. As all economies grow, and become more developed, addressing market failures is a priority that cannot be left to the private sector and demands explicate government involvement.

The Washington Consensus approach to economic reform addresses many crucial elements of policy, namely liberalization, austerity, stability, and openness. However, these factors are at best necessary but are insufficient for economic growth. The major shortcoming of the Washington Consensus is it is an economic doctrine that is crouched in the belief that access capital is the sole priority of economic policy. Unfortunately, in a time of advanced, global capital markets are ubiquitous access to capital is not the stop-gap for growth, but the right opportunities for investment. In order for developing countries to make domestic markets more productive through the use of advanced technologies, institutions that promote innovation are paramount to rigid rules that dictate market allocation.

### The Traditional Industrial Policy Approach

Industrial policy refers to the direct intervention of a government to promote particular industries in a country. It takes it as a given that development of the industrial sector leads to economic growth. As market imperfections and externalities impede the progress of the industrial sector, this doctrine justifies intervention to stimulate these industries thus improving overall welfare. Industrial policy does not simply mean government intervention, however, but specific and explicit intervention on behalf of particular sectors. This can be done in a variety of methods: protection via tariff and trade policy, providing subsidies or other business incentives such as access to capital and tax relief, developing specialized export processing zones, state ownership of the industry etc.<sup>25</sup>

#### **Does Industrial Policy Work?**

The evidence of industrial policy playing a positive role in the promotion of development is mixed. During the 1940s and 1950s, economists such as Myrdahl, Nurkse and Hirschman supported industrial policy on the grounds that market failures are so severe for developing economies that economic success cannot occur without governments picking and supporting specific sectors and industries.<sup>26</sup> Other economists who were more hesitant of government run economies supported short-term industrial policy. Singer and Prebisch advocated the need to close the economy for some time to develop an internationally competitive industrial sector, emphasizing dynamic comparative advantage. The argument is as follows; many developing countries have nascent comparative advantages that could allow domestic high-value sectors to be globally competitive. However, these sectors need initial support to grow- support provided by the industrial policy.

By the 1970s and 1980s, industrial policy was increasingly linked to the massive failures of the Soviet economy, and the approach was critiqued by scholars such as Anne Kruger and Deepak Lal who contested the notion that government failure was worse than market failure.<sup>27</sup> By allowing governments to pick economic winners, the economy as a whole was taking huge gambles that could not be justified through solely economic arguments. The success of the East Asian economies, especially South Korea, which relied heavily on industrial policy, rejuvenated interest in industrial policy.

Fluctuations in theory and varied results from different countries make it unclear whether industrial policy is a reliable way to promote development or not. In certain sectors there may be an argument for more heavy-handed government involvement. But what most advocates of industrial policy miss is that the cost of being wrong is incredibly high—particularly in ICT-driven economies where technologies can be locked in for generations.

#### **Industrial Policy and Ghana**

Despite the success of industrial policies in countries like South Korea the experiences of Latin America in the 1940s and then again in the 1980s, and Ghana in the 1960s with industrial policies are widely recognized as failures. The differences can be attributed to political climate, nature of intervention, method of implementation, and global economic and legal realities. In terms of the latter, South Korea and Taiwan implemented industrial policies prior to the TRIPs agreements that codified international intellectual property protection. Many scholars argue that in a post TRIPs world, these industrial policies are untenable options for many developing countries.

Nonetheless, even prior to TRIPs, many African countries adopted industrial policies that did not succeed. For example, in the 1960s Ghana established comprehensive industrial policy plans led by the government.<sup>28</sup> Killick's accounts of development in Ghana showcases how industrial policy is not a solution to Africa's problems. He discusses examples of industrial projects and illustrates case by case how inefficient they were.<sup>29</sup> Agriculture was promoted in areas where there was no demand, there were unrealistic expectations on factories to deliver goods, cost-benefit calculations were ignored, and lack of planning led to siting problems. These included production of raw materials far away from assembly, adding transportation costs to the mix, making the manufacturing process inefficient.

It is true that there was an increase in capital stock by 80% between 1960-65<sup>30</sup>. However, investment was misallocated and there was no total factor productivity growth. This meant that the economy was still inefficient. Also, the problem of patronage and favoritism was prominent: the government promoted its favorite players at the expense of potentially more productive sectors. Thus, Ghana's industrial policy in the 1960s did not lead to robust economic development; these policies did not create internationally competitive industries because investments were made into industries that were inefficient.

Industrial policy that propelled the economies to Taiwan and South Korea forward cannot be replicated everywhere, especially in African countries like Ghana where the geo-political circumstances are extremely different. As a result, industrial policy cannot be prescribed as a policy proposal for their development.

# A Third Approach: National Innovation Systems

There is a third approach to economic development that is different that both traditional industrial policy and neoclassical economic policy. This third doctrine is called National Innovation Systems (NIS). NIS assumes that innovation drives economic growth in all countries, regardless of their current technological status. NIS is usually defined as an analytical framework for understanding how institutions enable the diffusion of technology and knowledge for the purposes of economic growth throughout a nation.<sup>31</sup> Innovation can be defined as, "the diffusion of technologies—and related practices—which are new to a given context (not in absolute terms)."<sup>32</sup> Innovation is not just about technologies or "gadgets" but also organizing factors of production so firms can produce more efficiently. Innovation can mean non-technological forms of innovation such as organizational capacity, business models, management, marketing techniques and other process innovation.<sup>33</sup> Whatever its iteration, innovation enables economic actors to learn to use new equipment, adopt new practices, and both break into higher technology industry and make existing industries more productive.

Traditional growth economics often implies GDP growth across countries should convergence over the long-term. Given economic growth rates for many parts of the world have been systemically below the United States and other advanced countries—even amongst countries that have implemented similar macroeconomic policies—some economists, political scientists and others have asked, if economies should converge, what explains the drastically different long-run growth trends in different parts of the world? NIS literature offers a solution.

Technological catch-up is not a free ride. Lundvall describes the process of innovation as "the result of collisions between technical opportunities and user needs." In order for such "collisions" to increase productive potential, a country needs a shared capacity for technology suppliers and potential users to coordinate. This shared capacity that enables a country to successfully transfer more sophisticated technology to diverse users, and thus into the production process, is called "absorptive capacity".<sup>34</sup> Absorptive capacity is interdisciplinary in nature, relating to innovation systems, governance, political system, economic factor and product markets, and education.<sup>35</sup>

If there are large information asymmetries between innovation producers and users then adaptive capacity will break down. There are a number of coordination problems that keep users and producers from interacting. Micro-innovation produced at the individual or small firm level may be isolated from other producers and users and not able to be diffused. This is particularly true in developing economies with large informal sectors where there is little interaction with the formal sector. When good ideas are developed in the informal sector it is extremely difficult to recreate applicable factor conditions to allow imitation in the formal sector (and vice versa). Another explain of a producer/user coordination failure that exists in many emerging economies is foreign-based firms which tend to be disconnected from the domestic entrepreneurs. From an NIS perspective, such coordination failures (or market failures) are the most significant roadblock to long-term growth. This is not to say basic and technical infrastructure factors (broadband, affordable real estate) are not essential, but they are insufficient to long-run growth in any sector. Particularly, as this white paper will show, in high-tech sectors such as the ICT sector. Overcoming coordination failures between users/producers should a core component of government policy.

The NIS approach suggestions countries can overcome these coordination problems through the proper institutional arrangements. Innovation is a social process where a variety of public and private entities interact within a system to produce economic policies that move industrial activity and new sectors up the value chain. According the OECD, "the innovation process involve[s] continuous interactivity between suppliers, clients, universities, productivity centers, standard setting bodies, banks and other critical social and economic actors"<sup>36</sup> For developed economies this means creating linkages between basic R&D and private sector actors. For developing economies the emphasis is on creating autonomous agencies focusing on technical, financial, commercial, and legal factors that interact with firms on near-to-market innovation such as technology extension services, access to short-term training programs.

The entry point for innovation within developed economies is often taken for granted because there is a long institutional heritage of technological adoption, and these institutional arrangements (education systems, IP laws, etc.) beget future innovations. In developing countries, on the other hand, dynamic nascent industries, and related businesses are the best entry points into creating an innovation system. When these new industries are able to get a foothold within an economy they bring about change and needed reforms and investments. According to Aubert, "In many countries, entry points are often constituted by ICT related industries and services which provide the bulk of technological newness."<sup>37</sup> The applicable entry point to innovation systems is based on a mix of the level of science and technology capabilities and strength of institutions.

There are a number of differences between the NIS approach to development and the other two schools of thought. One primary difference is what type of efficiency is of primary concern. Neoclassical economists or the "Washington Consensus" model focuses primary on allocative efficiency. Allocative efficiency simply means when markets are free to operate the appropriate amount of goods and services are provided to consumers at the quantity they demand. Government intervention should be limited to creating the right conditions for price signals to accurately reflect market preferences. This general means liberalization of markets, privatization of government run entities and open trade barriers. Allocative efficiency implies that when governments get too close to markets they cause more harm than good. Where governments can help is within monetary policy, mostly stabilizing currency and regulating the financial sector to ensure capital is allocated to the most efficient actors. To the extent the government impacts innovation is to invest in basic infrastructure that decrease transaction costs between market players. For example, the government should never prioritize the ICT sector, but the government should create technological neutral telecommunication licensing so firms are free to develop which ever technologies they believe will meet the most demand.

Those in favor of the traditional industrial policy framework are willing to sacrifice allocative efficiency for future "productive efficiency". Productive efficiency is the industrial mix that provides the most output per input. Those in favor industrial policy constrain markets with the intent of creating an environment where infant industries can grow unencumbered by foreign competition. Advocates for this approach argue that high value-added sectors are the greatest potential for national growth, but will only exist if these sectors are protected. Doing so costs the entire economy as resources are diverted from current competitiveness areas to potential *future* areas of competitiveness. From this perspective the role of government in innovation policy is twofold. First, governments should invest in next generation science and technology that are specifically applicable for future industries. For example, creating national research labs for nanotechnology before any such industries exist within a country may be justified if the government believes doing so will springboard the nascent industry. Second, governments may believe current human capital and basic R&D is too low to support future industries and thus higher education and R&D, to which there is no current demand, should be supported through government funds. For example, in Latin America during the 1980s most governments ramped up spending on national labs, R&D facilities that had little interaction with current market actors.

The NIS perspective differs from both these perspectives in that both allocative and productive efficiency are necessary, but they are insufficient to economic development. Economic growth is also contingent upon "adaptive efficiency." Adaptive efficiency is the ability for economic actors to respond to changing economic (and non-economic) factors. These factors do not always reveal themselves in the form of price signals and thus cannot fully be appreciated solely with market mechanisms. Increasing adaptive efficiency requires public-private linkages that go beyond current market demand, but unlike the traditional industrial policy perspective, adaptive efficiency does not demand that current production is sacrificed for future production. Adaptive efficiency dictates that local markets should be directly tied to universities and public institutions that enable industries to be dynamic. Institutional linkages between the education, public and private sector should be "close-to-market" and relevant to firms. When adaptive efficiency is the goal the role of government in innovation policy is to create specific agencies and policies that fit the industrial mix of a country and linkages between institutions that promote entry of new firms, rapid learning from incumbents, and accessible imitation in both the formal and informal sector. For example, government labs are less important that government extension services that train workers how to use technologies such as computers, agriculture techniques, or ICT-enabled business practices. R&D is most valuable when government research is directly linked to the needs of current firms. Government technology policy can be rigid and become obsolete, so adaptive efficiency often hurt from picking industrial winners. The caveat is industries that have clear implications to the productive potential of the rest of the economy. For example, vocational education is important for adaptive efficiency because workers can guickly become skilled in industries today. Similarly, when developed with adaptive efficiency in mind, a basic ICT sector (BPO and local entrepreneurs) can also service as a local supplier of smallscale domestic needs. It may not be cost effective for web designers from India to

enter into the Ghanaian market, and without domestic designers, ICT services will not enter the economy. But because ICT enables greater productivity and access to global markets, foster a niche market to meet micro-demand may be warranted.

# Chapter 3 Current State of ICT Industry in Ghana

Ghana's ICT sector has developed rapidly over the last decade. This section serves as a brief overview of the current market environment within ICT infrastructure (broadband, fixed-internet, and mobile) and the ICT services sector—which constitutes the largest ICT market opportunity for Ghana. In particular, the Business Processing Outsourcing (BPO) sector that includes call centers is analyzed.

#### **Market Structure**

The telecommunication market in Ghana is fully deregulated and open to competition. Since 2007, government has reduced its investment and involvement in the market, selling 75 percent of its interests in Zain for \$120 million and 70 percent stake in Ghana Telecom to Vodafone for \$900 million in 2008. International services have been opened for licensing and there are four incumbent international gate service providers—Vodafone Ghana Limited, Milcom Gahan Limited, MTN Ghana, and Zain.<sup>38</sup> There are currently six mobile phone operators and two national fixed-network operators. The mobile telephone operators are MTN Ghana, Tigo Ghana Limited, Vodafone Ghana, Kasapa Telecom and Zain. The sixth operator, Glo Mobile, has just recently begun commercial activity, but is currently involved in building its physical infrastructure. With the exception of MTN and Glo, the operators are subsidiaries of multinational mobile telephone companies. Glo is a Nigerian firm making substantial inroads throughout Western Africa.

Both mobile, Internet, and broadband infrastructure are centered around urban hubs—particularly, Accra, Kumasi, Takoradi, and Tamale. Much of Ghana's rural areas are accessible by WiMax or no Internet connectivity at all. Ghana has a universal service funds that helps to augment market actors to provide mobile and Internet access to rural areas; however, currently the growing demand for mobile, and to a lesser degree Internet connectivity, has meant that market actors are outpacing GIFEC in communications roll out to un-served and underserved areas.<sup>39</sup> The Ghanaian government has created policy mechanism to increase shared infrastructure, particularly satellite/radio masses, which have decreased operators fixed costs and increased competition in remote areas.

#### **Mobile Phone Penetration Rates**

As with many emerging markets around the world, mobile phone penetration rates in Ghana have increased exponentially over the last decade. In 2000, less than one percent of Ghanaians owned a mobile phone. By 2008, the figured increased to 50 percent and by 2011, mobile penetration rates reached 85 percent of the population—an amazing 70 percent increase in three years.<sup>40</sup> MTN Ghana is still the market leader with a market share of 53%. It is followed by Tigo with 23%, Vodafone Mobile with 14%, Zain 8% and Kasapa with the lowest market share of 2%.<sup>41</sup> The expansion of mobile penetration rates can be attributed to three factors: one, the global time-trend of declining costs of mobile technology and increased functionally, and thus demand; two increased competition within the mobile telephone market which contributed to the fall in Average Revenue Per Users (ARPUs); and third, a predominate prepaid market which creates incentives for customers to purchase multiple SIM from various providers. While the vast majority of the expansion of the mobile phone market is just an extension of the global trend, in Ghana increased competition has induced substantial price declines amongst providers. Most of the operators have reduced their prices to target the lower income earners so as to increase their market share. Between 2007 and 2008 the largest mobile providers in Ghana saw a decline of ARPUs by over 70 percent.<sup>42</sup> While such rapid declines in revenue put pressure on providers, it represents a boon for the ICT sector. Second, because most Ghanaians use prepaid mobile services they are not tied into contracts. The lack of contracts complimented by the low cost of SIM cards (around .7 USD) and reduced rates for in-network calls means many Ghanaians purchase a different SIM card for each network. This inflates the per capita mobile penetration rates as the data only captures registered SIM cards. This over estimations means the ICT market may be far more urban that aggregate per capita data indicates. Nonetheless, there is a clear correlation between competition amongst providers, penetration rates, and lower costs. Using OECD pricing and user baskets, Ghana has the lowest prices of the 18 African countries reviewed by Research ICT Africa.43



Figure 2: Current Mobile Penetration Costs across African Countries

#### **Broadband Infrastructure and Costs**

To improve voice and data communication in Ghana, the national terrestrial fibre backbone is being constructed with a loan from the Chinese government. The fibre backbone took over the fibre ring of the Volta River Authority and a National Fibre Backbone Company was formed to manage the infrastructure.<sup>44</sup> Unlike the mobile market, there is little relationship between penetration rates and broadband costs. As Godred 2010 shows, broadband penetration rates have increased substantially over the last several years yet costs have not declined radically.



Figure 3: Penetration vs. End-User Prices 2004-2009

Broadband costs continue to higher than what most Ghanaians are able to pay. For example, Vodafone, the cheapest high-speed provider in Ghana, charge between \$199 and \$280 USD. Put another way, the average fixed broadband package cost 30% of per capita GNI. Compared to 10% in Indonesia, 5.4 percent in South Africa, 9.2% Mauritius, 2.5% in Costa Rica and 31% in Kenya.<sup>45</sup>

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The prohibitive costs are one explanation for extremely low fixed broadband take up. Currently .25 percent of Ghanaians have fixed broadband subscriptions. This is compared to 14 percent who use the Internet through either fixed or mobile devices.

# Information Technology Enabled Services (ITES)-Business Processing Outsourcing (BPO)

The ICT sector is emerging in Ghana. As of 2009, 50 companies were members in the national ICT association GASSCOM, including U.S.-based ICT services company ACS, which employed 1,800 people in Ghana.<sup>46</sup> The ITES-BPO sector (here out simply BPO) focuses on informational and transactional services, such as call stations, medical transcription and other outsourced, low-to-middle knowledge level tasks that can be done abroad when the appropriate technological ecosystem is in place. Particularly high quality broadband (T-1 connections are generally necessary for most firms). Depending on the type of BPO quality of broadband services is critical, for example voice-based BPO require reliably low jitter and latency rates.

The ITES is seen as an increasingly important avenue to rapid technological adoption, economic growth and job creation for developing countries. Across the developing world there has been a precipitous push away from natural resource sectors (although still the majority of economic activity in developing countries) and towards services. Services tend to require more skills (which promotes education). promote economic mobility, and have higher productivity and growth rates. For example, from 1988 to 2005, Ghana experienced a 14.5% decrease in agricultural contribution to the economy (from 61.1% to 46.6%), which is directly linked to the declining performance of agriculture.<sup>47</sup> Nearly 11% of that decrease transferred into an increase for the service sector (from 26.1% to 37.2%).<sup>48</sup> At the same time over the past two decades global corporations have leveraged IT to outsource informational and transactional services to developing countries, such as India, Malaysia, and Kenya. Global firms outsource BPO for cost-competitive reasons while developing countries use BPO sectors to move up the value-chain (following India's less than decade long movement from BPO to software programming). By one estimate the current global BPO industry is expected to be worth \$178 billion by 2015.49 Indeed, in Kenya alone the sector is expect to reach 80,000 jobs within three years.<sup>50</sup> Table One indicates the top five BPO destinations in 2010.

Country	BPO Market Size (\$ Billions)	BPO Employees	Expected Growth Rates
USA	47.6	1,190,000	-2%
India	18.4	768,000	15%
Canada	15	375,000	3.5%
Philippines	9.4	500,000	20%
China	6.3	158,000	20%

Table Six: Top Five BPO Destinations Source: HB paper

#### **BPO Sector in Ghana**

As India moves up the value chain, the Ghanaian government has been promoting the BPO sector. Much of the intellectual impetus to developing the sector came from a report written by Hewitt Associates that claimed Ghana, given its ideal time zone, stable government, and English proficiency, would be an ideal location for a global BPO sector. The report titled, "Improving Business Competitiveness and Increasing Economic Growth in Ghana," benched Ghana against global ITES competitors (such as Kenya, Mexico, Malaysia, etc.) across four broad indicators: people, environment, infrastructure, and clusters.<sup>51</sup> The report arranged the components of the BPO sector into four metrics: People (education, skills and language levels); Infrastructure (available real estate, technical infrastructure, IT parks etc.); Environment (political, legal, and economic coordination); and Incumbents (the presence of current BPO firms to build from). Table Two below expresses Hewitt's country analysis. Some of the goals of the BPO sector listed in the report are: job creation, quick source of revenue, improved business performance, indirect employment impact.<sup>52</sup> Following the Hewitt report several international organization and outside governments have supported the sector. For example, the World Bank has committed \$120,000 since 2006 to the development of the ITES sector.

The potential for a BPO sector in Ghana is reflected in several core strengths of Ghana. First, Ghana has a large labor pool that is proficient in English. Given that the United States represents almost 50 percent of the demand for BPO services, Ghana's ability to easily attract workers who need no English language training should help Ghanaian firms attract U.S. contracts. Second, Ghana is one of the most politically stable countries in the region. According to the 2011 Corruption Perceptions Index, Ghana ranks 69<sup>th</sup> out 188 countries, compared to peer countries Kenya and Mexico which rank 154 and 100, respectively. Medium- and long-run investors face lower risk of political instability within the Ghanaian market than many competitor countries (particularly within Africa). However, the degree to which political stability translates into a real competitive advantage is uncertain. Stability has not seemed to have helped local ICT firms secure domestic capital, as financial support for the ICT sector is still insufficient. Also, most of Ghana's BPO competitors such as Mexico, Malaysia, or South Africa, are also politically stable.

Since the Hewitt report and the World Bank funding, Ghana has made significant policy reforms to create a BPO sector. The Ministry of Communication has created the Secretariat of ITES that works closes with the Ghana Multimedia Incubator Centre to directly incentivize BPO firms to source in Ghana. The government has also worked with industry partners to develop the Ghana Association of Software and IT Services Companies, an industry association geared to direct the needs of the BPO sector to the government and development partners. The government has also created numerous investor friendly policies such as tax holidays and by allowing 100 percent foreign ownership of ICT firms. Nonetheless, there are few incentives specifically geared towards the ICT sector.<sup>53</sup>

Since then Ghana's BPO sector has met with limited success. On the one hand, the country has developed the necessary institutional arraignments to fully develop
the sector, yet on the other hand, six years later, few multinational outsourcing firms have set up locations in Ghana. While the Hewitt report concludes by estimating that the BPO sector will have produced \$738.2 million in revenues and between 24,727 and 36,910 jobs by 2010. While those interviewed were not able to put a specific figure to the number of BPO jobs created, I estimate the figures to be less than 2,000-3,000, including ACS, a large U.S. base firmed that has been in Ghana since 2004.



## Table Seven: Country Analysis

Source: Hewitt Associates, 2006.

# Chapter 4 Domestic Policy Mapping

#### Introduction

This chapter looks at the role of government and donor agencies in the ICT sector of Ghana. Before delving into how we can help improve/expand the role of the ICT sector in the advancement and development of Ghana, it is important to understand where Ghana stands. At the same time, it is also important to understand the role different government entities and different donor agencies, through their policies and projects play, in the ICT sector in Ghana. This is regardless of whether the government was promoting the use of ICT as an enabler and a productivity enhancer or encouraging businesses to move their outsourcing operations to Ghana. In order for us to be able to understand the current state of Ghana's ICT sector and the role different entities play in it, we drew upon the analytical framework of NIS, which places importance on the role of different actors in a system and on how coordination occurs between them.



Figure 4: Analytic framework of NIS

The four focus areas for ICT development include Infrastructure Development, Human Capital Development, Institutional Development and Business Development and it was according to these that we organized our findings. The image on the left shows how the different ministries fall into the four areas for ICT development.

We decided to delve deeper and split our analysis into two parts; core policy and donor mapping and the education sector in Ghana. In core domestic policy and donor mapping, we tried to uncover the linkages between various government ministries, agencies and donors along with their role in promoting the use of ICT to encourage productivity growth and in promoting the establishment of an ICT services sector. We also looked extensively at the education sector specifically because ICT as a service or good requires a high level of human capital development. Without a high level of human capital development the role of ICT in the economy cannot be increased.

We first state the methodology we used to gather and analyze the role of relevant ministries, agencies and donors, followed by our findings from this methodology. The findings will contain brief descriptions of ministries, its agencies and donors along with the activities they had undertaken.

#### **Core Policy and Donor Mapping Methodology**

In order to get the list of relevant government actors in the ICT sector of Ghana, we decided to look at the latest budget of the Government of Ghana - the budget speech which the Minister of Finance and Economic Planning gave in Ghana's legislature on November 16, 2011. This document was titled "The Budget Statement and Economic Policy of the Government of Ghana for the Financial Year 2012", henceforth referred to as the "Budget Document", and was the main source of information on the key government actors in the ICT sector. 54 The information in this section was obtained from the above source, unless cited otherwise.

From this budget speech, we identified relevant ministries and agencies which we think are central to Ghana's NIS. We gathered information regarding the role of each of the relevant ministries and agencies along with details of the projects which they carried out in 2011 and which they planned to carry out in 2012 from the Budget Document. If the role of a particular entity was unclear we tried to obtain information on those entities through other sources such as their websites, reports by consulting firms, etc. We were able to uncover certain entities which were not mentioned in the Budget Document, such as the Ghana Free Zone Board, due to research presented in other sections of this report.

We were also able to get budgetary allocations for each ministry for the year 2012, which we then converted to US Dollars. The conversion rate for GH¢1 was \$0.50. These numbers were obtained from the Budget Document.55 We calculated the percentage share of each ministry in the budget, after converting the numbers to US Dollars and following the same format as the Budget Document.56 We would have liked to have more financial information on the projects and budgetary allocations to each agency and department under a particular ministry but we were unable to find such data.

Some information was gathered from interviews, which were held in August 2012 by the group members who had visited Ghana. This information was incorporated into this section as well. In addition to interviews, we incorporated information obtained from documents, such as the Industrial Sector Support Program of Ghana's Ministry of Trade and Industry, and from either government websites or had information on the government entities.

In order to map out the activities of donors, we identified key donors and analysed the projects of the donors and their associated government project partners. We identified the funding, the progress made in the projects through the monitoring, and evaluation documents available from the donors and other funding partners.

Using the information we had gathered we then proceeded to list the roles of each of the government entities involved in Ghana's ICT sector and were able to construct a network map showing visually the relationships and roles the relevant the ministries and agencies are currently playing in the ICT sector of Ghana. It should be noted that this network map only represents entities that are playing a role in encouraging the use of ICT or are using ICT themselves. Hence, it does not include all the entities which constitute the Government of Ghana. There is a possibility that some government entities which do play a role in the ICT sector of Ghana were not found and, thus, are not included in our network map.

#### **Core Policy and Donor Mapping - Findings**

Our findings indicate that there are complex relationships between different ministries, within the same ministries, and between different agencies. The network map shows these relationships visually. A non-NIS approach would have looked at entities which are conventionally considered important to a sector. In the case of Ghana's ICT sector, one of them would have been the Ministry of Communications. However, our research indicates there are a lot of other actors in the government sector whose policies and decisions have an impact on Ghana's ICT sector. The findings from this section not only complemented the findings from other research avenues but also allowed us to state which entity we believe should play a role in implementing the recommendations from this research.

In this subsection, we first show the network map along with the meaning of any abbreviations used in the network map. The network map complements the descriptions of the roles of the entities and their projects to give one a sense of the government's role in the ICT sector of Ghana. After the network map, we proceed to the descriptions of the role of each of the ministries and their agencies and some of their projects for 2011 and 2012.

A graphic representation of the relevant government actors in Ghana's ICT sector can be seen below:



Source: Authors analysis based on budget documents

Figure 5: A network map of the key players from the government and donors in the ICT sectors NIS of Ghana

#### **Glossary of Abbrevations:**

**IP** - Industrial Policy ISSP - Industrial Sector Support program **REP - Rural Enterprise Project** NTP - National Traceability Program MSMEP - Micro, Small and Medium **Enterprises Project** STIP - Science, Technology and Innovation Policy GSTDP - Ghana Skills and Technology **Development Project BG-ICTP** - Better Ghana ICT Project MSTESS- Mathematics, Science and Technology Education Scholarship Scheme NSTTPP - National Science and Technology Theme Park Project NICTADP - National ICT for Accelerated **Development Policy (Review)** NDC - National Data Centre **RIC - Regional Innovation Centres Project** 

eG - e-Government PCP - Prison Connectivity Project eGP - eGovernment Procurement **BPOP - BPO Project** GMIC - Ghana Multimedia Incubation Centre NYEP - National Youth Employment Program IGR - Internet Governance Registry CD-OS - Capacity Development in Open Source CD-AI - Capacity Development in Artificial Intelligence MVP - Millennium Village Project SDP - Skills Development Program LMIS - Labor Market Information System LESDP - Local Enterprise and Skills **Development Programme** 

## **Ministry of Communication**

Ministry of Communication (MoC) is the main entity with the role of developing and providing access to a reliable and cost effective communication infrastructure and services in Ghana. In order to ensure transparent and accountable governance, the Ministry is continuing with the implementation of a number of e-applications that have been adapted to facilitate efficient and effective service delivery to the public. In this regard the Ministry will continue the national e- government network infrastructure project by utilizing capacity from the National Communication Backbone Company. The Ministry has a budget outlay of \$ 33 million, accounting to 0.49 % of the total Government budget.

Key implementing agencies of the Ministry are Information Technology Enabled Services Secretariat, Ghana Investment Fund for Electronic Communications, National Information Technology Agency, Ghana-India Kofi Annan Centre of Excellence in ICT and National Communication Authority.

## Information Technology Enabled Services (ITES) Secretariat

The ITES Secretariat is part of the eGhana Project, funded by the World Bank, and was created to facilitate the ITES/BPO industry by addressing obstacles and

promoting changes that are needed to help the BPO/ITES industry become globally competitive.<sup>57</sup>

Some of the key activities of the ITES Secretariat are:

- Facilitating the collaboration of private sector players and training institutions
- Helping the BPO sector to grow by raising awareness and informing the sector of opportunities
- Promoting Ghana as the destination for the BPO sector by holding summits and conferences<sup>58</sup>

## Ghana Investment Fund for Electronic Communications (GIFEC)

The Ghana Investment Fund for Telecommunications (GIFTEL) was created as an implementing agency of the MoC to facilitate the provision of universal access to basic telephony by the unserved and underserved communities in the country in 2004, under the Ghana ICT Policy for Accelerated Development. The Electronic Communications Act 775 promulgated in 2008, gave legal backing to the agency, changed the agency's name to the Ghana Investment Fund for Electronic Communication (GIFEC) and widened the scope of its mandate to include the provision of access to electronic services including broadband service, ICT, broadcasting, internet, multimedia service and basic telephony, by the un- served and underserved communities in Ghana.<sup>59</sup>

Key programs that are supported by GIFEC are:

- Security Connectivity Project (Working with Ministry of Education<sup>60</sup> & Ministry of Youth & Sports)
- ICT Capacity Building<sup>61</sup>

## National Information Technology Agency (NITA)

NITA is a public service institution established by Act 771 in 2008 as the ICT policy implementing arm of the MoC. Its mandate includes identifying, promoting and developing innovative technologies, standards, guidelines and practices among government agencies and local governments, as well as ensuring the sustainable growth of ICT via research, development planning and technology acquisition strategies to facilitate Ghana's prospect of becoming a technology-driven, knowledge-based and value based economy as espoused in the eGhana project which ideally seeks to assist the Government generate growth and employment, by leveraging ICT and public-private partnerships.

Key activities of NITA are:

- eGhana Projects
- eGovernment Network Infrastructure
- Technical Assistance
- Workshops and Seminars<sup>62</sup>

## **Ghana-India Kofi Annan Centre of Excellence in ICT**

The Ghana-India Kofi Annan Centre of Excellence in ICT, also known as the Advanced Information Technology Institute, works to stimulate the growth of the ICT Sector in Economic Community of West African States (ECOWAS). Established in 2003, through a partnership between the Government of Ghana and the Government of India, it is a public sector institution run on private sector lines with a strong emphasis on social development, building networks and developing mutually beneficial partnerships. It also works with institutions located in six continents, Africa, Asia, Australia, Latin America, Europe and the United States. It offers a wide variety of courses to various groups apart from students, such as parliamentarians, sometimes with partnerships with firms such as Oracle, Cisco, etc.<sup>63</sup>

Key training programs offered are:

- Cisco Certified Network Associate
- Diploma in Business Computing<sup>64</sup>

## **National Communications Authority (NCA)**

The National Communications Authority (NCA) was established by the National Communications Act 1996 Act 524<sup>65</sup> with the objective to regulate communications by wire, cable, radio, television, satellite and any other means of technology for the development and operation of such services in Ghana.<sup>66</sup> This act was repealed and replaced by the National Communications Authority Act of 2008, Act 769.<sup>67</sup> The NCA is responsible for:

- Grant licenses and authorizations for operation of communication systems and services
- Ensure fair competition among licensees
- Establish and monitor quality of service indicators for operators and service providers
- Consumer education and protection and equipment standards and type
   approval
- International Frequency Coordination<sup>68</sup>

#### Key projects in 2011

The Ministry has played a pivotal role in the development of policy for the development of ICT sector, development of infrastructure, development of e-governance platforms and development of BPO and training.

Key progress made in policy areas:

 Review of National ICT for Accelerated Development Policy - Launched in May 2011, review to include issues of Cyber Security, Broadband, Green ICT, Environment and Climate Change and Geo-Information. Key progress made in development of infrastructure:

- Development of ICT Park in collaboration with the Ministry of Trade and Industry. Private sector has expressed interest in the development of the ICT parks and more parks to be modeled on similar basis
- Commencement of Construction of National Data Centre. Pilot data center has been completed by NITA for rolling out e-government for entities like Passport Office, NCA and the National Identification Authority
- Development of Regional Innovation Centers to expand infrastructure and to promote access to ICT. The Ministry has awarded construction contracts for ICT Innovation Centers to facilitate the application of ICT learning and research in some parts of the country. As of 2011, 10 centers are under construction
- Expansion of e-Government infrastructure project under the cooperation agreement with the Government of China. The project aims to expand fiber optic infrastructure to all district capitals and provide broadband capacity to facilitate e- governance activities

Key progress made in the development of e-governance platforms:

- eServices including content management system for managing hosted content on a portal, payment gateway to allow portal applications to receive payments, e-forms application and document management application
- eJustice in collaboration with the Judicial Service. The technical proposal for the development has been evaluated
- elmmigration in collaboration with the Immigration Service. The design of the system has been completed
- eParliament in collaboration with the Legislature. Technical design has been completed, contract awarded and inception report submitted. Functional specification requirements are being developed
- eGovernment Procurement (e-GP) system design has been developed and is being reviewed
- Library and Prisons connectivity: GIFEC provided ICT equipment and internet connectivity to 8 regional libraries and inaugurated ten mobile libraries. Commissioned the prison connectivity project providing ICT facilities to help prison inmate reformation

Key progress made in development of BPO and training:

- Procured a warehouse and hired a consultant to transform it into a 900 seat BPO setup of international standards
- Ghana Multimedia Incubation Centre Collaborating with Teletech and trained 120 persons for the BPO industry

#### Key projects in 2012

The Ministry plans to initiate new projects to further improve the infrastructure, continue with the implementation of e-governance platforms, enhance the policy and legal framework with the development of new policies and laws, and encourage capacity building in ICT education.

Key projects proposed in policy areas:

- Development of Internet Registry Formal establishment of public Internet Governance Registry is being pursued. Policy guidelines will be developed for migration from IPV4 to IPV6
- Development of an Incubation Policy to support ICT business incubation
- Monitoring the ICT for Accelerated Development (ICT4AD) Monitoring implementation of ICT4AD, a project supported by UNDP
- eGhana Project Draft ICT and Broadcasting bills keeping in mind convergent Technology

Key projects proposed for development of infrastructure:

- Continue construction of National Data Centre
- Continue development of Regional Innovation Centres constructing 5
   more innovation centres
- Pursue development of a technology park, under the Minor, Small and Medium Enterprises (MSME) project. It will be placed near academic institutions and will attract 300 new business set-ups in the country
- Implement Millennium Village projects aimed at using ICT such as mobile voice and data accessibility to facilitate the achievement of the Millennium Development Goals related to health and education
- Increase Penetration of ICT Access to rural areas by offering special incentives to existing telecom companies to make it profitable for them to invest in rural and deprived areas

Key projects proposed for the development of e-governance platforms:

- Ensure the timely implementation of e-Parliament, e-Immigration and WiMax infrastructure
- Undertake extensive investment promotion activities

Key projects proposed for development of BPO sector and training:

 Capacity development in the area of open source platform and artificial intelligence through R&D in Ghana-India Kofi Annan Centre of Excellence for ICT

## **ICT4AD** policy in Ghana

Ghana's ICT4AD policy was created in 2003 with a focus to simultaneously target the development of the ICT sector and industry as well as use ICTs as a broadbased enabler of developmental goals, with emphasis on the development, deployment and exploitation of ICTs to aid the development of all other sectors of the economy. Key points of the policy are to pursue:

- ICTs as a social-enabler (education, health, poverty-reduction, incomedistribution)
- ICTs as an enabler of rapid socio-economic development
- ICTs as an enabler of government administration and service delivery
- ICTs as a facilitator of electronic government and electronic commerce initiatives
- ICTs as an engine of the service sector

- ICTs as an enabler of knowledge-driven industrial development
- ICTs as an enabler of the agriculture sector
- ICTs as a driver of private sector development
- ICTs as an agent for wealth creation
- ICTs as a tool for bridging the gender inequality gap in social, economic and political development

The initial ICT4AD policy has 14 focus areas:

- 1. Accelerated Human Resource Development
- Promoting ICTs in Education The Deployment and Exploitation of ICTs in Education
- 3. Facilitating Government Administration and Service Delivery Promoting Electronic
- 4. Government and Governance
- 5. Facilitating the Development of the Private Sector
- 6. Developing an Export-Oriented ICT Products and Services Industry
- 7. Modernization of Agriculture and the Development of an Agro-Business Industry
- Developing a Globally Competitive Value-Added Services Sector A Regional Business Service and ICT Hub employment and Spread of ICTs in the Community
- 9. Promotion of National Health
- 10. Rapid ICT and Enabling Physical Infrastructure Development
- 11. Legal, Regulatory, and Institutional Framework Provisions
- 12. R&D, Scientific and Industrial Research Capacity Development
- 13. Promoting Foreign and Local Direct Investment Drive in ICTs
- 14. Facilitating National Security and Law and Order<sup>69</sup>

Considering the changing needs and priorities, the policy is being reviewed and additional focus areas such as server security, ICT climatic change and environment, broadband connectivity are proposed to be added. In addition, the review committee is also working towards development of time bound action plans for 6 of the original 14 focus areas.<sup>70</sup>

## Ministry of Trade and Industry (MoTI)

Ministry of Trade and Industry (MoTI) is the lead policy advisor to government on trade, industrial and private sector development with responsibility for the formulation and implementation of policies for the promotion, growth and development of domestic and international trade and industry. The Ministry is also the advocate for the private sector within government and is the principal agency responsible for monitoring and implementing the Government's private sector development programmes and activities.

The vision of MoTI is to establish Ghana as a major manufacturing, value-added, financial and commercial hub in West Africa by the year 2015. The Ministry has a budget outlay of \$ 78 million, accounting to 1.16 % of the total Government budget with a mission to develop a vibrant, technology-driven, liberalized and competitive trade and industrial sector that significantly contributes to economic growth and employment creation, particularly involving mass mobilization of rural communities and other vulnerable groups including women.

Key implementing agencies of the MoTI are the Ghana Export Promotion Council, National Board for Small Scale Industries, Ghana Standards Board, GRATIS Foundation of Ghana, Central Regional Development Commission and Private Sector Development Board. MoTI has presence across all the 10 administrative regions in Ghana and overseas presence in London, Washington DC, Geneva, Brussels and Abuja.

## **Ghana Export Promotion Authority (GEPA)**

The Ghana Export Promotion Authority (GEPA) is an agency of the Ministry of Trade and Industry with the mandate to facilitate, develop and promote non-traditional exports from Ghana. Trade in Services has recently been added to the nontraditional export portfolio. Established by Act 396 in 1969, as the Ghana Export Promotion Council, it was recently granted Authority status in order to clearly define its core functions for marketing and promotion of non-traditional exports.<sup>71</sup>

Key activities of GEPA include:

- Creating awareness about exports in the country
- Identifying products suitable for export and creating a market for them through various means such as organizing exhibitions and trade fairs in and outside the country
- Providing Ghanaian exporters with all the required help to enter competitive markets abroad such as organizing market missions to facilitate meetings between exporters and prospective buyers from abroad, assisting exporters in upgrading their marketing skills, and providing technical advice on products
- Locating appropriate markets for them businessmen and exporters and providing those who are travelling overseas from Ghana with relevant information and knowledge about target markets
- Submitting recommendations to the Ghanaian government for necessary assistance and incentives required by Ghanaian exporters<sup>72</sup>

## **Ghana Free Zones Board (GFZB)**

The Ghana Free Zones Board (GFZB) was established in 1995 by Ghana's Parliament under The Free Zone Act, 1995 (Act 504). The GFZB's aim is to promote processing and manufacturing of goods through the establishment of Export Processing Zones (EPZs), and, encourage the development of commercial and service activities at sea- and air-port areas. <sup>73</sup> The GFZB considers ICT as one of the eleven priority sectors for Foreign Direct Investment.<sup>74</sup> The GFZB is in the process of setting up an ICT Cyber Village, among other projects, in the Ashanti Technology Park located at Ejisu in the Ashanti Region of Ghana.<sup>75</sup> Currently, there are at least 11 ICT-related companies working in Free Zones in Ghana.<sup>76</sup>

Key functions of the GFZB include:

- Providing information on investment opportunities in the free zone
- Issuing licenses to approved free zone enterprises
- Assisting in securing other permits from related agencies
- Providing ready facilities i.e. serviced land and utilities at the Export Processing Zones
- Obtaining work/residence permits for expatriates in the free zone
- Providing any other services requested by investors<sup>77</sup>

## National Board for Small Scale Industries (NBSSI)

The NBSSI is the apex governmental body for the promotion and development of the Micro and Small Enterprises (MSE) sector in Ghana and was established in 1985 by an Act of the Parliament. The government viewed the sector as having the potential to contribute substantially to reducing unemployment and generating economic growth in Ghana. MSEs account for a significant share of economic activity in Ghana. The NBSSI undertakes financial and nonfinancial based consulting activities for MSE. The Financial services aim to improve NBSSI clients' banking culture, accounting practices and extend credit through its loan schemes to entrepreneurs for both working capital and the acquisition of fixed assets.<sup>78</sup>

## **Private Sector Development Board**

The Private Sector Development Board and a Secretariat were established in 2011 to aid in the implementation of the Private Sector Development Strategy Phase II (PSDSII) with the aim of developing a competitive private sector that will lead to job creation.

Key targets of PSDP are:

- 500,000 new jobs should be created in the formal sector by the year 2015
- Ghana should rank among the top 43 countries in the Global competitiveness index
- Ghana should rank among the top 51 countries in the World in Ease of Doing Business
- Gross capital formation through private sector investment should contribute 40% of GDP<sup>79</sup>

Key projects in 2011

The Ministry has played a pivotal role in the development of policy for the development of trade, development of infrastructure and training. Key progress made in policy areas:

• Launched the Industrial Policy and Industrial Sector Support program

Key progress made in the capacity building:

- National Traceability Program Training of 12 IT experts who will act as trainers in 40 export companies for the application of traceability software
- Launched Rural Enterprise Project for development of rural technology facilities for training small enterprises in business management and marketing skills

Key progress made in development of **IT sector**:

• Completed the joint planning and designing of ICT Park with the Ministry of Communications (MOC)

#### Key projects in 2012

The Ministry has planned to play a more effective role in developing the ICT infrastructure and increasing access and use of ICT in the country. The key projects proposed are:

- Implementation of Industrial Sector Support Program (ISSP) to help the manufacturing sector to become competitive, build efficient supply chains and increase the use of subcontracting partnerships
- Continued expansion of the Rural Enterprise Project
- Launch of Micro, Small and Medium Enterprises (MSME) Project for providing grants to MSME to help such businesses.
- Establishment of additional rural technology facilities to assist in development of MSMEs

## **Ghana Industrial Policy**

Ghana's Industrial Policy is designed to promote increased competitiveness and enhanced industrial production, with increased employment and prosperity for all Ghanaians. It will also provide a broader range of fair-priced, better quality products for the domestic and international markets.

The key objectives of the Industrial Policy are as follows:

- To expand productive employment in the manufacturing sector
- To expand technological capacity in the manufacturing sector
- To promote agro-based industrial development
- To promote spatial distribution of industries in order to achieve reduction in poverty and income inequalities<sup>80</sup>

#### Industrial Sector Support Program

Industrial Sector Support Program 2011-2015 is the mechanism through which the Industrial Policy is proposed to be implemented. The key objectives of the Industrial Policy are as follows:

- To create a modern productive economy, with high levels of value-addition
- To expand productive employment in the manufacturing sector
- To expand technological capacity in the manufacturing sector
- To transform agriculture through agro-based industrial development
- To provide consumers with fairly-priced, better quality products and services, competitive in both the domestic and international markets
- To promote spatial distribution of industrial development in order to achieve reduction in poverty and income inequalities<sup>81</sup>

#### Projects with emphasis on IT adoption by industry

In the Industrial Sector Support Program, the Ministry has included projects which are directly relevant for the ICT sector in an effort to increase the use of ICT by firms in Ghana but also to improve the Intellectual Property Rights regime in Ghana. Information on the projects is given below:

#### Promotion of ICT for industrial development

Key objective of the project is to enhance the adoption and effective use of ICT in the manufacturing sector to drive competitiveness, to develop globally competitive ICT-related manufacturing industries and to attract investment into ICT equipment manufacturing. Key activities of the project are:

- Increased use of ICT in the manufacturing sector in collaborate with Ministry of Communication & ICT industry
- Strengthening of educational and training institutions strengthened to develop the requisite skills to support the application of ICT in manufacturing
- Increased investments in ICT infrastructure
- Increased investments in ICT equipment manufacturing and ICT-enabled services sector by working in in collaboration with Ghana Investment Promotion Centre for investment promotion and the Ministry of Communication for policy measures<sup>82</sup>

#### Intellectual Property Rights for Industrial Development

A key objective of the project is to establish adequate and appropriate legal forms of intellectual property rights and effective rules to protect intellectual property rights and to stimulate innovation and technology development in Ghana. Key activities of the project are:

- Establishment of effective rules to protect intellectual property rights
- Development of coordination mechanism to ensure effective administration of intellectual property rights in coordination with Ministry of Justice and Attorney General's Department, the Registrar-General's Department and the Copyright Office
- Increasing awareness of intellectual property rights<sup>83</sup>

## Ministry of Environment, Science and Technology

Ministry of Environment, Science and Technology (MEST) is the main entity with the role of supporting the country's socio-economic development using research, science, technology, institutional strengthening and capacity building while ensuring that such development is environmentally sustainable. The Ministry plans to continue implementation of projects and programs that focus on biodiversity, reduction of the impact of climate variability and change, application of science and technology, enhancing environmental quality and ensuring proper spatial organization for sustainable development as outlined in their Medium Term Development Plan. The Ministry has a budget outlay of \$ 61 million, accounting to 0.91 % of the total Government budget.

Key implementing agencies of the Ministry are Centre for Scientific and Industrial Research, Town and Country Planning Department and Science, Technology and Innovation Fund.

## **Council for Scientific and Industrial Research**

The aim of the Council for Scientific and Industrial Research (CSIR) is to generate and apply innovative technologies to efficiently exploit science and technology to aid in the development of agriculture, industry, health and environment. The technologies developed by the Council for Scientific and Industrial Research will be commercialized for private sector development in both Ghana and abroad.<sup>84</sup>

Relevant Key activities of CSIR:

- Conduct policy related projects such as a survey on the use of mobile telephones for micro and small business development<sup>85</sup>
- Conduct policy research in various areas including Technology Assessments and Science and Technology Policy Management Studies<sup>86</sup>

## **Town and Country Planning Department**

It was established in 1945 with the responsibility of planning and managing the growth and development of cities, towns and villages in the country. It aims to promote development based on principles of efficiency, orderliness, safety and healthy growth of communities.<sup>87</sup>

## Science, Technology and Innovation Fund

To be established in 2012 as a result of the passage of the Science Technology and Innovation Policy, to address the perennial problem of inadequate funding for research and development in the long run. The private sector has been asked to contribute to the fund.<sup>88</sup>

The specific objectives of the National Science, Technology and Innovation Policy are among others to:

- Enhance scientific and technological capabilities and infrastructure
- Provide the inter-institutional framework for development of Science, Technology and Innovation in all sectors of the economy<sup>89</sup>

#### Key Projects in 2011

- Approved Science, Technology and Innovation (STI) Policy Implementation Plan & the Development Plan for the Implementation
- Commencement of the Ghana Skills and Technology Development Project (GSTDP) to equip the youth with skills and where possible to provide them with start-up capital to generate self-employment
- Better Ghana ICT Project distributed 3,000 laptops to various educational institutions throughout the country and organized a Science congress
- Mathematics, Science and Technology Education Scholarship Scheme To address fall in Mathematics, Science and Technology Education. 5000 students benefitting

#### Key Projects in 2012

- Establishment of Science Technology and Innovation Fund
- Initiation of the National Science and Technology Theme Park Project distribute additional 6,000 laptops for distribution and training of youth in assembling and repairs of ICT equipment, in order promote skills and knowledge in Information Communication Technology (ICT)
- Mathematics, Science and Technology Education Scholarship Scheme to sponsor 2000 more students
- Geographic Information Systems Training for Town & County Planning Department Staff - 100 staff members to be trained

## Ministry of Youth & Sports

The Ministry of Youth and Sports has been charged with the task to develop the productive capacity of the youth and integrate them in national development while inculcating in them the nation's values and aspirations. The Ministry also uses sports for building national cohesion and expressing national pride and promoting healthy living. The Ministry aims to strengthen supervisory, monitoring and evaluation roles to ensure effective implementation of its planned activities. The Ministry has a budget outlay of \$27 million, accounting to 0.4% of the total Government budget.

Some of the relevant implementing agencies of the Ministry are the National Youth Authority and the National Youth Employment Program.

#### **National Youth Authority**

The National Youth Authority was established in 1974 by the passage of the National Youth Council Act, 1974 (NRCD 241). The key activities of the National Youth Authority are to:

- Build a database by registering youth groups and associations throughout the country for effective youth development
- Provide skill training to out-of-school youth through Youth Leadership and Skill Training Institutes
- Organize programs on career, health, civic responsibilities, morality and governance
- Provide opportunities for the youth to build their own businesses
- Run a distance education with the University of Ghana in Youth Development Work<sup>90</sup>

## National Youth Employment Program

The National Youth Employment Program was designed to tackle youth unemployment in the country. Its goal is to empower the young people by supporting the youth to transit from unemployment to employment or to assist school dropouts to continue their education.

The program provides training in Youth in Security Services (via Community Protection Unit, Youth in Fire Prevention, Youth in Immigration), Agri-Business, Health Extension, Waste and Sanitation, Paid Internship, Community Teaching Assistants, Trades and Vocation, Eco-Brigade, and Information Communication Technology.<sup>91</sup>

## Key Projects in 2011

- The National Youth Authority's 11 Youth Leadership and Skills Training Institutes provided training to over 2,250 deprived and disadvantaged youth. Of these 11 Youth Leadership and Skills Training Institutes, 10 benefitted from the School Connectivity Project sponsored by the Ghana Investment Fund for Electronic Communication (GIFEC).
- The Trade and Vocation Module of the National Youth Employment Program was expanded to include self-employment modules for various vocations including ICT and Mobile Phone Repairs. Beneficiaries were trained and operate on their own and are not on the program payroll.
- 55 persons were trained for the Business Process Outsourcing industry under the National Youth Employment Program.

## Ministry of Employment & Social Welfare

The Ministry of Employment and Social Welfare is mandated with the task to aid in the development of Ghana through skill development of the people, effective labor administration and promotion of peaceful labor relations through integration of the vulnerable into the development of the country. The Ministry has a budget outlay of almost \$19 million, accounting to 0.28% of the total Government budget.

Some of the relevant implementing agencies of the Ministry are National Vocational Training Institute and the Opportunities Industrialization Center.

#### **National Vocational Training Institute**

The National Vocational Training Institute was established in 1970 by the Legislature through Act No. 351. Its mission is to provide demand-driven employable skills and enhance the income generating capacities of people, especially basic and secondary school leavers, through Competency-Based Apprenticeship, Master Craftsmanship, Testing and Career Development. It also provides vocational guidance and career development and develops training standards and certification policies while studying the country's manpower requirements at the worker level.<sup>92</sup> They provide basic training in management skills and ICT in their bookkeeping course. <sup>93</sup>

#### **Opportunities Industrialization Centre**

The Opportunities Industrialization Centre (OIC) was originally established in 1970 as a Non-Governmental Organization by individuals who were concerned about the unemployment problem in their country. Its operations were fully funded by the United States Agency for International Development (USAID) till 1980. After the end of USAID sponsorship ended, the Government of Ghana took over the entity and it is now under the Ministry of Employment and Social Welfare. It offers computer skills training at all three of its centers. Its goal is to reduce unemployment and poverty among the youth in Ghana by:

- Providing vocational, technical and business skills training, on the job training, counseling and follow-up services to junior and senior high schools dropouts and graduates
- Providing business advisory services to OIC graduates who are selfemployed<sup>94</sup>

#### Key Projects in 2011

• Both the Opportunities Industrialization Center and the National Vocational Training Institute along with the Management Development and Productivity Institute trained over 11,000 individuals. The Management Development and Productivity Institute was not included in the relevant entities above as in 2012 it was to focus on training individuals for the oil and gas sector.

#### Key Projects in 2012

- National Vocational Training Institute and Opportunities Industrialization Center will be provided with modern equipment to implement Skill Development Programs for training over 18,000 individuals.
- National Vocational Training Institute, Opportunities Industrialization Center and Management Development and Productivity Institute in collaboration with the Ghana Statistical Service and the International Labor Organization will jointly conduct a national labor demand survey. A Labor Market Information System will be established to provide information on labor demand and supply data on all segments of the economy.

## **Ministry of Local Government & Rural Development**

The objective of the Ministry of Local Government and Rural Development is to increase the participation of Ghanaians in governance, increase openness and transparency in governance and deepen the decentralization program. The Ministry has a budget outlay of almost \$ 111 million, accounting to 1.65 % of the total Government budget.

#### Local Enterprise Skills and Development Program

The Local Enterprise Skills and Development Program, supported by the Ministry of Local Government and Rural Development, is a private venture. It registers people for free and after completion of training allows the individual to take away any piece of equipment of their choice to start a business. Relevant training programs include programs for Information Technology and mobile/laptop repair.<sup>95</sup>

In Information Technology, individuals are given training in basic computing and then specialized training in areas of hardware, software, web design, coral draw, networking and computer repairs. After the specialized training, they get a general orientation in business management, record keeping, entrepreneurship, and customer, banking and finance. After completion of training, the beneficiaries are provided with computers, scanners, printers, binding and lamination machines.<sup>96</sup>

In mobile/laptop repair, individuals are given training in trouble-shooting, flashing, unlocking, decoding, changing of assembling components etc. with a general orientation in business management, record keeping, entrepreneurship, and customer, banking and finance. After completion of training, the beneficiaries are provided with a customized LESDEP training kit and mobile canopy-like shops.<sup>97</sup> The Ministry plans to continue supporting the program through 2012.

## **Ministry of Energy**

The Ministry of Energy is responsible for providing a safe and reliable energy in an efficient, competitive and environmentally sustainable manner. The Ministry formulates, monitors and evaluates policies, programs and projects to ensure it fulfils its responsibilities. The Ministry has a budget outlay of almost \$328 million, accounting to 4.86% of the total government budget.

#### **National Energy Data Processing & Information Centre**

This centre is being established in collaboration with the Kwame Nkrumah University of Science and Technology in Ghana.<sup>98</sup> The database system, which will form the basis for the centre's operations, was completed in 2011. The National Energy Data Processing & Information Centre is currently being operationalized and it appears its role will be to use ICT in order to help improve the efficiency and decision making ability of the Ministry of Energy.

## **Office of Government Machinery**

A number of agencies come under the ambit of the Office of Government Machinery, each of them dealing with a very different field. The Office of Government Machinery is part of the Executive Branch of the government.

## **Ghana Investment Promotion Centre**

The Ghana Investment Promotion Centre was established under the Ghana Investment Promotion Centre Act, 1994 (Act 478) to promote and facilitate investments in all sectors of the economy except mining and petroleum. The Centre encourages investment in a number of fields including ICT. It is mandated to facilitate both domestic and foreign investment in all sectors of the economy. In order to do this, the Centre carries out a number of tasks:

- It collects, analyzes and disseminates information about investment opportunities, sources of investment capital and advises on the availability, choice or suitability of partners in joint-venture projects
- It keeps records on all enterprises which are registered with it, including any tech-transfer agreements related to investments made through it
- It identifies specific projects and invites interested investors for participation in those projects
- It holds exhibitions, conferences and seminars for the stimulation of investments and provides information on incentives available to investors
- It acts as a liaison between investors and government entities and institutional lenders
- It provides support services such as assistance with permits required for the establishment and operation of enterprises
- It evaluates the impact of the Centre on investments in the country and recommends changes<sup>99</sup>

# **Donor sector - Findings**

The amount of foreign aid to Ghana has been on an increasing trend. While many of the donors are focusing on developing basic infrastructure and healthcare facilities in Ghana few of the donors including World Bank and UNDP have been focusing on ICT sector.

## World Bank

World Bank has been the pioneer in development of ICT sector in Ghana. Starting from the eGhana project in 2006 the World Bank has been supporting the Government of Ghana in the development of its ICT sector. World Bank currently has three projects operations directly related to ICT sector in Ghana – the eGhana project, the eGhana additional and the Ghana Skill and Technology Development project.

#### eGhana project

The core objectives of the project is to assist Ghana to generate growth and employment by leveraging ICT and public-private partnerships to i) develop the IT Enabled Services industry, and ii) contribute to improved efficiency and transparency of selected government functions through e-government applications. The project was initiated in 2006 with a funding of \$40 million, being implemented by Ministry of Communications and Ministry of Finance and Economic Planning. Though the initial project was to be completed by March 2012, the project deadline has been extended till June 2014. The project has four key components: developing enabling environment, support to ITES and ICT SMEs, e-Government and development of Ghana Integrated Financial Management Information System (GIFMIS). Significant progress has been made in each of the key areas.

Key developments in the IT Enabled Services Industry include:

- Establishment of a 300 seat call center by TeleTech, with 2 additional international companies (Aegis and Tech Mahindra) at very advanced stages of contract discussions
- Increase in the number of jobs from 2200 to about 7000
- Completion of standards, curriculum and training materials for BPO agents and training institutions which will be used for the training of the first 500 agents anticipated to commence in May, 2012
- Increased outreach Ghana Association of Software and IT Services Companies (GASSCOM), has resulted in registration of over 40 ICT SMEs in the IT Association, up from 5 in 2006
- Increased competitiveness by reduction in broadband price from \$5,000/mbps/month five years back to \$1000/mbps/month currently as well as with increased redundancy with multiple submarine cables

Key developments in the e-Governance project include:

- Launch of online the applications for the Registrar General's Department in December 2011
- Launch of Tax payer registration module of TRIPS in 10 of the 11 pilot offices
- Development of interim Data Center and disaster recovery sites, and ongoing testing of selected e-services
- Training of about 2,412 of Ghana Revenue Authority staff on computer literacy and office applications, and training of about 500 staff on TRIPS/GeReg Applications/ISO27001
- In addition, preliminary work of 4 additional e-govt applications (e-justice, eparliament, e-procurement, e-immigration) is underway

Key developments in the GFMIS project include:

- Installation of the technology infrastructure for implementation of the GIFMIS including the servers/ work stations/WAN/LAN systems, upgradation of the application software
- Commencement of implementation actions related to General Ledger and 'Procure to Pay' core modules that are to be rolled out to all MDAs in Accra by July 2012
- In addition, design of systems interfaces between the GIFMIS Cash Management Module and the Bank of Ghana using SWIFT and automated bank reconciliation is being carried out

Significant progress has also been registered on e-Governance and GIFMIS subcomponents. However, some delays have been observed in project implementation and the project has been extended till 2014 and additional funding has been approved through eGhana additional project.

## eGhana Additional Project

In order to enhance the development of e-Government projects and further rollout of GFMIS, World Bank approved an additional funding of \$44.7 million in 2010. The proposed additional funds would be used to meet the financing gap under the original eGhana project components and scale up project activities to include a GIFMIS component. The objective of the additional financing is to enhance development impact of the project and to improve accountability and transparency of government financial operations using ICT-based tools.

## Ghana Skill and Technology Development project:

The core objective of the project is to improve demand-driven skills development and increase adoption of new technologies in selected economic sectors. The project has been initiated in 2011 with a funding of \$ 70 million and is anticipated to finish by Jun 2016. The core components of the project are institutional strengthening of skill development, institutional strengthening of science and technology development and financing of skills and technology development programs through the Skills Development Fund (SDF).

As a part of institutional strengthening of skills development the project proposes:

 Development of Council for Technical and Vocational Education and Training (COTVET) technical capacity, strategic systems, and policies • Support to TVET providers to improve accountability and institutional effectiveness of formal public and private non-profit TVETs

As a part of institutional strengthening of science and technology development the project proposes:

- Strengthening national STI planning, management, and coordination (Develop the technical capacity of the STI staff, coordinate implementation of the national STI policy with other government agencies and the private sector, and monitor STI programs and policies, develop information systems and data gathering mechanisms that can be used to provide policy makers with up to date information on the financing, performance, and impact of technology providers and the wider STI system)
- Strengthening capacities of science and technology providers (improve the capacities and incentives of selected research institutes, universities, and technology providers to develop, adapt and diffuse technologies to private sector enterprises on a demand-driven basis)

As a part of financing of skills and technology development programs through the SDF, the project proposes to support:

- Upgrading the skills of employees for productivity improvement and to enable employees to adopt emerging new technologies
- Supporting industrial attachment for students in training and apprenticeships
- Enabling current employees to acquire higher technical and vocational skills, qualifications and incomes
- Introduction of new technologies or innovations at firms (Research and Development, consulting services, equipment); and
- Transfer of off-the shelf technologies

The SDF already established by COTVET focuses on formal sector, informal sector, training innovations and science and technology. The SDF will also work towards development of institutional partnerships.<sup>100</sup>

## UNDP

UNDP has been a key player in the development of ICT sector in Ghana with an overarching goal of poverty reduction and achievement of the MDGs, democratic governance, crisis prevention and recovery, sustainable environment (energy and environment) and HIV/AIDS. UNDP Ghana has been actively working with Government of Ghana to use ICT for development. UNDP partnered with Ministry of Communications, Ghana Multimedia Incubator Centre, District Assemblies, the Head of the Civil Service, Ghana Investment Fund for Telecommunications, Ghana Information Communication Technology Directorate for the 'ICT for Accelerated development' project. The project is implemented during 2006-2011 with financing from Government of Ghana, Microsoft and UNDP. Some of the key focus areas of the project include providing support to ICT policy implementation of e-governance activities, bridging the digital divide and building a knowledge based society and using ICT as an enabler of economic growth and employment.

Key activities conducted as a part of the project include:

- Supporting the e-governance: improving the e-government system for ministries, department and agencies (MDAs) standardization and harmonization of public sector electronic networks; messaging and collaboration system; developing ICT skills of government officials; and information coordination between the government and the private sector.
- Bridging the digital divide and building a knowledge based society: support and establishment of Community Information Centers (CIC's) nationwide. The CIC's are equipped with internet connectivity to serve as hubs for respective districts.
- Economic development: development of BPOs and providing resources and support for business incubation.

The project has been completed and the final evaluation/results are yet to be published. <sup>101</sup>

## DANIDA

Government of Denmark through its aid agency DANIDA, has been assisting Government of Ghana in public financial management, health sector reforms, local service delivery and private sector development programs. Support through the private sector development program includes two key components: developing business enterprise and supporting enterprise growth and job creation. Key targets planned as a part of developing the business climate include:

- Rank among top 43 countries in GCI of World Economic Forum by 2014
- Rank among top 51 counties in World Bank Ease of Doing Business reports by 2015
- To increase gross capital formation through private investment as % of GDP to 40 %
- To increase credit to the private sector as % of GDP to 35 %
- Trade in Goods and Services as proportion of GDP to 95 %

Though the projects have no direct funding to the ICT sector, the activities will help in developing an enabling business environment in the country and in turn aid the development of the ICT sector.<sup>102</sup>

## **Development assistance from China**

China has been proving support to Ghana in the form of loans, grants and technical assistance for development of infrastructure in a variety of sectors. In 2006, Chinese government provided a concessional loan of \$ 30 million to Government of Ghana to fund the first phase of the National Communications Backbone Network project. The project is being implemented by Ministry of Communications and aims to link up all 10 regional capitals and 36 towns with internet connectivity. Further to this in 2007, China provided a second loan of \$ 30

million to undertake the first phase of Dedicated Communications Project for security agencies. This project's aim is to develop ICT facilities for the various security agencies in Ghana including immigration, prisons, fire service, customs, armed forces, police service and also the Ministry of Defence and National Security.<sup>103</sup>

# **Education Sector**

## Introduction

The Ministry of Education in Ghana is committed to accomplishing goals of universal access to primary education, along with building skilled human capital for a thriving economy in the coming decades of progress. "Ghana has since 1951, and especially after independence in 1957, made significant strides in the education system" [32].

One of the pioneering strides was Free Compulsory Universal Basic Education Programme. The "MoE launched FCUBE in September 1995 with the goal of improving access to quality basic education over the 10 years to 2005. Its four broad strategic objectives were to:

- improve the quality of teaching and learning
- improve management for efficiency within the education sectors
- improve access and participation
- decentralise the education management system" [33]

The MoE made significant progress on the targets for FCUBE over this decade, but was still not able to come in near sight of the targets it set out in 1995.

Today, there are 18,579 primary schools, 10,768 Junior High Schools and 697 Senior High Schools in the country. A large majority of these schools are public, but the growth rate in private schools since 2008 has been significantly higher than private schools. [11]

Apart from significant efforts in basic education, the MoE has placed an increasingly large thrust on pre-tertiary and tertiary education, and this is evident from the growth of the number of technical institutions and vocational training institutes in the formal and informal sectors. As reported in 2007-08, the government is spending 23% of its education spending; only second to primary education's 35%, on tertiary education leading to almost 94,000 enrollments is universities [11].

Since early in the 2000s, Ghana has introduced and consequently increasingly focused energy on ICT in education at all levels. As stated in the ICT in Education Policy 2006 draft, the new policy aims to transform Ghana "into an information rich knowledge based and technology driven high income economy and society" [11].

Irrespective of a focus on teaching ICT as a skillset in the ICT sector of the country, there is a growing realization that education is going to fundamental building block to the country's blooming ICT sector. Sub-sectors like BPOs and ITES are going to be fueled by strong motivated English-speaking technical talent, and it is going to

be the role of educational institutions in the country to build a large pool of skilled leaders who serve into these sectors to grow at a rapid pace [34].

#### Methodology adopted

In order to understand the past policies and implementation progress, current programs and goals, and future plans for the education sector, we primarily resorted to learning from reporting in Ghana by the Ministry of Education and external agencies. As much as possible, we avoided using information from unreliable secondary sources which we could not verify. The reason for the same is that while there may be added value from insights reported in non-authentic sources, not being on the ground to be able to validate ground realities and assumptions opens up possibilities for false factual reporting and causation findings.

We primarily reviewed much of the important literature on the MoE's website from the past decade, and sometimes pertaining to years ahead, to gain an understanding of strategic goals, outcomes and challenges. Such reports included past review reports, recommendations, statistical reporting on state-of-affairs in educational programs, strategic planning reports, and some qualitative analysis. Apart from these reports, we also reviewed literature by international development agencies such as the UNICEF and journals such as the Pan African Report to gain perspective on outside reporting. We found out that in several cases the MoE's reporting on challenges and accomplishments was reasonably accurate and honest. Thus, these are also some of the popular primary sources to reporting by external agencies.

To gain a clearer understanding of the country's ICT strategies in education, we explored the policy documents by the MoE, along with informal reporting from specific projects outlined in past progress reports. Occasionally, we also compared this with what the public facing websites of several government departments or local popular press websites stated about the same policies, to understand if these policies evolved or were reported to public differently.

Lastly, to report on the roles and activities of various MoE agencies, we used search engines to find the current websites of each of these agencies, and used information on these websites to gather information on their goals and work. For several of the newer agencies introduced in the 2007 policy, official websites did not exist, and we had to rely either on policy reports or third-party websites to extract relevant information. There were several agencies that did not have accurately reported goals and activities that were easily discoverable through search.

#### **Ministry of Education**

As a part of our process to map and determine the various activities in the public education sector in Ghana, we developed a comprehensive and consolidated yet concise list of the activities of the various agencies/departments under the Ministry of Education. The role and activities of each the agencies identified are discussed below:

#### Ghana Education Service (GES)

Established in 1974, the GES is mandated "to coordinate national education policy on pre-tertiary education". The GES was endorsed by the 1992 Constitution of Ghana in the Article 190 and "then subsequently in the Ghana Education Service Act 506, 1995". The mission of the GES is "to ensure that all Ghanaian children of school- going age irrespective of tribe, gender, disability, religious and political affiliations have access and are provided with quality formal education and training." [13]

The goals of the GES include:

- Expanding access to education at all level of education
- Providing and improving infrastructural facilities
- Raising the quality of teaching and learning for effective outcomes
- Making education more relevant to national goals and aspiration by focusing on vocational and technical education
- Making tertiary education more cost effective

Departments (Divisions):

- Basic Education
- Secondary Education
- Science Resource Centers (SRC) in schools
- Computerized School Selection and Placement Systems (CSSPS)
- Technical and Vocational Education
- Teacher Education
- Special Education
- Human Resources
- Supply and Logistics
- Curriculum Research and Development Division (CRDD)
- Finance and Administration
- Inspectorate Directorate

#### Ghana Library Board

The Ghana Library Board was established as a result of a donation of 1,000 British pounds in 1946. It aims to "promote education through the provision of reading materials such as books, periodicals and other non-book materials" and "act as a center for information dissemination for the general Public". Additionally, it aims to:

- "Provide facilities for study and research;
- Encourage and promote the reading habit from the pre-school level to adulthood;

- Collect, store and preserve our national heritage for research purposes;
- Alleviate poverty through the provision of information, using all forms of medium;
- Provide facilities and equipment to promote world wide access to information;
- Encourage reading in relation to people's job and occupations;
- Assist in the campaign for the eradication of illiteracy." [14]

#### **Council for Technical Vocational Education and Training (COTVET)**

The "Council for Technical and Vocational Education and Training (COTVET) is a national body set up by an Act of Parliament of the Republic of Ghana to coordinate and oversee all aspects of technical and vocational education and training in the country." Its "major objective is to formulate policies for skills development across the broad spectrum of pre-tertiary and tertiary education, formal, informal and non-formal sectors. "

Other, specific functions of the COTVET are to:

- "Coordinate, harmonize and supervise the activities of private and public providers of technical and vocational education and training, including the informal sector
- Rationalize the assessment and certification system in technical and vocational education and training
- Take measures to ensure quality in delivery of and equity in access to technical and vocational education and training
- Maintain a national database on technical, vocational education and training
- Facilitate research and development in the technical and vocational education and training system;
- Source funding to support technical and vocational education and training activities
- Facilitate collaboration between training providers and industry to promote (i) demand driven curriculum development and placement, and (ii) national internship programmes
- Promote co-operation with international agencies and development partners;
- Issue annual reports on the state of skills development in the country;
- Advise Government on all matters related to the management and improvement of the technical and vocational education and training system" [15]

The COTVET consists of the following divisions:

- Human Resource Development
- Finance and Administration
- Testing and Certification
- Accreditation Advisory
- Planning, Research, Monitoring and Evaluation
- Informal Sector affairs

- TVET for Persons with Disabilities
- Women in TVET

#### **Non- Formal Education Division**

"The provision of non-formal education in Ghana has been the responsibility of the Non-Formal Education Division (NFED) of the Ministry of Education (MOE). The NFED was established in 1991 with the task of eradicating illiteracy in Ghana by the year 2015."

The role of the NFED has been to provide access to educational opportunities for those children who are not currently enrolled in schools. [16]

"The main objective of the NFED is to 'make the poorest Ghanaians especially those living in the rural communities functionally literate with emphasis on women'

"The Non-Formal Education Division (NFED) is the main implementing organisation responsible for policy formulation, programme coordination, programme design and development, materials design and production, radio programme development and general supervision of programme implementation, evaluation and monitoring of the National Functional Literacy Programme (NFLP)."

**NFLP**: "...A government policy that seeks to address inequalities by improving the ability of the large rural poor to improve their standards of living and their capabilities to raise income by equipping them with functional literacy skills." [17]

#### **National Service Secretariat**

"The Ghana National Service Scheme was established in 1973 by a Military Decree (N. R. C. D 208) with the mandate to mobilize and deploy Ghanaian citizens of 18 years and above especially newly qualified University graduates on national priority development programmes that contribute to improving the quality of life of the ordinary Ghanaian for a one year mandatory national service."

Its core objectives include:

- "Encourage the spirit of national service among all segments of Ghanaian society in the effort of nation -building through active participation.
- Undertake projects designed to combat hunger, illiteracy, disease and unemployment in Ghana.
- Help provide essential services and amenities, particularly in towns and villages of the rural areas of Ghana.
- Develop skilled manpower through practical training.
- Promote national unity and strengthen the bonds of common citizenship among Ghanaians." [18]

#### West African Examinations Council (WAEC - NATIONAL)

The West African Examinations Council was established in Ghana (along with Nigeria, Sierra Leone and Gambia) in 1952. Its objectives are to:

- To conduct examinations in the public interest
- To award certificates, provided that the certificates did not represent lower standards of attainment than equivalent certificates of examining authorities in the United Kingdom.

"In Ghana, the West African Examination Council conducts the terminal examinations for all pupils and students at the pre-tertiary levels of education. The examinations of the Council also serve as selection tests for progression from one level to the other in the country's educational structure up to the tertiary level where the results of the Council's examinations are used for direct entry into all tertiary Institutions in Ghana." [19]

It is responsible to conduct the following examinations:

- 1. Major Examinations
  - West African Senior School Certificate Examinations (WASSCE)
  - Basic Education Certificate Examination (BECE)
  - Business Certificate Examinations (Advanced and Basic)
- 2. Aptitude tests
- 3. Miscellaneous Examinations

#### Secretary General, Ghana National Commission for UNESCO

Ghana joined UNESCO in 1958. Two major UNESCO programs that Ghana is a part of are:

- Teacher Training Initiative for Sub-Saharan Africa (TTISSA)
- EDUCAIDS, for HIV/AIDS prevention education

The program areas that are the major focus for UNESCO in Ghana are:

- Education
  - Associated Schools Project network (ASPnet)
- Natural Sciences
  - Agenda items about climate change
- Social and Human Sciences
- Culture
  - Research project with focus on community history of Osu
- Communication and Information [20]

#### National Council for Tertiary Education

The NCTE was created as a result of the Constitution of Ghana mandate in 1992 to "lead tertiary education to new heights". "The National Council for Tertiary Education is devoted to providing leadership in the direction, functions, role and relevance of tertiary education in Ghana. To this end the NCTE will:

• Deliver objective and carefully considered advice to Government, which will contribute to the creation of conditions and structures that will support the

establishment of a vibrant and dynamic sub-sector.

- Be guided by the needs and priorities of tertiary education institutions which it serves, providing them with reliable information, appropriately targeted resource support and exposing them to global best practices.
- Ensure that tertiary education assumes its rightful role as a catalyst and resource base for national growth and prosperity.
- Provide guidance and advice to drive the development of world-class skills and standards in teaching, research and administration.
- Mediate a strategic balance between the differing priorities of our stakeholders (Government, tertiary institutions, teachers, students, civil society, and industry/business)." [21]

## National Accreditations Board (NAB)

"The National Accreditation Board was established by the Government of Ghana in 1993" to ensure high standards in tertiary education.

"The Board is mandated to:

- Accredit both public and private (tertiary) institutions with regard to the contents and standards of their programmes.
- Determine, in consultation with the appropriate institution or body, the programme and requirements for the proper operation of that institution and the maintenance of acceptable levels of academic or professional standards;
- Determine the equivalences of diplomas, certificates and other qualifications awarded by institutions in Ghana or elsewhere.
- Publish as it considers appropriate the list of accredited public and private institutions at the beginning of the calendar year.
- Advise the President on the grant of a Charter to a private tertiary institution.
- Perform any other functions determined by the Minister." [22]

## Ghana Book Development Council (GBDC)

The GBDC is an operational agency of the MoE that exists to "nurture and develop an indigenous and vibrant book industry that will provide the foundation for the creation of a functionally literate society". The functions of the Ghana Book Development Council include:

- "To act as a national agency for the coordination of all activities of groups and individuals connected with the Book Industry.
- To make recommendations for national book development policies.
- To ensure the establishment of suitable machinery for the promotion of reading habits among all age groups particularly among children.
- To ensure the development of the library system in the country by encouraging private interest in the establishment of library facilities in cooperation with the public system.
- To promote, assist and where necessary co-ordinate plans for concerted action on the training of personnel for the book profession and its allied areas.

• Generally, to undertake or promote such activities that will ensure the full development of the Book Industry." [23]

#### National Board for Professional and Technical Examinations (NABPTEX)

"The National Board for professional and Technician Examinations (NABPTEX) is one of three bodies with the mandate to regulate the tertiary education sector." It was established in 1994 by an act of the parliament.

"The objective of the Board is to formulate and administer schemes of examinations, evaluation, assessment certification and standards for skill competence and for non-university tertiary institutions, professional bodies and private institutions with accreditation by the National Accreditation Board."

It is mandated to perform the following functions:

- "To provide administrative and structural facilities and expertise for the organization and conduct professional and technician examinations.
- In consultation with the relevant polytechnics and professional institutions conduct examinations and award national certificates and diplomas based on the results of the examinations;
- At the request of government or any other body, conduct any examination
  - To review syllabuses for general curriculum enrichment
  - To appoint examiners and moderators and determine methods for the proper conduct of examinations;
  - To make regulations to govern its examinations and rewards;
  - To devise a scheme for testing skills for competence and for testing aptitude;
  - To provide such guidance and counseling services as would be needed by non-university tertiary institutions; and
  - To perform any other functions that are ancillary to the functions specified." [24]

## National Inspectorate Board (NIB)

"The National Inspectorate Board is a newly-established agency of the Ministry of Education mandated by Parliament under the 2008 Education Act (Act 778) to provide an independent external evaluation of the quality and standards in basic and second cycle educational institutions in the country, both public and private. The main objective of the Board is to provide a diagnosis of what a school must do to improve.

In order to carry out its functions, the Board intends to constitute inspection panels that will undertake supervision and inspection visits to the schools focusing on:

- The quality of leadership and management in the schools
- The quality of teaching and learning
- The standard of academic achievement
- The academic, physical, and recreation facilities available
- The system of internal and external examinations
- The values emphasized and taught, and

• The parental and community involvement in the schools" [25]

#### Encyclopaedia Africana

Started in 1961 by W.E.B. Du Bois upon the invitation of the President Nkrumah, Encyclopedia Africana was started to tell the story and culture of the black people in Africa. [26]

"The short-term mission of the Encyclopedia Africana project is:

- To strengthen the infra structural facilities and human resource capacities of the Encyclopaedia Africana Project Secretariat in Accra, Ghana, West Africa
- To generate and review researched biographical articles for the completion of the next two volumes of the Encyclopaedia Africana: Dictionary of African Biography®<sup>™</sup>. Countries to be covered - Nigeria and Egypt.
- To have accumulated articles on Libya, presently in Arabic, translated into English and organized for publication.
- To facilitate intellectual interaction and cooperation among literary scholars on African biographies and history.
- To initiate the translation of volumes 1, 2 & 3 of the Encyclopaedia Africana: Dictionary of African Biography®<sup>™</sup> into French and Arabic." [27]

#### Centre for Distance Learning and Open Schooling

"CENDLOS is a new agency created under the Ministry of Education by a Cabinet Memorandum. It has also absorbed the activities of the erstwhile President's Special Initiative on Distance Learning (PSI – DL)."

"The role of CENDLOS is to reinforce Open and Distance Learning (ODL) at the tertiary level and make it a reality at the pre-tertiary stage, including the formal and informal sectors. It is also charged to work toward regulating and harmonising ODL in Ghana." [28]

#### **Ghana Education Trust Fund**

"The Ghana Education Trust Fund (GETFund) was established by an Act of Parliament in 2000 (Act 581) with the object of providing finance to supplement the provision of Education at all levels by Government. The Fund began operations in the second half of 2001. "

The functions of the GETFund include:

- "Scaling up in enrolments at almost all cycles of the educational system;
- Escalating demands on Educational resources by users at all levels;
- Declining public sector spending on Education mainly on account of sluggish growth in the broader economy;
- Over-crowded and decrepit Educational infrastructure, including obsolete textbooks and equipment; and,
- Recurrent tensions between USERS and EDUCATION SERVICE providers, arising from persistent mismatch between sectoral resources on one hand,

and escalating costs of providing services and facilities on the other." [29]

#### Funds for Procurement and Management Unit (FPMU)

The FPMU replaced the initial standalone implementing agency Project Management Unit (PMU) in 1999. It is tasked with managing all the donor funded projects. The rationale for replacing PMU was that the new FPMU would lead to positive results through increased efficiency and leveraging of capacity. [30]

#### Students' Loan Trust

"The Students Loan Trust Fund (SLTF) was established in December 2005".

"The objectives of the Trust Fund are to provide financial resources for the sound management of the Trust for the benefit of students and to help promote and facilitate the national ideals enshrined in Article 28 and 38 of the 1992 Constitution.

For the purpose of achieving the objectives of the Trust Fund, monies from the Trust Fund shall be applied to the relevant activities that the Trustees of the Fund may determine, including, in particular

- The provision of facilities to enhance the tertiary education to support students.
- The provision of moneys to support any other activities and programmes for the promotion of relevant courses as determined by the Trustees, in consultation with the Minister." [31]

## Analysis of the sector

The Government of Ghana has repeatedly placed education as the cornerstone of the development story of the country. "Beginning with the Accelerated Development Plan for Education in 1951, access and participation increased at all levels rapidly until the economic decline of the late mid-1970s. The 1987 Educational reforms were initiated to revamp the educational system, which had suffered considerable deterioration following the Economic Recovery Programme that was launched in 1983 to arrest the economic decline." [1].

Overtime, the key focus of the government's education planning has shifted from merely ensuring access to primary, secondary and tertiary education to focus on various non-formal and vocational learning possibilities, along with an increased thrust on student performance. The Ministry of Education (MoE) has also created divisions to ensure wider arrays of educational opportunities, as in the case of the Center for Distance Learning and Open Schooling, while significantly tightening the management and structure around quality of learning and administration, for example the creation of the National Inspectorate Board.

The 1987 Educational reforms, in particular, "brought to the forefront many problems in the objectives, content, administration and the management of education" [2]. In 2002, the then President of Ghana K.A. Kufuor created a review committee to address some of the concerns of public education. The committee
came up with a number of recommendations (see Appendix A), highlighting the new Ghana Education Reforms that were eventually implemented in the latter half of 2007.

### **Budget allocation**

The Ministry of Education seeks to provide quality education to the people of Ghana so that they may contribute to the growth and development of Ghana. The Ministry intends to provide such infrastructure and human resource to support and improve the delivery of quality education to all Ghanaians. The Ministry has a budget outlay of \$1.43 billion, accounting to 21% of the total government budget.

Key Projects in 2011

• Internet facilities were provided to the 10 mobile library vans of the Ghana Library Board with assistance from the Ghana Investment Fund for Electronic Communication (GIFEC)

Key Projects in 2012

- About 160 educational lessons will be telecast nationwide. The Centre for National Distance Learning and Open Schooling will continue to train course developers in open distance learning material production
- Ghana Library Board will extend the program to 20 more communities to help provide access to un-served and underserved communities

### **ICT & Education**

It has been less than 15 years since the MoE decided to introduce ICTs into the educational sector, spanning from junior secondary schooling through tertiary education, primarily through the Ghana Education Service (GES) [3]. The 2003 ICT for Accelerated Development (ICT4AD) Policy identified the following strategy for ICT in education: "modernizing Ghana's educational system using ICTs to improve and expand access to education, training and research resources and facilities, as well as to improve the quality of education and training and make the educational system responsive to the needs and requirements of the economy and society with specific reference to the development of information and knowledge-based economy and society".

However, these initiatives by the MoE had a large number of implementation challenges, including:

- "Poor selection of schools without the involvement of GES / MOE resulting in duplication and hence some schools having several parallel initiatives while others (especially those in the remote rural towns) had none
- Lack of policy direction at all levels (schools, districts, national) for the integration of ICT in education;
- Heavy dependency on external funds, with most initiatives stopped after depletion of initial funding
- "Dumping" of obsolete and inappropriate equipment as "support" for the initiatives
- Low levels of ownership at the level of the schools, due to external

motivations, and low levels of understanding on the part of recipients about the potentials of ICTs in education

• Lack of trained ICT personnel (including teachers) far below the numbers demanded to support the initiatives with most capacity building efforts one-off with no continuous trainings planned for"

In 2008, the MoE released a report titled ICT in Education Policy to inform sector stakeholders as to why ICTs are an important part of (Ghana's) modern society and the role it plays in the education sector", along with a vision and mission around using ICTs to develop its human resources.

The goals of this policy, as adapted from the National ICT4D Policy document, included:

- "Facilitating the deployment, utilisation and exploitation within the educational system to improve on educational access and delivery to support teaching and learning from the primary level upwards
- 2. Modernise the educational system to improve the quality of education and training at all levels of the educational system and expanding access to education, training and research resources and facilities.
- 3. To orient all levels of the country's educational system to the teaching and learning of science and technology in order to accelerate the acculturation of science and technology in society and produce a critical mass of requites human resources and a well informed citizenry.
- 4. To achieve universal basic education and improve the level of basic and computer literacy in the country.
- 5. To ensure a population in which all citizens are at least functionally literate and productive.
- 6. To expand and increase access to secondary and tertiary education.
- 7. To strengthen science education at all levels and in all aspects of the educational system, especially at the basic and secondary levels."

But the MoE continues to face implementation difficulties in realizing these goals. "A recent study on [pedagogical] integration of ICTs from 2009 - 2011 in 10 Ghanaian schools indicates that there is gap between the policy directives and actual practices in schools. The emphasis of the official curricula is on the development of students' skills in operating ICTs but not necessarily using the technology as a means of learning subjects other than ICTs. The study also found that the MOE is currently at the stage of deployment of ICT resources for developing the needed ICT literacy required for integration into teaching/learning." [4]

To address some of these concerns, the ESP 2010-2020 has further proposed the following strategies to achieve an ICT policy with "an interlinked tripartite approach: ICT as a management tool within institutions at all levels, ICT skills development for all, ICT as a pedagogical tool":

1. "Modernise the educational system through ICTs to improve the quality of education and training at all levels thereby expanding access to education, training (in particular teacher professional development) and research resources and facilities.

- 2. Use ICTs to orient all levels of the country's educational system to the teaching and learning of all subjects, including science and technology.
- 3. Improve national competence in 21st-century ICT skills
- 4. Use ICTs to assist in ensuring that graduates from basic education are functionally literate and productive"

# Findings

Some of the largest challenges with ICT in education, as stated previously, continue to be related to implementation challenges. Such challenges are very thoroughly covered and documented across most reporting on the educational sector, and are accurately identified and explained. These should indeed be prioritized and emphasized to the nature they have been in these reports, specifically the E-Readiness report. And so, the findings presented below do not dwell into details of implementation challenges, but draw on our understanding of the national vision of innovation, literature review and comparative analysis with countries that we think bare similarities to Ghana in different ways.

# Measures for ICT in accomplishing national human capital readiness goals

Most of the metrics being used currently to capture the ICT readiness of the educational sector in the country are focused on connectivity, accessibility, usage and skill-sets. The problem with focusing on these metrics to accurately capture the ICT readiness of the sector is that its primary emphasis remains on aggregate measures of availability of computing infrastructure and competent ICT professionals to teach ICT as curricular subject. This is not a holistic measure because it does not capture, apart from other things,:

- The nature of demand and responsiveness from schools in implementing ICT
- The use of ICT as a dispensable tool, and not an end goal, in accomplishing and driving policy priorities of national growth through educational and other human capital interventions

For example, the E-Readiness report of 2009 states that the national average of student to computer ratio is 42:1, and highlights how significant a hindrance this is in achieving ICT readiness. This seems frightening, in an age where personal computing does indeed refer to 1:1 computer to human ratio. However, some of the factors a statistic such as student to computer ratio completely fails to capture are:

- The amount of time the students are required to spend using computers during school hours
- The % of students who have to share computers during shifts when students are required to use computers during class hours
- The intent of schools to co-invest and hold accountability for new computing infrastructure in schools
- The difference in improved computing and general analytical skill aggregate of schools with access to lower and higher student to computer ratios
- etc.

The goal here is not to create the perfect indicator or statistical measure - that is

very hard and expensive to create and capture, but to bring into consideration the fact that ICT measures cannot be thought of in isolation from core national goals of human capital development. In essence, ICT in education is a strategy, and it spans across several touch points, and thus requires capturing the net improvement of human capabilities in the context of ICT interventions. This will ensure recording and measuring the interlinked tripartite approach laid out in the ESP 2010-2020 report.

According to the Ministries 2006 report on ICT in Education Policy, the vision is "to enable graduates from Ghanaian educational institutions – formal and non-formal - to confidently and creatively use ICT tools and resources to develop requisite skills and knowledge needed to be active participants in the global knowledge economy by 2015." To complement this vision, a systemic thinking around ability of graduates to participate in the global knowledge economy needs to be established and prioritized in measuring ICT readiness.

### Focus on core competencies for ICT sector employability

If Ghana's near future plan is to strengthen its rising BPO and ITES industry, and not invest majority of its resources into building a technology economy, the focus of primary and secondary education schools must continue to be core subject competencies, with Mathematics and English held as top-most priority as opposed to ICT education.

ICT curricula is certainly an important component of junior secondary and senior secondary education, but may not be considered as a complete answer to the needs of the ICT sector. That is because ICT competencies required in the two sub-sectors of BPO and ITES may be picked up through on-the-job with minimal prior familiarity with use of computers. Also, due to the nature of diversity in tools and technologies required to accomplish tasks in the sub-sectors, there is no ideal industry-ready ICT education that can meet the evolving needs of companies in these industries.

On the other hand, as explored in the curriculum analysis, competencies from core subjects like Mathematics and English, are vital across most short-term and long-term jobs from clients in these industries. Strong English and Mathematics skills require time to develop and enhance, but deserve highest attention as these are critical to success in communication and analytical skills required not only for ICT sector employability, but across all sectors of the economy.

Unfortunately, thus far, low performance in these very essential subjects, English and Mathematics has been a cause for concern, more so in the past decade [11]. According to the ESP 2010-2020, there has been no significant improvements in overall proficiency in Mathematics and English in grades 3 and 6 between 2005 and 2007. Thus, it is critical that most energy be dedicated to improve performance in these areas.

While there are huge opportunities in using ICTs are pedagogical tools in the teaching and testing of these subjects, it is not recommended that the MoE launches further pioneering efforts to test these models (such as OLPC[11]) at

scale. The simple reason is that institutionalizing efforts for education projects in the ICT4D space have had a very high failure rate around the world, and shifting focus in this direction will take away the focus from fundamental implementation challenges faced today. Nevertheless, there is a great deal that the MoE, specifically the GES, can do to advance their internal understanding of such pedagogical interventions, as discussed ahead.

### Small-scale pilots on ICT for education interventions

In the past years, the MoE has piloted a roll out of school management systems like SchoolWrite [10], at a small scale – three schools to begin with, specifically. Such an approach is an excellent step forward towards the goal of using ICT as a management tool in education. A few of the several advantages of doing small-scale pilots for ICT in education projects include:

- Testing and validating the methodology, technology and support systems of the intervention
- Gaining a more realistic understanding of the implementation challenges and prerequisites
- Understanding effectiveness and utility of the proposed processes
- Being able to gauge the capacity of the MoE departments and of schools in being able to roll out and maintain the interventions

Thus, we believe that all new ICT for Education initiatives should, to begin with, be rolled out in a small-scale "incubator" environment in pilot programs, where metrics of achievement associated with student, faculty or administration performance are carefully sampled and compared to benchmarks. Such a research approach to introducing new initiatives will ensure trial-and-error and experimentation, so as to avoid unexpected pedagogical and support system challenges, as most ICT for Education initiatives face today.

To support such a methodology of introducing any changes in the ICT for education ecosystem in Ghana, the MoE may consider establishing an agency or committee or task force that focuses entirely on exploration, experimentation and R&D of such initiatives, for example, KERIS in Korea [12]. Active involvement of research communities and the private ICT sector within Ghana and from other partner countries will enable better discovery, accountability, and much needed financial support in the form of co-investments or partnerships in the process. Another advantage of involving such institutions is the strengths they will bring in evaluating initiatives, and understanding the long-term total cost of ownership of these technologies.

# **Curriculum Analysis**

There has been adequate reporting and analysis done on the state of ICT readiness in schools, such as the ICT in Education Policy report from 2008, E-Readiness Report from 2009, and the Pan-African Research report from 2009. But, in order to understand the ability of ICT education in schools and technical and vocational institutions in fulfilling the industry needs of the IT sector, it is important to consider the core competencies and skill sets required by jobs in the sector and evaluate the existing ICT curriculum against them, something that these reports don't cover.

# Methodology

### Curriculum - IT value chain mapping

Appendices A, B, C & D map institution level ICT curriculum-based skills taught in Primary schools, Junior Secondary schools, Senior Secondary schools and a pioneer technical/vocational institute respectively to the specific job roles in the ICT sector.

In each of these mappings, the columns represent either major topics from ICT curricula or non-ICT curricula subjects and the rows represent tasks that constitute the operations of various services across the value chain in the ICT sector, primarily specific to Ghana [1]. The tasks listed in the rows are sorted first by the categorization (BPO/KPO, ITES, Hardware, R&D\*), and then by the industry specific vertical, if any. Each topic from the curriculum is a high-level representation of the specific task competencies taught, as described in the curriculum maps from the Ministry of Education for primary and secondary education [5,6,7] and from the Advanced Information Technology Institute (AITI), a leading center for technical and vocational training [8].

For each intersection of a curriculum skill and an industry task or set of tasks, an 'X' is marked, if the skill is:

- either necessary, but not sufficient for the task; or
- may be necessary, depending on a case-by-case basis, but not sufficient for the task; or
- is a prerequisite for a more advanced skill necessary for the task, but not sufficient for the task; or
- is necessary and sufficient for the task, or in other words; or

In future, these binary representations may be replaced by significance level indicators. Also, a better representation may be devised to express the exclusiveness of the set of 'X's for a given task.

For the purpose of this analysis, the relationship between the curriculum skill and the industry task is deduced from an initial understanding of the nature of the task. The nature and sub-tasks of the task were better understood through a collaborative process with a recruiter at one the largest BPOs in India. These may change marginally across different situations and job-specific needs, but serves as a starting-point for early comparative analysis. Also, we are starting with an assumption that the jobs do not differ significantly between BPOs in India and Ghana, given our historical context of Ghana modeling their BPO sector on India's counterpart – this may be not be an entirely accurate assumption.

# **Senior Secondary Schools**

If we consider the table in Appendix C, a mapping between the curriculum skills in senior secondary schools (grade 10-12) and the industry tasks, we can draw out

several inferences about how the ICT curriculum, if well adopted in schools, feeds into producing ICT sector industry ready talent. If we look at category of ITES-BPO, a combination of the two sub-sectors ITES and BPO/KPO, we observe the following highlights:

- Skills that are not imparted in school such as working in difficult work-shifts, having a coverage of demand-based curriculum material, and "analytical skills" on the whole do not map very well to curriculum skills
- Several curriculum skills feed very well into common tasks across industry verticals such as Indexing, Data Verification, Data entry, Invoice processing and Loan processing.
- Industries with more specific competency requirements even in the shortterm, such as in the case of Health care, seem to require more skills than the inadequate breadth of skills covered in the ICT and non-ICT specific curricula. On the other hand, clients from industries like Insurance seem to be covered pretty well with the curriculum skills covered.
- ICT skills remain inadequate for "medium term"1 jobs for most part, as these jobs require more on-the-job skills and teamwork experience, rather than core technical skills to perform operational tasks.

Similarly, we may look at the telecommunications and hardware/software subsectors, and draw the following simple conclusions:

- The ICT curricula competencies do not feed directly into the technical tasks in the telecommunications sub-sector. However, just like any other industry where IT is used heavily for administrative, coordination and customercentric operational tasks, this sub-sector does draw upon the skills of basic uses of computers.
- As far as hardware and software services are concerned, the sub-sector draws upon several core skills covered specifically such as that relating to Introduction to ICT, Internet and Keyboard skills. Nevertheless, these skills serve as very basic and required skills, and do not account for much significant technology competency that may be required in this sector.

To synthesize the highlights from this mapping in the case of Senior Secondary Schooling, we can conclude that the ICT curriculum equips students with the necessary skills that may serve as prerequisites for more specific on-the-job skills in the case of the BPO industry, but are not sufficient for jobs in other sub-sectors, specifically the hardware & software sub-sector.

# Primary school, Junior secondary school and Technical and Vocational Training

Similar to senior secondary schools, we can begin to draw some inferences from the curricula for primary schools, junior secondary schools and technical and vocational training institutions. Some of the more prominent observations and inferences are:

• Competencies from Junior Secondary Schools falling within the realm of the

<sup>1</sup> As categorized in "Improving Business Competitiveness and increasing economic growth in Ghana" report in 2006 by Hewitt Associates

ICT or non-ICT curricula map very similarly to jobs in the IT value chain as in the case for Senior Secondary Schools. The reason for the same is that the core areas (or "themes") of curriculum coverage are consistent between the Primary, Junior Secondary and Senior secondary schooling. This also implies that there is no significant variation in the range of competencies over the 12 years of schooling, specifically in ICT – as students advance to higher grades, they are taught more advanced competencies in the same core areas. For example, grade 7 students are introduced to word processing through simple activities like saving and opening files, while by grade 9, students are taught to advance their word processing skills and knowledge by having a deeper understanding of formatting functionalities, apart from other things.

If we do not take into consideration the number of students graduating out
of programs from technical and vocational institutions such as the AITI, and
only consider the curriculum mapping, we observe that the competencies
from the courses in the institute map very strongly to several job tasks in
the hardware and software sub-sector. For example, their courses on Linux,
International Computer Driver License, and Foundations of Web Technology
are useful in several software deployment jobs. This also means that
institutes like AITI have a close relationship with the industry, and constantly
update their offerings to meet the current needs of the industry.

### Curriculum opportunities and industry needs

The ICT in Education Policy 2008 report states that "curriculum reform is necessary for ICT to be introduced and utilized effectively in the classroom". Goals resulting from this reform ought to be SMART (Specific, Measurable, Attainable, Relevant & Timely), to avoid unnecessarily high and unattainable targets.

We have identified some gaps and opportunities relating specifically to this aspect the curriculum policy that may help Ghana realize their goals building an economy of more equipped human capital for the 21st century:

1. Opportunities for breadth and further competency in ICT curricula

As stated earlier, the core areas covered in the ICT curriculum across Primary, Junior secondary and Senior secondary schooling are consistent. However, these areas do not cover a large breadth of early ICT learning, and are focused on very fundamental operational and administration skills. These areas include:

- Introduction to ICT
- Word Processing
- Spreadsheet
- Internet
- Keyboarding skills

Skills in these areas do align with the goals of ICT education in Ghana. But there are opportunities to plan on bringing in more advanced ICT skills and expand the breadth of the core areas, as the MoE significantly improves school ICT readiness across the country by providing better computing access and building capacity among teachers with fixed capital investments in the near future.

For example, countries like India[9] have for long prescribed IT curricula for middle and senior schooling that covers a range of critical ICT and early computer science topics like introductory logic and programming, markup languages, databases, and web development, etc. Such skills may not directly contribute to ICT skills in the general workforce, but are extremely useful in the following ways:

- Promoting advanced literacy on technology concepts among tomorrow's general workforce, for informed decision making and discussions
- Piquing interest of students in software and building in the Internet sphere, to promote discovery and self-learning
- Providing more skilled inputs into the hardware and software subsector, and raising the competency bar, such that students do not have to depend on technical and vocational institutes for foundational understanding of these topics
- Problem-solving in ICT and non-ICT related sectors

#### 2. Further involvement of private sector in filling curriculum opportunities

Recently, the MoE has partnered with companies like Microsoft[10] and Cisco to create ICT training programs for teachers for innovative ICT and non-ICT curricula teaching practices. Such partnerships are a sign of the beginning of fruitful collaborations between the MoE and the private sector.

There ought to be further involvement of large private sector technology firms, including the BPO and telecommunications sector, in filling the gaps and creating learning opportunities in the curriculum for ICT and non-ICT courses. Some of the implementation challenges may be overcome by involving current private ICT sector firms in taking more responsibility and accountability in improving the ICT readiness, and by introducing more innovative practices to better equip teachers and students with necessary resources to advance their skills.

# Chapter 5 Qualitative Survey Analysis

# Introduction

The main objective of the qualitative survey is to analyze current ICT conditions in Ghana and assess how other developing economies have successfully implemented ICT-focused strategies. Leading up to the survey, we tapped into quantitative data from a number of sources, but the results from the survey provide something more: the informed opinions of experts on the ground in Ghana or immersed in our research topic. Experts were sought from all over the world, and represented a variety of economic sectors and specialty knowledge and expertise.

# **Overview of Respondents**

We sent the survey to 136 experts all over the world in different fields. We identified participants using different sources: research papers we looked at while doing background research, ICT government ministry websites, web searches of experts in ICT policy and ICT for Development (ICT4D). 36% of all individuals contacted were listed as working in the education sector, 27% in government, 19% in development, 11% in the private sector, and 7% from NGO's. A total of 24 individuals completed the survey, although not all 24 answered all questions. 23 respondents reported their sector of employment at the beginning of the survey. 34.8% of respondents work in the government sector, 26.1% in education and 21.7% in NGOs. The remaining 17.4% of respondents work in the private sector or for international development organizations. We believe the 24 self-selected respondents are comparable to the pool of potential participants contacted. The majority of the respondents identified themselves and their organization.

Organization	NIS Actor	Location
World Bank	Development partner	International
OECD	Development partner	International
Ashoka	Development partner	Location in Ghana
Innovation for Poverty Action	Development partner	Location in Ghana
Institute of Economic Research - Tshwane University of Technology	Education	South Africa
Ghana Telecom University	Education	Ghana
University of Ghana	Education	Ghana
Center for International Policy & Innovation, Carnegie Mellon University	Education	United States

# Organizations represented in our survey

Heinz College, Carnegie Mellon		
University	Education	United States
KAN Carnegie Mellon University	Education	United States
University of Colorado at Boulder	Education	United States
Yale University	Education	United States
CSIR-STEPRI	Government	Ghana
NITA	Government	Ghana
U.S. Department of State	Government	United States
International Trade Administration	Government	United States
Information Technology and Innovation		
Foundation	Non-profit (research)	United States
THINK! The Information Knowledge		Location in
Foundation	Non-profit (research)	Ghana
Network Security Architecture,		
Vodafone	Private sector	United States
		Location in
Adamus Resources Ltd.	Private sector	Ghana
		Location in
Google	Private sector	Ghana
Access Capital Co. Ltd.	Private sector	Ghana
Sabine Group	Private sector	Ghana

The biggest discrepancy between number of experts emailed and those who actually took the survey was in the NGO sector. It could be that many experts working for research institutes or academies identified their workplace as a NGO as opposed to an educational institution.

Our response rate was approximately 18% (24/136). This rate is considerable given that we used purposeful sampling by 'cold-calling' (emailing) experts, a tactic which we knew would get us a minimal number of responses. This is not a traditional survey in that we did not use simple random sampling of respondents, and respondents are not representative of the Ghanaian population at large. Although we have a small respondent pool (n=24), this isn't an issue because the purpose of our survey is to gather expert opinion from individuals who are more knowledgeable on ICT and Ghanaian issues than the general public. We were interested in gauging how many cumulative years respondents had worked in Ghana. Out of 22 people who answered the question, 14 reported currently working, or having worked in Ghana. The amount of time spent working in Ghana by these respondents ranged from 1 month to 25 years, with an average of 9.7 years spent in-country.

The final question in the Respondent Information section of the survey asked participants to describe their interaction with ICT (respondents could pick more than one option). Of the 22 people who answered the question, 12 chose 'ICT for development'. 10 more respondents claim to work in 'ICT policy' and 10 hold the title of 'Educator/Researcher'. Because our research is focused on using ICT for

development in Ghana to promote better policy-making, we were pleased with the demographics of the respondents.

### Methodology

We gathered qualitative information from the experts using computer-assisted selfadministered surveys. There are a few reasons why we chose this mode. The first is geographic: our selected experts work in cities around the world, and contacting each individual separately would be inefficient and invasive. An online survey allows respondents to log in at their convenience and take the time they need to answer. Given the length of some of the survey questions and the long list of answer choices, it was unfeasible to administer phone surveys (even though experts in Ghana are sometimes more easily reached by phone). Towards the end of the data collection period, we called a few key informants by phone in Ghana to remind them to take the survey as soon as possible.

A lot of thought was put into question design. We populated the survey with closeended questions with predefined options. A group effort was made to create answers that were inclusive of all viewpoints but limited enough that a policymaking situation, where decision-makers must choose between alternatives, could be simulated. Closed-ended questions are easier to code and analyze and also enhance reliability (the likelihood that questions are answered the same way each time). The use of surveys also helps avoid potential effects of bias or persuasion that group discussions often create. While completing the survey, respondents had the possibility of choosing "My expertise doesn't cover this question" for questions which they did not feel qualified to answer.

One approach to ensuring that answers were usable in some way was the creation of paired questions that first frame the question in a general context, then in a Ghana-specific context. Other questions were asked in a context of growing the overall economy, and then with the goal of growing the ICT sector specifically.

### **Survey Findings and Analysis**

We are able to organize our survey findings under five overarching themes: enterprises, external players, ICT policy goals, barriers to growth, and human capital factors. A question-by-question analysis can be found in the report appendix.

Questions that fit under the **enterprises** theme focused on finding the optimal characteristics of Ghanaian firms in a new and improved ICT economy. Responses for questions 9 and 10 indicate that domestic-oriented enterprises are more appropriate to grow an ICT economy than are export-oriented industries relying on trade.

In order to help a small developing economy grow "in general" / "its ICT sector specifically", a government should promote the expansion of:



Answers to questions 5 and 6 indicated a shift towards large, stable firms (perhaps due to economies of scale) over small dynamic firms in an ICT economy. In order to help a small developing economy grow "in general" / "its ICT sector specifically", a government should promote the rise of:



Finally, ICT effects seem to be felt primarily in the most productive, value-added industries such as healthcare, manufacturing and agriculture. A majority of respondents in the government, education, and private sector groups chose 'healthcare' as one of their top three choices for question 11.



Questions about **external players** asked respondents to consider the role of international organizations, businesses, and Foreign Direct Investment (FDI) in an ICT economy. All respondents agreed that international organizations should be involved in ICT development, but there was no consensus as to how exactly they should help.



Next, although respondents agree that domestic firms should lead growth in a developing economy, a majority of respondents backed international firms when asked about growing the ICT sector. Respondents also favored collaboration in trade and business with countries which are potential investors or have a developed ICT sector.



In order to help a small developing economy grow "in general" / "its ICT sector specifically", a government should promote the rise of:



It is important to understand whether ICT experts looking at Ghana all agree on the country's **ICT policy goals.** In terms of telecommunications infrastructure, the majority of respondents agreed that mobile data was a priority, although all three private sector experts identified fixed high speed data as most crucial.



A majority of respondents agreed that ICT for education services is a priority, over rural areas, export, and creation and protection of proprietary technology.



Finally, when asked about appropriate short term sector outcomes, respondents chose BPO and ICT services over ICT hardware manufacturing and Research and Development (R&D).



Many **barriers to growth** still linger for domestic entrepreneurs and global players investing in Ghana. Both in a general and Ghana-specific context, government regulation and ICT infrastructure are blocks on reducing costs of ICT services and attracting FDI.



Curiously, government regulation was a less important factor in a Ghana-specific context (perhaps because more respondents identified 'industry clustering' as a key condition). Meanwhile, over 80% of government respondents identified 'government regulation' as a top condition in a Ghana-specific context. For Ghana's entrepreneurs, lack of access to capital and high starting costs are creating barriers to entry.



On the demand side of the equation, respondents feel that users are still struggling with the high costs to own and operate a mobile.



The final set of questions centered around **human capital factors** and how education and skills training fits into the ICT economy. Unfortunately, there were only a few questions with consensus around specific policy avenues in education. Respondents agreed that in the long term, improving tertiary level education is most important for ICT sector gains. They also agreed that desktops and laptops,

rather than mobile feature phones, can most support job training and productivity gains. Additionally, 79% of respondents felt that the existing tertiary level curriculum was at least 'somewhat relevant' to ICT sector needs.





# Limitations

We decided to adopt a web-based closed-ended survey because we are located in the United States and our largest desired respondent group is in Ghana. The choice of mode contributed to a low response rate, not least because there was selection bias in excluding experts with no access to the internet (although we argue that ICT experts are more likely to be active on the internet anyway). In the future, a local team (perhaps based out of Ashesi University) could be hired to reach out to more Ghanaian respondents. Another issue was unequal respondent representation from each economic sector: 8 government experts, 3 private sector experts, but only 1 development expert answered the survey.

### **Future Research**

Future research should focus on asking questions that pinpoint specific reasons for policy implementation failure (an area of interest that other colleagues in the Systems team have identified). If there is time, focus groups with different Ghanaian stakeholders should be conducted. The focus groups should ask multi-layered questions and simulate a systems environment where different stakeholders build on each other's answers.

# Chapter 6 Comparative Analysis

### Methodology

Following the qualitative data from the survey, we performed a comparative analysis of peer countries to determine the effectiveness of Ghana's policies. We based the comparative country analysis approach on understanding the critical factors that led to ICT growth and development in countries around the world that we considered to be peers of Ghana. This is a critical step in incorporating the NIS approach to our analysis of Ghana's ICT sectorial development. The comparative country review revealed important lessons about development in..."in institutional linkages, human capital, infrastructure, business environment, and legal/regulatory measures encountered by Ghana's peer countries when growing their own ICT sectors. We found the specific NIS policies that helped these countries attract foreign direct investment, and how those countries incorporated those policies and specifically the partnerships they garnered to promote their ICT expansion. Analyzing select peer countries (and their policies in detail) allowed us to understand the broad successes and failures of ICT development so that we could better recommend policy changes to the government of Ghana. While the lessons from peer countries offered valuable insight into effective NIS policies, these lessons could not necessarily be translated perfectly to Ghana. Using the NIS approach, we understand that no policies can be exactly replicated from one country to another, and that we must incorporate an adaption threshold to drive organic policy development specific to Ghana. Therefore, our in-depth literature review and policy analysis of the ICT innovation environments of Ghana's peer countries enabled us to decipher broad patterns of success and failures in their ICT development. We then translate those into general lessons learned to model specific policy recommendations relevant only to Ghana's ICT growth.

### **Country Justification**

We conducted the comparative analysis by identifying, then prioritizing, the key areas in which Ghana's government can improve its ICT sector. Next, we researched 10 countries and various stages in ICT development, Botswana, India, Indonesia, Kenya, Mauritius, Philippines, South Africa, South Korea, and Thailand, to determine ICT practices that proved to be successes or failures among these countries. We selected the countries based on those consistently ranked as top performers in ICT growth. We found these rankings in research reports published by consulting groups like KPMG and A.T. Kearny, the World Bank, and the World Economic Forum. These countries are the basis for our broad literature review and quantitative analysis. We next conducted a deeper literature review, interviews, and policy analysis on four of the 10 countries that we considered to be Ghana's peers based on their regional proximity and recent ICT growth and development. These peer countries include *Mauritius, Botswana, Kenya, and South Africa*.

# **Country Excerpts**

India: A rapidly developing economy with a large ICT services sector.

**Indonesia:** A high-growth economy that has shown limited success in the ICT and BPO sectors.

**Malaysia:** Sound government planning is devoted to shift economy away from manufacturing based to services based, including ICT related service.

**Philippines:** A rapidly growing BPO sector along with other ICT-related services.

**Thailand:** A country with substantial gains in the ICT sector yet has missed expectations.

**South Korea:** A strong economy with a developed ICT sectors that can be used as a best practices and long-term lessons learned benchmark.

**Botswana:** Has a sound plan to utilize ICT services to improve healthcare, government transparency, education and develop efficiencies for its key industries (i.e. mining).

**Kenya:** Regional hub for financial, communication, and transportation sectors. Also, the government has started to promote IT enabled services (ITES).

**Mauritius:** A rapidly developing economy, with high FDI and a well-planned ICT sector growth model.

**South Africa:** The largest economy in Africa and a leader in utilizing ICTs to facilitate its growth and development.

# **Country Reviews**

India



**Background:** Boasting the second largest population and a GDP of \$1.8 trillion, India recorded an annual growth rate of 6.8 percent in 2011<sup>civ</sup>. The ICT sector is expected to reach a revenue of \$100 billion. The ICT sector in India has seen staggering growth over the past decade as indicated by percentage contribution to GDP and to exports. The ICT sector is expected to contribute 7.5% of the GDP in FY 2012 up from 1.2% of GHP in FY 1998. The ICT sector contributed 25% of the total Indian exports (merchandise plus services) in FY 2012

up from close to 4% of the exports in FY1998. The ICT sector is expected to generate a direct employment to about \$2.8 million, and an indirect employing 8.9 million people in FY 2012.

**Industry:** India's ICT sector evolved over time. Starting from US based companies outsourcing to India in 1995 due to low cost, it became major destination for FDI and R&D from 1995 to 2000. Western companies set up captive units in India through 2005 and Indian companies expanded their global footprint and operations through 2010. The ICT sector also expanded its focus across value chain. The ICT sector has four major key components: ICT services (\$46 billion revenue and 73 % revenue from exports), BPO services (17.3 billion in revenue and 60 % from exports to US), Engineering design and product development (\$12.9 billion in revenue and 70 % from exports), and hardware (\$11.8 billion in revenue and 80 % from domestic market). Fuelled by local economic development, telecom penetration, and e-governance activities, the industry focus has been shifting towards the domestic market in the recent years. Continued focus on optimal cost efficiency, unparalleled human capital, unique customer centricity, scalable and secure environment and a supportive ecosystem are being seen as the key pillars of growth by the industry.<sup>cv</sup>

**Government policy:** The growth in the ICT sector has been facilitated by the programs and reforms introduced by the central and state governments. Starting with the establishment of the Department of Electronics in 1971 to the New Computer Policy in 1984, Policy on Computer Software Export, Software Development and Training in 1986, the government acted as a facilitator in establishing the framework for the industry. Because of the economic liberalization and liberalization of the telecom sector in 1991 and with relevant incentives and policies like developing Export Processing Zones (EPZs), 100% Export Oriented Units (EOUs), Electronics Hardware Technology Parks (EHTPs) and Software Technology Parks of India (STPIs) acted as a catalyst to the development of the ICT sector. Industry associations such as Electronics and Computer Software and Service Companies (NASSCOM) played a key role in developing industry linkages and promoting industry-oriented policy reforms<sup>cvi</sup>.

Human capital: Availability of skilled manpower has been the key driver for the emergence of India as a dominant player in the global ICT market. Out of 144, India is ranked 16 on the availability of scientists and engineering, 30 on the quality of math and science education, 34 on the quality of education system, and 39 on the quality of scientific R&D institutions on the Global Competitiveness report 2012-13 by World Economic Forum. It is also received similar rankings ranked on similar lines in The Global Information Technology Report 2012<sup>cvii</sup>. In 2010 alone India added 3.2 million graduates to the total graduate pool of 571 million and this number is expected to grow to 4.4 million in 2012<sup>cviii</sup>. However, industry and government needs to empower graduates with skills necessary to be 'industry ready'. In 2011, the 'ready to hire' graduate pool was in the range of 400,000 to 500,000, a mere 10 % of the total graduates<sup>cix</sup>. Considering the growth pattern being witnessed by the industry, NASSCOM and the Government have initiated programs to foster employability through finishing schools, industry mentorship programs, setting up industry benchmark for skill assessments (NASSCOM Assessment of Competence) and ICT-BPO Sector Skill Council - a collaborative model between industry, academia and government to create a sustainable industry ready talent pipeline by scaling quality capacity.

**Conclusion:** The Indian ICT industry stands as an example of a national innovation Systems approach for development of ICT sector with interplay from all stakeholders involved - government, industry, human capital and infrastructure development, as well as domestic and international market forces. The Government acted as a facilitator by providing the necessary infrastructure and framework for development. The collaboration between industry and academia provided vast improvements in human capital, which led to growth within the sector.

### Indonesia



**Background**: Indonesia is the world's third most populous democracy (population of 250 million), the world's largest archipelagic state, and houses the world's largest Muslim population.cx With a real GDP growth rate of 6.5%, Indonesia has shown a remarkable growth trajectory and is now the world's 17th

largest economy and the 6th largest among developing countries.cxi Indonesia was one of the three G 20 members exhibiting growth during the global financial crisis in 2009.cxii Cost of doing business is low and it offers competitive salaries for industry professionals. Indonesia has a strong macroeconomic environment, a strong fiscal footing, a reduced debt burden, and increasing savings and investments.cxiii Though National Innovation Systems and Science and Technology have surfaced recently as the government's priority, ICT does not make Indonesia's top industries and it has a limited ICT and business skills in outsourcing centers. Poverty, corruption, inflation, natural disasters and terrorism are a few of Indonesia's top problems as the country continues to solidify democracy after four decades of authoritarianism.

**Human Capital**: Indonesia has an impressive labor force of 117.4 millioncxiv, but most employments are in the low-skilled sectors. It has a small ICT labor pool with only 20,000 ICT graduates per year, well below the market demand.cxv 38.3% of the labor force works in agriculture, 12.8% in industry and 48.9% in services. Bahasa is the only national language in Indonesia, and English is not widely spoken. Though English is increasingly favored as a second language, present skills do not meet the needs of enterprises.cxvi According to UNESCO Indonesia has a literacy rate (in Bahasa Indonesian) of 92% in the age group 15 years and above. Indonesia underinvests in the ICT sector; there are limited sears, lack of standardized courses as well as of ICT graduates with specialized skills. In an attempt to improve conditions, research funds in Indonesia are mostly allocated to universities and scholarships are provided to pursue ICT at the master's and postgraduate level.cxvii

**Industry**: The top industries include petroleum and natural gas, textiles, apparel, footwear, mining, cement, chemical fertilizers, plywood, rubber, food and tourism.cxviii It exports electrical appliances and imports machinery and equipment. Indonesia is now seeing multinational corporations and offshore providers setting up captive and offshore facilities. Indonesia offers some of the least expensive labor costs for ICT and business process skills, lower than China, Malaysia and Thailand. Real estate costs are also competitive. However, bureaucratic policies, poor infrastructure, lack of tax incentives, data security and IP issues, and an unstable electricity supply contribute to the 'hidden cost' of doing business in Indonesia.

### **Government Policy**

Indonesia dramatic growth owes largely to the government's fiscally conservative policies; a debt-to-GDP ratio of less than 25%, a small current account surplus, a fiscal deficit below 2%, and historically low rates of inflation.cxix Fitch and Moody have upgraded Indonesia's credit rating to investment grade in December 2011. Explicitly putting Science and Technology on top of the government's agenda, an ICT council has been set up to promote growth for both onshore and offshore ICT services, and develop a long-term ICT vision with programs involved in upgrading ICT infrastructure, e-government and e-education amongst others. Economic zones have been set up to offer business incentives for investors, but there is insignificant support for the ICT industry and limited tax incentives or initiatives for developing technology parks.cxx

**Conclusion**: Indonesia's progress has been remarkable in the past decade due to its favorable government policies and peaceful political climate. However, lack of government interest and numerous business climate obstacles has limited the ICT sector's prominence in industry.

# Malaysia



**Background:** A constitutional monarchy in Southeast Asia, Malaysia has transformed itself since the 1970s from a producer of raw materials, to a multifaceted economy. Malaysia's government supported the development of an ICT infrastructure, by developing special businesses parks devoted to technology.<sup>cxxi</sup> Malaysia is quickly shifting its focus from a manufacturing based economy toward IT-enabled services,

thanks to English and Mandarin speakers comprise a large percent of the labor pool.<sup>cxxii</sup>

**Human Capital:** English is the language of commerce in Malaysia, and an estimated 90% speak fluent English in Kuala Lumpur. Additionally, Malaysia is one of the few countries where the average business worker's core languages are English and Mandarin; consequently it can support both Chinese and English speaking countries. In an effort to develop a more educated workforce, the government has enacted strategic plans to mainstream vocational and technical training to become a high-income country. The government is working to train the existing workforce, and school-aged children in ICT related technical skills. However, Malaysia still lags behind other developed nations in tertiary education in science and technology.<sup>cxxiii</sup> This deficiency could pose economic challenges in the future, as demand for these skills is growing faster than the education system can produce. The government is boosting its focus on public/private research at Malaysian universities; however the system is centralized leaving Malaysia lagging behind its neighbors in the quality of education and research.<sup>cxxiv</sup>

**Industry:** The top Malaysian exports include crude and refined oil and petroleum gases, as well as high technology equipment. Around 15% of Malaysia's major exports include electrical components, computers and computer related peripheral devices. The government also developed the Malaysia Super Corridor, comprised of 12 technology parks focused on attracting data centers, and shared services centers. Government policies are the main driver behind a national shift from exporting predominantly raw materials and manufactured goods, to attracting foreign ICT services companies.<sup>cxxv</sup> However, foreign direct investment is restricted in several sectors (telecommunications, retail, and banking) as Malaysia still maintains protectionist policies in effort to build its domestic industries.<sup>cxxvi</sup>

**Government Policy:** The Malaysian government is dedicated to moving up the value chain among high technology countries. The measures that the government is using to achieve this goal include implementing favorable policies for foreign investment in technology intensive industries. These policies include 10 year tax holidays, 100% investment tax allowance, 100% foreign ownership and duty-free imports of multimedia equipment. Additionally, the government is planning to reduce corporate and individual tax rates (of foreign nationals) to reduce the financial burden of companies operating in the country. High technology companies can hire foreign nationals and obtain visa within 7 working days.<sup>cxxvii</sup> These policies are a part of the government's strategic plans to boost ICT and ITES. Malaysia offers a low-cost, highly productive, low attrition labor pool for high

technologies, and maintains 30%-50% higher salaries than those of India and the Philippines, but 60% lower cost than western countries.<sup>cxxviii</sup>

**Conclusion:** Malaysia still has opportunities for growth in the areas of high education and research. However, the main driver behind the high-technology growth is led by government strategic planning and implementing policies favorable to FDI in this industry. Malaysia can offer a low cost labor pool, and maintains a favorable regulatory environment for foreign high-tech companies operating within its borders.

# **Philippines**



**Background:** Charged with a strong consumer demand, the Philippines' economy grew by 7.6% in 2010. The economy was more resilient to the 2008/2009 recession than its neighboring countries due to its domestic consumption, lower dependence on exports, and growing business process outsourcing sector. In 2011, the Philippines' economy was composed of 55.7% services, 31.5% industrial, and 12.8% agriculture. Based on the industrial sector, around 15% of the total exports

are computers, peripheral computer devices, and electronics. cxxix

**Human Capital:** Although the Philippines has a moderately small economy (around \$395.4 Billion USD), there is a high focus on education. The literacy rate is more than 92% of the population, which places the Philippines as one of the highest in the Asia Pacific region. Education is subsidized by the government, and the government continues to increase its investment (around \$4.7 billion USD, around 3-4% of GDP, in 2011) in university-level education and offer free primary and secondary education services to its predominantly young population.<sup>cxxx</sup> All finance and accounting classes are taught commensurate to the American system, allowing the Philippines to position itself as a key trading partner with the western countries because they use similar accounting practices, which makes compatibility easier.<sup>cxxxi</sup>

**Industry:** Additionally, the government has assiduously promoted a culture of research in science and technology. Beginning in 2006, the Philippines-American Academy of Science and Engineering built Quezon City, a large science and technology park and incubation space fostering the development of ICT's for natural resource management, e-governance, and computer networking capabilities.<sup>cxxxii</sup>

Human resource costs are less expensive than in Ghana. In 2010, entry-level costs for an ICT professional were \$8,000 annually and \$7,000 annually for a BPO professional and there are enough qualified individuals for these jobs. Beyond entry-level jobs, however, the availability of qualified managers is smaller because there is a shortage of skills such as SAP and Oracle.<sup>cxxxiii</sup> The Philippines deregulated its telecommunication market in the early 2000s, which significantly

lowered costs compared with most other Asia/Pacific locations. Inexpensive telecom prices and wider access to telecom and broadband internet, combined with lower costs of doing business than other Asia Pacific countries (e.g. inexpensive real estate and labor costs), makes the Philippines optimal for business development in major cities.<sup>cxxxiv</sup>

**Government Policy:** The Philippine government reduced tariffs on 99% of products in 2010 to comply with the ASEAN Harmonized Tariff agreements.<sup>cxxxv</sup> The Aquino government also is not protectionist on ICT's, allowing foreign companies to freely operate in country, have access to local capital, and participate in eight year tax holidays for BPO and IT-service related activities. Additionally, the government continues to reform its policies on attracting more foreign direct investment. Some of the key policies on which the Aquino government focuses are the development of economic zones for innovation, a 2011-2016 Philippines Development Plan (delineating strategy and implementation tactics for growing its BPO sector), liberalized visa requirement for ICT professionals.<sup>cxxvi</sup> Moving forward, in order to be more competitive with its neighbors like China and India, the government must focus on building a more robust infrastructure, maintain price competitiveness, and improve its IP protection laws and enforcement capabilities.

**Conclusion:** Key lessons for Ghana leveraged from the Philippine BPO model include strict government planning and focus on attracting FDI onshore, policies and regulations that favor FDI in certain sectors, a growing educated workforce with globally accepted language and coveted ICT skills, robust IP protection laws and sound communication infrastructure, and cost competitiveness with one's neighbors.

# Thailand



**Background:** With a population of 68.1 million and a GDP of \$318.9 Billion, Thailand has seen substantial growth in its ICT sector, but has not reached its potential. Real GDP growth has fluctuated recently (0.1% in 2011, 7.8% in 2010, - 2.3% in 2009). A number of events have created challenges for the nation's stability, including a coup d'etat in 2006 and devastating floods in 2011, which has disrupted government policy, specifically privatizing telecom.<sup>cxxvii</sup> Historically,

Thailand was an agriculturally based economy, but in recent decades there has been a push to modernize, particularly in in the ICT sector with program IT2000 in 1997 and IT2010 (IT2000 2.0) in 2002.<sup>cxxxviii</sup>

**Human Capital:** Compared to the other countries analyzed here, Thailand has a very high adult literacy rate (93%). When it comes to enrollment rates Thailand has a more complicated story being that is on the lower end for secondary education, but on the upper end for tertiary education.<sup>cxxxix</sup> Developing human capital was a goal of IT2000, but it fell short of its goals and so IT2010 made a recommitment to

developing human capital.<sup>cxl</sup> Thailand's universities were not improving in performance as its counterparts in other countries in the region, the focus on research in Thailand was weaker, and there was little cooperation between academia and industry.<sup>cxli</sup> It's "national school informatization" program had been achieved by providing schools with access to computers and the internet, but IT2010 made a stronger push for developing human capital "on a continual basis".<sup>cxlii</sup>

**Industry:** Thailand's economy is driven by exports in machinery and electronic components, agricultural commodities, and jewelry.<sup>cxliii</sup> When entering the manufacturing market, Thailand served primarily as a middle-assemblyman. This meant while many exports were technology-based the technology production was not actually taking place in Thailand, which has changed gradually.<sup>cxliv</sup> Telecom monopolies kept prices high and prevented competition, while inhibiting infrastructure development. Privatization has been stopped partially due to political unrest, though some telecom liberalization has taken place due to WTO<sup>cxlv</sup>. Indicators show that Thailand does not have the friendliest business environment.<sup>cxlvi</sup>

**Government Policy:** Before the two plans were implemented, weak industry linkages were a major problem in Thailand. These included weak user-producer links, such as between firms in the same area, between industry and universities, and between industry and public sector research organizations.<sup>cxlvii</sup> Several years after IT2000 was implemented, there was an evaluation process before proposing and implementing IT2010. Targets of IT2000 involving the government sector were not met. IT2010 showed a renewed government focus on the ICT sector. Infrastructure has developed significantly and a push towards creating more content has helped fuel demand for ICT products.<sup>cxlvii</sup> Government has yet to privatize telecom firms and further increase competition.<sup>cxlix</sup>

**Conclusion:** Thailand has made progress in the ICT sector, but relative to other sectors of the economy the growth has not been spectacular. Much of the ICT sector growth seems to come from the development of infrastructure. Thailand's ICT sector had higher growth after IT2010 improved upon ICT 2000. Thailand illustrates the advantages of telecom privatization, the importance of industry linkages, development of domestic content, and domestic R&D.

# South Korea



**Introduction**: South Korea has a population of 48.5 million with a GDP of \$1 Trillion and a fluctuating real GDP growth in the past four years (3.6% in 2011, 6.3% in 2010, 0.3% in 2009). The size of South Korea's economy in the 1960s was comparable to other African developing nations at the time. In the past few decades, however, it has grown to a high tech industrialized country. One of the reasons for its rapid development is the heavy US

investment in South Korea during the Korean War and the Cold War.cl

**Human Capital**: English is widely taught in middle schools and high schools, and taking English classes outside of mandatory school is common practice.cli Education was considered a critical driver in their growth.clii Education policy was tied to ICT growth; technology was integrated into the schools and the classroom setting. Technology competence was required in college examinations and there even were policies to educate housewives, which increased both demand of ICT services and supply of ICT savvy individuals.cliii South Korean universities have been growing in prominence, and have an extremely high tertiary education rate.cliv Both the supply and demand of skilled labor in ICT grew simultaneously, mostly due to effective government policy decisions.clv However, given that growing supply and demand of ICT services is a goal for many countries, other factors, such as growth in other sectors of the economy helped the success of this policy.

**Industry**: Electronics and Telecommunications are now major industries in South Korea along with automobiles, chemicals, steel, and shipbuilding.clvi Manufacturing is very strong across industries including in ICT. Domestic control of industry was maintained through policy because of the idea that this would support down-stream firms (domestic semi-conductor industry will support HD TVs as well). Exports were the focus of developing industry, especially in R&D intensive sectors, as Korea was developing as an economy. There was a strong focus on domestic production as opposed to being a cog in the supply chain. clvii Korea has been consistently rated as business friendly except when it comes to judicial independence, resolving business disputes, and regulatory framework. Additionally, there was (and is) low venture capital available for entrepreneurs, which was led by the government to boost private sector growth. clviii

**Government Policy**: Effective government policy drove South Korea's growth. The Korean government adopted the "infant industry" argument and protected certain industries until they had the potential to grow and enter into protected industries.clix This access to preferential treatment was granted by technological capability and not political connections.clx Public Sector Research Organizations focused on technology acquisition, assimilation, adaptation, design, and engineering which benefited many organizations as opposed to giving a private firm technology that they developed.clxi The telecom industry liberalized because the Minister of Communication had more control over the state industry, (as opposed to the state industry having more control over policy). While the economy was developing, the government provided strong incentives for investment and infrastructure (which provided stronger rate of returns than normal economies).clxii There were also strong linkages to industry and Academia.clxiii

**Conclusion**: South Korea demonstrated that government can lead growth, and that free trade is not always the best policy for industry, which is called the infant industry argument. Although there was external support boosting South Korea's growth, its government policy for equally developing supply and demand for all ICT

services, rapid infrastructure development, and temporary protectionism drove South Korea's economic growth, including the ICT sector.

# Further ICT Policy Research

This section is aimed at identifying key lessons learned from other countries similar to Ghana that have had sustained growth in their ICT sectors. Specifically, we identified four key countries (Kenya, South Africa, Botswana, and Mauritius) and analyzed their ICT-related polices and strategic plans to better understand the underlying reasons for the successes and failures that each has experienced in its ICT environments. In order to identify the common themes in ICT development for each of these countries, we will analyze each country's ICT sector from a human capital, policy/regulatory, and infrastructure perspective. Then, we will draw consistent conclusions to determine if there are one or many reasons for Ghana. We selected the countries based on their proximity to Ghana, economic size and historic growth factors. Although no two countries are exactly the same, we believe that we can leverage the lessons learned from the ICT successes and failures of the countries to help Ghana incorporate the ideal strategies for its own ICT sector development.

# Botswana

### Background

Botswana, formerly known as the British protectorate Bechuanaland, earned its independence from Britain in 1966. Since then, the government has made great strides toward implementing progressive social policies and making capital investments in growing its economy.ckiv Today, Botswana is one of the fastest growing economies in the world. The country experienced only one year of economic decline in 2009, and has since recovered showing GDP growth of 7.2% in 2010 and 6.2% in 2011. Fiscal discipline and financial management have allowed Botswana to move from one of the poorest countries in the world to a middle-income country, yielding the highest credit rating in Africa. Diamond and other mineral extraction is largely responsible for Botswana's sustained economic growth, whereby 70-80% of export earnings are comprised of diamond exports. Botswana is heavily focused in this single luxury export, thereby leaving the country open to global economic risks if demand fluctuates.cixv In terms of ICT trade, Botswana's ICT exports are about 0.3% of total export, and ICT imports are about 3.1% of the total (4.7% in 2005). However, ICT service exports have doubled between 2005 and 2010 (2.7% to 5.5% of total exports). clavi Botswana's government is focused on leveraging ICTs into growing its economy from developing more efficient methods of mining, to improving food, water and the environment.clxvii In order to achieve these goals, Botswana developed the e-Governance Strategy for 2011-2016, and the National ICT Policy delineating the government's intended uses of growing its ICT sector.

The government's specific ICT goals include creating an enabling growth in the ICT industry by developing provisions for universal service and access to ICTs throughout the country, and making Botswana a regional ICT hub to promote its services sector.<sup>clxviii</sup> Botswana developed its strategy by reaching out to experts

around the country and creating seven task forces that focus on ICT development in areas such as government, learning, health, legislation, economic development, infrastructure, and community access. Although Botswana is not striving to become a world leader in the BPO sector, we will leverage lessons learned for Ghana around Botswana's incorporation of education, infrastructure, and regulations into its ICT strategy.

### **Education/Human Capital**

Botswana's primary and junior secondary education is free but not compulsory. Senior secondary education involves a selection process, therefore only about half of Botswana's students attend to earn the Botswana General Certificate of Education. There are six technical schools throughout the country, and the new Botswana International University of Science and Technology (opened in October 2010). The population is about 84% literate, and an estimated 2.1% of the population speaks English.ckix Although Botswana and Ghana vary greatly in their education needs and current baseline. Ghana can leverage some of the key characteristics of Botswana's National ICT Policy for education. Specifically, the 2016 Policy provides goals to expose children and young adults to ICT, science, and engineering education. The government identified these key skills as critical in transforming Botswana to a "knowledge-based society" by 2016. In 2012, about 17.1% of the one million person workforce was engaged in knowledge-intensive activities (i.e. those requiring higher education).<sup>cixx</sup> The government is taking steps to improve this by connecting all school and learning centers through an infrastructure called Thuto Net, which will allow these institutions to maintain constant access, affordability, and reliable service to each other and the Internet. The goal is that schools can leverage each other's knowledge, and enable ICTs to be introduced to all students across the country at the earliest age possible. The Thuto Net program will also train school teachers and administrators properly so that they can pass that knowledge to the students.clxxi

Additionally, the 2016 ICT Policy provides a framework to identify specially trained young adults to help spread the knowledge of ICTs to other citizens around the country. Therefore, Botswana developed specialized programs that train young adults in high quality services such as computer skills, internet training, and technical assistance for small businesses, website design, e-Commerce, and troubleshooting call centers. This Student Connection and Net Corps initiative will help build new skills in the local population and workforce, and ideally create entrylevel employment opportunities that can translate into sustaining employment in the ICT sector, which is a key element of the National ICT Policy.<sup>cixxii</sup> Additionally, the National ICT Policy lists goals to train government employees for increased levels of electronic services (incorporated under its e-Governance Strategy) so that more government employees can transition to consultative and decision-making roles rather than their current transactional and administrative duties.<sup>clxxiii</sup> Although education policy is very important for Botswana to achieve its 2016 Vision, it will be more effective if Botswana has the proper infrastructure in place to support its policies.

### Infrastructure

Botswana identified key infrastructure developments that need to develop in order

to achieve its 2016 goals. Similar to *Thuto Net* and its educative mission, the government also identified other areas where it can implement ICTs such as the e-Health program. The purpose of this program is to transform health records to electronic format. The National Policy sets goals to review legislation around privacy concerns for electronic health records, and identify the necessary infrastructure to incorporate e-Health across the country. This will allow physicians to share a patient's information between hospitals, and connect patients and nurses via telephone. However, this program requires a robust infrastructure that connects all areas of the country. As of 2010, mobile networks covered about 99% of the population, but only about 0.6 per 100 people had fixed broadband subscriptions. Therefore, the government plans to increase connectivity in all regions of Botswana. The program dubbed Connecting Botswana, will incorporate an analysis of all ICT requirements to develop, standardize, and regulate the appropriate technologies needed to connect the government, private sector, and local communities to each other.clxxiv However, the National ICT Plan does not provide specifics on how the government will achieve these goals, or provide a specific timeline that includes milestones for achievement other than by a simple ill-defined goal of 2016. The ICT Policy does not cover areas for infrastructure such as access to electricity (in 2011, about 45% of the country had access electricity), cixxv which is a major aspect of infrastructure development.

### Legal/Regulatory

Botswana's legal and regulatory environment needs to improve before the government can reach its 2016 goal of becoming a regional ICT services hub. Currently, Botswana maintains some restrictions on licensing business operations (i.e. operations reserved for Botswana companies only), but there are few barriers to trade.clxxvi Additionally, foreign companies face many hurdles when starting operations in Botswana. Specifically, companies must complete about ten procedures to begin operations in Botswana, which take an average of about 61 days to complete.clxxvii However, the government has not yet implemented regulations to promote ICT or BPO growth from foreign direct investment. The National ICT Policy begins to address this issue by setting goals to analyze and incorporate the proper standards and regulations for secure connections and privacy. These goals include liberalizing the telecommunication industry; conducting a thorough review of the security and privacy policies, procedures, and international standards to ensure all are enacted to provide a secure and coherent ICT environment; and appointing an Advisory Board that oversees areas such as online security, Public Key Infrastructure, Open Source Software, and standards development. The policy also aims to develop and continuously improve an ICT legal framework to attract FDI, enable local companies to compete globally, and assist with development of an entrepreneurial sector so that the Government can boost investor confidence of investing in Botswana. Finally, the Policy strives to achieve greater levels of affordability for ICTs across the country. Although these goals are intended to attract more FDI, the 2016 National Policy does not delineate specifics on how the government plans to achieve them. clxxviii

### Conclusions

Based on this analysis, we identified that both Ghana and Botswana have varying education, regulatory, and infrastructure needs. However, the overarching lessons

that Ghana can learn from Botswana's National ICT Plan include the utmost importance of setting very specific goals and tracking mechanisms, appointing a champion agency or advisory board to lead the effort with full decision-making authority, and utilizing public-private partnerships to help achieve the goals and vision by a target deadline date. Ghana must ensure that all aspects of the infrastructure can support its ICT vision and goals.

# Kenya

### Background

Kenya is the largest economy in East Africa and a regional hub for the financial, communication and transportation sectors. The Kenyan economy is driven largely by low-value primary goods in agriculture where nearly three-fourths of workers are employed in the informal sector.<sup>ctxxix</sup> Kenya's government historically had overly relied on low-value commodity markets. This reliance led to volatile GDP growth ranging from decline and stagnation in the 1990s to a marginal improvement in the 2000s. The Kenyan government saw the importance of increasing mid-value employment and reliable exports markets, and began promoting IT enabled services (ITES) such as Business Processing Outsourcing in order to achieve these goals.<sup>ctxxx</sup>

The Communication Commission of Kenya (CCK) maintains regulatory power over telecommunications in the country. The CCK is largely a technocratic body with a strong understanding of the technical components of telecom penetration. Even though its technical competency has resulted in sound decisions, the CCK is less effective than it otherwise could be because it is not an independent agency and faces budgetary constraints from the Ministry of Communications. For instance, the CCK recently adopted a unified licensing model that permits any communication service provider to deliver its services openly on the available infrastructure throughout the country. This model increased competition by allowing mobile service providers to deliver Internet services to their customers. The CCK has little power to regulate competition among dominant communication service providers which results in the last mile broadband costs remaining overly expensive.

The main institutional actors overseeing the Kenyan ITES are the National Communication Secretariat and the Kenyan ICT Board. However, these agencies have substantial overlap in their operations and responsibilities, so the agency in charge of developing and implementing ITES policy is ambiguous. Overall, there is minimal institutional cohesion within the ITES sector or the Kenyan government, which reflects a lack of coordination among private sector firms and agencies within the government.

### **Education/Human Capital**

Compared to many African nations, Kenya has been successful in promoting the skills needed to compete globally in the ICT sector. Over 15 percent of the population has obtained a secondary degree, and roughly 30,000 Kenyans graduate from tertiary institutions every year. The relatively large number of

graduates has led some ICT analysts to believe there is little human capacity gap in Kenya—particularly to operate call stations and other BPO-sector firms. However, most relevant higher education institutions do not align with needs of the industry. Institutions such as The School of Computing and Informatics at the University of Nairobi either produce graduates that are overqualified, or are unwilling to work at the wages that curb the costs necessary to make Kenya competitive. Many graduates still require substantial on-the-job training necessary to work in a global call center.<sup>clxxxi</sup> In order to bridge this gap, the government pledged \$12 million in annual BPO-related training in 2010. It is unclear however, if such funding is sufficient to overcome the "donut hole" between the necessary skills that BPO firms while offering services that are priced at globally competitive rates.

### Infrastructure

Prior to 2009, Internet connectivity remained exclusively satellite-based. In May 2009, Kenya connected to its first undersea fiber-optic cable (SEACOM), followed by its second (TEAMS), and third (EASSy) which landed in 2010. While the introduction of submarine cables reduced wholesale prices (from XX to YY), retail prices (consumer-level) have declined only marginally.<sup>clxxxii</sup> In order to extend the fiber-optic network, the government invested in the National Optic Fibre Backbone Infrastructure (NOFBI). NOFBI currently extends through 56 towns but are not linked together. The project continues with a \$71 million loan from the government of China.<sup>clxxxiii</sup> High costs and a lack of connectivity continue to dampen demand for web-enabled services, but robust mobile penetration rates may still provide enough local demand for basic BPO clusters.

The ITES sector in Kenya is still embryonic. The BPO sector is currently comprised of roughly a half-dozen 200+ seat call centers and many smaller facilities.<sup>clxxxiv</sup> Kenya has developed a cluster-based perspective, and considers BPO to be a gateway into higher-value ITES, such as data storage security, technical support services, and potentially, software development. However, the players that currently exist in these auxiliary markets are fragmented and have little interaction with one another. The main driver of BPO services in Kenya is its low price point. Total (fully loaded) costs of setting up and running a BPO in Kenya are currently 10 percent lower than those offered by firms in India and the Philippines, and one-third lower than those offered by South African BPO firms.<sup>clxxxv</sup>

One area of unprecedented success in Kenya's ICT sector is access to mobile money. Safaricom's M-PESA, a small-value electronic payment through mobile phones, is currently used by 11.9 million customers, more than half the adult population. Each month, \$415 million is exchanged person-to-person through M-PESA, which is equivalent to 17 percent of Kenya's GDP.<sup>clxxxvi</sup> Safaricom is Kenya's largest mobile operator and a market maker, which has helped M-PESA leverage over 19,000 small businesses into accepting mobile payments. M-PESA has had a revolutionary impact on access to credit for family businesses and SMES. Also, the World Bank's Doing Business Index reports that Kenya ranks 8th in the world for ease in accessing credit.

### **Regulatory/Legal**
Corruption continues to constrain the ICT industry in Kenya. In 2011, Kenya ranked 154 on the Corruption Perception Index, compared to Ghana's 69 ranking.<sup>clxxvvii</sup> Strong tribal loyalties (where tribal members "help" each other in a process called "kitu kidogo"), coupled with little national regulatory oversight have led to an entrenched lack of rule-of-law. This has impacted telecom deregulation and business promotion overall. Government contracts are particularly impacted by corruption with the estimated corruption premium equaling 10%. Many of the broad-based policies relating to the ICT sector have also failed to make a strong impact on curbing this corruption. Specifically, the degree to which the new unified licensing agreement makes an impact depends on the price premium of corruption in the sector. Conversely, some ICTs could reduce corruption. The Freedom of Information Bill has gained greater support within the advent of increased e-government services, and is supported by international corruption watchdog groups as a key method to reduce corruption.

### Conclusion

Kenya is slowly developing an ITES sector. However, many constraints must first be addressed before the sector can flourish as a global leader in BPO. First, primary schools do not teach students the skills demanded by the BPO sector and the industry must rely solely on current university graduates, which is not a viable long-term strategy for growth. Second, Kenya's lack of employment opportunities in the ICT sector implies low attrition rates, but this will change as the sector develops. The government has taken the necessary first steps toward opening the telecommunications market, but also needs to regulate fair competition practices among service providers to ensure the end consumers (i.e. BPO sector customers) are receiving the best prices. Finally, Kenya's success with M-PESA indicates an opportunity to induce local demand, however, the government should move ITES beyond mobile finance and into greater employment generating sectors such as BPO.

# **Mauritius**

### Background

Mauritius gained its independence from British rule in 1968, and has since flourished from a low-income agriculturally focused economy into a hub of finance, tourism, and ICT focused. Given its stable democracy, free elections, and positive human rights record, the government has achieved one of Africa's highest per capita incomes and attracted more than 32,000 offshore entities aimed at servicing Chinese, South African, and Indian commerce. The government adopted conservative banking and economic practices which weathered the 2008-2009 global economic crises, and grew at an average of 4% per year between 2010 and 2011.<sup>clxxxviii</sup> Currently, its top exports to the U.K., France and U.S. include textiles, sugar cane, diamonds, and frozen fish.<sup>clxxxix</sup> The government, however, has prepared an ICT Strategic Plan for 2011-2014 that focuses heavily on ICT services. Mauritius has already made progress since the plan's inception. Specifically, between 2005 and 2010, Mauritius reduced its ICT exports from 13.3% to 1.1% of total exports, its ICT imports from 12.8% to 5.1%, and increased its ICT service exports from 2.3% to 3.8%.<sup>cxc</sup>

Mauritius' National ICT Strategic Plan 2011-2014 is the key policy that the government developed and implemented to bring the ICT sector to the forefront of the national economy, and to position itself as a globally recognized ICT hub.<sup>cxci</sup> Development of this plan started with the end-goal in mind (Mauritius wants to brand itself as a global ICT hub), and from a strategic market review of its strengths and weaknesses. The Government of Mauritius conducted a review of its market to understand the optimal level of competition and prices that fit the current operating capacity. The Ministry of ICT, in coordination with the National Regulatory Agency, instituted regulations that fit around these findings. These policies include education/training, cyber security, infrastructure access, regulatory/legal, and employment. These areas combine to form greater business development capabilities by attracting FDI from its target countries (i.e. China, India, E.U., U.S. and South Africa).<sup>cxcii</sup>

### **Education/Human Capital**

Mauritius recognized that it has low labor costs and citizens with high English/French skills, which are especially critical for the growing the Business Process Outsourcing (BPO) sector by targeting customers in the U.S. and Europe. However, the Mauritian labor pool with the right technical or vocational skills for this sector is small. In 2012, about 15% of the population was engaged in knowledge-intensive activities.<sup>cxciii</sup> Therefore, the government identified the need to improve the educational system, or import the skilled employees from other countries. One example of how the Ministry of ICT plans to resolve the lack of skills is by developing the ICT Academy, which will promote the skills and competencies of the Mauritian workforce, and will serve as a global destination of ICT-related business talents.<sup>cxciv</sup> Mauritius is not only developing a specialty ICT vocational school, but is also partnering with existing schools, trade organizations, and private companies to refine the specific types of ICT skills that are needed to meet industry demand. Examples of these partnerships include the IT School in Mauritius Institute for Training and Development (MITD), Human Resource Development Council, and National Empowerment Foundation. Additionally, Mauritius is creating an ICT laboratory devoted to developing cutting-edge software applications, and an ICT think-tank to identify global developments and help create public policy on the basis of rigorous research and application to the Mauritius situation.cxcv

Finally, Mauritius enabled the National Computer Board as the main entity overseeing coordination among these ICT goals to ensure the goals meeting their milestones.<sup>cxcvi</sup> Although the government has several goals in place, Mauritius currently graduates an average of 1,000 ICT employees annually and recruits around 30,000 Ugandan expatriates to fill the void. Current ICT graduates are finding higher paying jobs in the U.S. and U.K.,<sup>cxcvii</sup> but the ICT Strategic Plan does not directly address the ways in which the government plans to incorporate more competitive salaries while keeping costs low.

### Infrastructure

Mauritius is connected to the South Atlantic 3/West Africa Submarine Cable/South Africa Far East (SAT-3/WASC/SAFE) submarine fiber-optic cable system. This

provides broad bandwidth and international connectivity to Mauritius, and an additional layer of security via high-speed satellite connectivity in the event of a cyclone disconnecting the submarine cable.<sup>cxcviii</sup> In 2011, the World Bank reported that 100% of Mauritius' population was covered by a mobile-cellular network. Also, as of 2010, there were about 6.1 fixed broadband subscriptions per 100 people (which is the highest among the four countries in this comparative analysis section). The Mauritian government understands that one key of attracting top levels of FDI requires the safety and security of information. Therefore, the Information and Communication Technologies Authority (ICTA) of Mauritius established policies to operationalize Public Key Infrastructure (PKI) across the country's networks.

Although the government currently lacks the funding, compliance, and enforceability mechanisms, the strategic plan incorporated a roadmap by identifying security goals, actors, and priorities. In order to give security greater momentum, the ICT Strategic Plan set up the National IT Security Committee, which will act to incorporate the IT security operational plan, and develop and implement universal security standards.<sup>cxcix</sup> Mauritius also has sound physical infrastructure in place for transportation and five airports. The country is fully electrified and a 132 kV network (presently being used at 66 kV) has already been set up to cater for increasing demand. Furthermore, new requests for connection to the grid, especially for new buildings, are addressed within a relatively short period.<sup>cc</sup> Also, the government is working to set up business parks to lower cost and offer "green" computing.<sup>cci</sup>

### Legal/Regulatory

Mauritius has established a strong reputation for effective regulation in the areas of telecommunications, incorporated several regulatory measures in the ICT Strategic Plan to further enable access of FDI and extend its broadband capabilities. These measures include reviewing licensing regulations to enable more competition and competitive prices, developing a universal access plan with set goals, unbundling the local loop to drive competition and lower costs in the last mile, reviewing wholesale pricing regulations of monopoly components of the network for mobile termination, and leasing lines and international bandwidth.<sup>ccii</sup>

Additionally, Mauritius has developed trade relations with the EU, the United States, Turkey, Iceland, Norway, and Switzerland. Mauritius also has a bi-lateral trade agreement with China for economic and technological cooperation. The government lowered its red tape of doing business onshore by offering foreign direct investors more legal protection, lowered corruption, and political stability through continuous reform of these policies in accordance with the demands of investors. Also, the government offers a 15% corporate income tax, low capital gains and inheritance taxes, and no tax on the repatriation of dividends or invested capital.<sup>cciii</sup> Finally, the government makes it easy to establish a business onshore (usually taking about six working days) by requiring only five procedures/paperwork items.<sup>cciv</sup>

### Conclusion

The key lessons learned from the Mauritian ICT strategic policies are centered on

strict government planning, goal-setting, and a long term vision (ex: to become a global hub for ICTs and BPO). The government continuously focuses on developing its physical infrastructure and legal framework to provide a safe and easily accessible destination for FDI. The population has high English and French language capabilities, which combined with low labor costs make it an ideal destination for BPO outsourcing from Europe or the U.S. Mauritius identified its key areas of weakness, and is working to mitigate those by implementing policies for improving ICT education, and the legal and regulatory frameworks around cyber security and contract enforceability.

# **South Africa**

**Background:** South Africa is the largest economy in Africa, with a GDP growth rate at 5% per annum, and it is a leader in ICT development. It is close to Europe in its time zone and business culture, and has a solid political and regulatory setting. Having a population of nearly 49 million, South Africa is the 20th largest consumer of ICT products and services in the world and its ICT outsourcing services industry comprise more than one third of the 3.5 billion USD (30 billion rand) ICT services market.<sup>ccv</sup> South African companies are global leaders in electronic banking, prepayment services, revenue management and fraud prevention systems, call-center provision, telecommunication, and the manufacturing of set-top boxes. South Africa's ICT products and services industry is rapidly penetrating the African markets, which could benefit Ghana if its government chooses to partner with South Africa in order to boost its ICT industry.<sup>ccvi</sup>

In 2005, the government of South Africa identified BPO and Offshoring as two priorities for the attracting foreign investment and creating jobs.<sup>ccvii</sup> The private and government sectors were to work cooperatively to make South Africa a preferred location for offshore business processes. The Business Trust allocated funding of tens of millions of dollars to further the interaction between the public and private sectors.<sup>ccviii</sup> This government initiative, named the BPO Partnership, has developed the BPO sector to earn revenues worth over 170 million USD (1.5 billion rand).<sup>ccix</sup>

The Department of Science and Technology and Microsoft South Africa have signed a public private partnership to refine the ICT skills in the country, and to train local government staff to improve service delivery. The Department of Trade and Industry (DTI) was tasked with developing and leading the "Offshoring South Africa" program.<sup>cex</sup> The government is also promoting the spread of ICT in rural areas and the development of high-end skilled labor. South Africa has also entered into bilateral agreements for joint cooperation and exchange of technological information.<sup>cexi</sup>

### **Education/Human Capital**

South Africa has a literacy rate of about 89% and a well-developed network of schools, colleges and universities, with about 28% of South Africa's 2009 university graduates studying science and technology-related subjects. Additionally, 23.7% of the labor force is employed in knowledge-intensive

activities. South Africa's spending on education was 5.3% of their GDP in 2011 and ranked 46 out of 132 economies globally.<sup>ccxii</sup> The quality of education in South Africa varies in different parts of the country, but many private schools and colleges offer high quality education and international standard qualifications. In an effort to improve and restructure the education sector, the government has concentrated its efforts on primary school education through action plans. This includes the "Schooling 2025 Plan" to monitor the educational system against benchmarked standards.

### Infrastructure

Government policies are also favorable for offering competitive infrastructure and operating costs, low property taxes, as well as 99.8% mobile coverage rates- the largest telecom network on the African continent. The improvement of infrastructure has been a conscious investment; high-speed public trains have been built, 10 airports were upgraded for the 2010 FIFA World Cup visitors, and 75% of the population has access to electricity. All of these developments make the country more attractive of foreign investment in the region, as well as facilitating business ventures. The submarine cable capacity to South Africa has increased since June 2009 fourfold, and is set to continue growing to more than 10 times.<sup>ccxiii</sup> Additionally, telecommunication costs are decreasing in South Africa and are likely to continue to decrease by 15% to 25% over the next five years due to competition in the broadband market. The government plans to address limited Internet penetration in South Africa, by investing up to \$890 million (6 billion rand) to connect 2.5 million homes to a fiber-optic broadband network capable of delivering connections speeds of 1 Gbps within the next five years.<sup>ccxiv</sup> This is projected to attract even more foreign investment.

### Legal/Regulatory

The government requires employment equity, black economic empowerment (BEEwhich measures businesses against criteria including the proportion of company ownership and the ratio of senior management by ethnicity) and tax compliance for foreign investment but also provides numerous incentives to support investors in South Africa. Also, government approval is not required for foreign investment, grants are present to cover 50% of the cost of developing innovative products and processes, there are discounts on rental space, a 100% rate rebate is present alongside free land and buildings (in the Western Cape province) etc. There are only five procedures to be completed in order to start a business, and the process takes an average of 19 days.<sup>ccxv</sup>

South Africa's key economic sectors include its automotive industry, tourism industry, its mining and minerals sector and its ICT and electronics. Although South Africa has attractive framework conditions for entrepreneurship and innovation, theft, crime and corruption are the top problems plaguing South African businesses. However, the government is actively trying to curb corruption through new laws including the Promotion of Access to Information Act, which became law in February 2000, which has helped to increase transparency in government.

According to Global Software Piracy Study 2010 by Business Software Alliance (BSA), South Africa's piracy rate has remained the same (35%) for three

consecutive years since 2008.<sup>ccxvi</sup> In November 2009, the Companies and Intellectual Property Rights Office and the Office of Companies and Intellectual Property Enforcement formed the Companies and Intellectual Properties Commission to improve education and enforcement of IP laws.<sup>ccxvii</sup> Although cybercrime is high in South Africa, privacy, security, and IP protection are generally very effective. Information security professionals are available and the information security industry is mature, mostly due to the country's banking industry.<sup>ccxvii</sup> With a piracy rate of 35%, shown as the percentage of total legally acquired installed software, South Africa is among the 20 countries with the lowest piracy rates (on a par with Ireland).<sup>ccxix</sup>

However, the government lacks clear policies for the future, has a limited focus on the importance of ICT on national agenda, and does not provide consistent support across all provinces and ICT services segments for growth. As a result, specialized ICT skills are in short supply and only the BPO industry (in particular call centers) is ensured a sufficiently educated, English speaking staff. Strict employment laws inhibit the ease of doing business in South Africa by making it difficult to reduce staff size and/or terminate employment. The World Bank reported a decline in South Africa's rank for ease of doing business in 2011 by placing it on No. 34 out of 183 countries.

**Conclusion:** South Africa has implemented a number of valuable policies to advance its BPO sector. It can offer sufficiently skilled English speakers for BPOs and call centers (even though specialized ICT labor needs to be imported) as the government focuses on improving education. Favorable government policies have attracted foreign investment by allowing South Africa to offer 99.8% mobile coverage rates, competitive infrastructure and operating costs, and improve Internet connectivity. Public private institutional linkages are strong as the "BPO partnership" focuses on improving Offshoring and BPOs, in turn creating jobs. South Africa's regional leadership in ICT and the increasing penetration of its products and services can benefit Ghana via mutual trade and cooperation.

# Findings for Ghana

Based on the previous analyses of the major policies driving the growth of the ICT sectors in Botswana, Kenya, Mauritius and South Africa, we identified the consistent trends and strategies across each market. Therefore, we advise CSIR – STEPRI to consider working with the Government of Ghana to develop, refine, and implement the following recommendations in Ghana. In addition to creating recommendations based on an in-depth analysis of the policies of Botswana, Kenya, Mauritius, and South Africa, we have created other recommendation based on preliminary analyses of other countries' ICT sectors and our own analysis of the ICT sector in Ghana.

### **Business Development**

The Government of Ghana should first create a formal overall vision of how it wants global businesses to perceive it in five, ten, and fifteen years. The government should then draft a strategy document including very specific goals, targets, milestones, timelines, and mechanisms for measuring completion of those targets. This document can elaborate on the Priority Focus Areas of ICT4 Accelerated Development goals. These goals should be realistic and achievable within a three to five year period. The government should then appoint champion ministries or advisory boards to help meet each of these specific goals. These champions can then appoint various sub-advisory leaders/teams for each area (Legislative, Health, Industrial, BPO, etc.), similar to those found in Mauritius.

Developing a program like this is critical for success, which can be seen by Mauritius' ICT service exports growing by 65% between 2005 and 2010 (after the implementation of its detailed ICT strategy). *Please refer to the Quantitative section of this report for more details on ICT sector growth in other regional markets.* These champion organizations should have full decision-making authority to help track progress of completed milestones and publically report on those achievements in a timely and consistent manner (reports, working websites or news releases). Setting specific targets and working to meet those targets within the allotted timeframe will allow the government to report and showcase its successes to global BPO firms, and thereby attract more BPO-related FDI to Ghana. This recommendation corresponds to the Facilitating the Development of the Private Sector/Necessary Conditions for Success (5); Developing a Globally Competitive Value-added Service Sector (8); Promoting Foreign and Local Direct Investment in ICTs (13) of Ghana's Priority Focus Areas of ICT4 Accelerated Development.

Taxation policy is important when considering attracting investment and larger companies frequently utilize a strategy of selecting a location to house operations based on tax policy. The government of Ghana should consider negotiating and signing a Double Taxation Agreements (DTA) with the United States and other countries. DTAs are special agreements that define tax rates that international firms pay to operate within the borders of the host country. The goal is for a company to pay an equitable rate of tax based on involvement in each country and should result in a firm paying an effective tax rate of somewhere in between the tax

rates of countries involved. Ghana currently only has DTAs with France, UK, and Germany and finished negotiations with Italy, Yugoslavia, and Belgium.<sup>ccxx</sup> The US has DTAs with South Africa, India, South Korea, Indonesia, the Philippines, Thailand, and other countries. It does not have DTAs with Botswana, Mauritius, nor Malaysia.<sup>ccxxi</sup>

Access to capital is another problem for small startup firms in the ICT sector. A major obstacle for these firms is that they cannot get a loan because they do not have capital for collateral. In India, ICT is recognized as a special sector such that the Reserve Bank of India (India's central bank) backs loans for small firms in the ICT sector collateral-free. A developing ICT sector cannot solely rely on large multinational firms; entrepreneurs must be given the right conditions to create domestic firms. These recommendations correspond to Facilitating the Development of the Private Sector (5), Developing a Globally Competitive Value-Added Services Sector (8), and Promoting Foreign and Local Direct Investment Drive in ICTs (13) of Ghana's Priority Focus Areas of ICT4 Accelerated Development.

### **Institutional Linkages**

The Ministry of Communication should further develop and comprehensively utilize public-private partnerships with actors in academia, trade organizations, consultants, and entrepreneurs to help achieve the overarching mission and vision on a local or regional level. The Ministry of Communication collaborates with the Ghana Telecommunications University College and the Business School of Kwame Nkrumah University of Technology, but this needs to be expanded.<sup>ccxxii</sup> The government does not have the resources to incorporate large-scale ICT projects on its own, and therefore can leverage the assistance, expertise, and resources of its private sector partners. These partners can help conduct the necessary research, develop and help implement ICT policy, to achieve the goals on local levels where a true impact can be made in developing a strong ICT sector, educating the workforce, and creating regional jobs. This recommendation correlates to the Partners in ICT Development (3), Scientific/Industrial Research Capacity Development (12), and Legal, Regulatory, and Institutional Framework Provisions (11) of Ghana's Priority Focus Areas of ICT4 Accelerated Development.

### **Education/Human Capital**

The Government of Ghana should utilize these institutional linkages to learn the specific business needs of its workforce. Specifically, companies competing in the BPO sector require a very specialized skillset. The government should assign a specific ministry or private sector partner to research, interview, or survey BPO sector businesses to fully understand the specific skills that these businesses demand. Then, the government can develop education policies and programs to help increase these specific skills in the workforce. These education policies can range from reforming the primary and secondary education curriculum to expose younger children to basic ICT skills (long-term sustainable skills), or providing subsidies or other assistance to vocational/technical schools (to meet short term skills needs). If Ghana desires to build a strong ICT workforce, education and language skills are crucial to achieving these goals. However, the private sector's

immediate and long term needs should be strongly considered before drafting or implementing any policies or programs. This recommendation corresponds to the Accelerated Human Development (1), Promoting ICTs in Education (2), and Education and human Capital (6) Priority Focus Areas of ICT4 Accelerated Development.

### Legal/Regulatory

Ghana is strongly advised to develop and implement businesses-friendly policies that enable foreign direct investors to gain easier access to Ghana's markets. Although Ghana has lowered its corporate tax rate to 25% for the first three years after a new business starts and offers incentives for manufacturing industries, ccxxiii there should also be additional business friendly policies that are aimed at specifically impacting the services sector. These policies will be vital since BPO is a key driver in the growth of the ICT services sector, and the majority of future growth will be generated by the services sector firms and not manufacturing. Therefore, it is essential that the business environment support the launch and growth of services-based firms. Policies for consideration should include but are not limited to fewer procedures/paperwork required when initiating operations onshore, and lower corporate taxes (special tax zones for ICT companies or minimal corporate tax, dividend repatriation, in additional to the investment incentives and guarantees the government already has in place). Mauritius experienced an influx of FDI at around \$430 million in 2010 along from large multinational firms after implementing these types of business environment policies. ccxxiv See Recommendation#5 below for specific ICT Park legal and regulatory fiscal options to attract FDI.

Developing demand and supply together of ICT goods and services is important to a successful sector. One of the ways this can be achieved is through the allocation of funds to develop more content. The Ministry of Information Communication and Technology of Thailand created a policy that recognizes Digital Content Production is recognized as a priority sector. It provides resources for development of local content for community, education, and public health organizations.<sup>ccxxv</sup> While Ghana has an e-Government program, more programs should be developed so that people and businesses can easily access information and use ICT products and services in a productive manner.

This should also include updating government websites with current information. A potential investor may decide to go to another country because of lack of knowledge of the advantages that Ghana already provides. For example: the Ghana Investment Promotion Centre lists countries with which it has Investment Promotion and Protection Agreements which are the UK, the Netherlands, Germany, Malaysia, China, Denmark, and Switzerland.<sup>ccxxvi</sup> As of July 16<sup>th</sup>, 2012 Ghana signed such an agreement, also known as a Bilateral Investment Treaty with the United States.<sup>ccxxvii</sup> Displaying updated and accurate information is of great importance in attracting potential business partners who are unfamiliar with Ghana.

Additionally, Ghana must focus on implementing and rigorously enforcing regulations to further curb corruption, uphold intellectual property and contract

rights, and develop privacy security. Mauritius is one example of an African country that attracted significantly greater FDI after focusing on improving these areas. It is critical that Ghana incorporate methods for improving these key areas into its Strategic Plan discussed in *Recommendation #1*. This recommendation corresponds to Facilitating Government Administration and Service Delivery (3); Government and Governance (4); Facilitating National Security and Law and Order (14); and Legal, Regulatory, and Institutional Framework Provisions (11) Priority Focus Areas of ICT4 Accelerated Development.

# Infrastructure

Infrastructure development is critical in attracting top FDI. Therefore the Government should continue to construct ICT office parks or special business zones that incorporate several of the following business environment characteristics. These attributes have proven to be successful in helping to grow the ICT sector in other developing countries, and include:

- Income tax holiday on profits from exports, higher rates of depreciation on ICT equipment and infrastructure, duty free imports, and 50% tax exemption for five on profits ploughed back into the local entity – *India;*
- b. 100% tax exemption for ten years after initial period, 100% deduction on capital expenditures, duty free imports of multimedia equipment, and 50% cost reduction on feasibility studies and business planning expenses *Malaysia;* and
- c. 100% corporate income tax exemption for the first 7 years, 100% exemption from dividend withholding tax for foreign investment in technology, and exemption from custom duties, VAT, and excise taxes for companies that were established with foreign investment *Korea.*<sup>ccxxviii</sup>

Additionally, some of the basic infrastructure capabilities that should be consistent throughout all ICT parks include:

- d. Reliable and stable electricity connections, including backup power sources to allow for 24/7 electrification, and possible subsidies for reduced prices;
- e. Competitive market priced telecommunication services;
- f. Reliable and stable government or private broadband Internet connections; and
- g. Proximity to paved roads (or other transportation areas such as airports or seaports), clean water, sewage and affordable housing units.<sup>ccxxix</sup>

Also, Ghana should continue improving the national infrastructure of continuous broadband Internet access, and grow the reach of mobile telecommunication capabilities in rural areas. This recommendation corresponds to the Rapid ICT and Enabling Physical Infrastructure Development (10); and Focus Areas and Goals of ICT Development (3) Priority Focus Areas of ICT4 Accelerated Development.

### Limitations

While we tried to be as thorough as possible, one of the limitations we had was that our team did not have the resources to make trips to Ghana or the other countries that we analyzed in the Comparative Analysis. Two of our group members had spent the previous summer there, but it would have been helpful in the Comparative Analysis team were able to go to Ghana after its research to talk to individuals in person and do research on the groups such as reviewing the progress of the IT park construction. We tried the best we could to reach individuals in Ghana remotely (via email and telephone), but this posed quite a challenge that would have been easier if we were actually in Ghana.

### **Future Research**

While we chose a diverse and relevant set of countries to research ICT policies and their effects for Ghana, in the future a team can look into more countries. Furthermore, depending on how long in the future this will be, a team will have more information on the effects of current policies and will see if and how ICT policy in Ghana changes. A future team could also perform a detailed cost-benefit analysis of proposed recommendations if the time and money were available, but this might not be feasible for a systems synthesis project.

# Chapter 7 Quantitative Analysis

# Methodology

# Introduction

The first three methods sections of this white paper address the relevant institutions in Ghana (Ghana's Institutional Network Map), economic factors important for Ghana's ICT sector (through the qualitative expert Survey) and what the policy environments look like in peer countries (comparative analysis). While these sections bear substantial fruit for our analysis they are all based on qualitative data. We strongly believe hard data should complement these more qualitative methodologies. In this section we seek to analyze the National Innovation System (NIS) and economic environment within the 10 peer countries determined by the comparative analysis.

### Methodology

22 indicators have been chosen based on the economic and NIS literature.<sup>ccxxx</sup> These indicators have been separated into five sub-indicator categories that reflect the necessary conditions to sustain a NIS for the ICT sector in developing countries: institutional, financial, demographic, scientific and technological. Figure 11 provides detail on these categories (see Findings on the Indicators for more detail).

		Figure 11: Inc	licators	
Demographic	Financial	Institutional	Science	Technology
Population ages 15-64	Bank non performing loans	Corruption Perception Index	Firms offering formal training	Fixed broadband Internet subscribers
Unemployment	Domestic credit provided by banking sector	Political Stability/Absence of Violence	R&D expenditure	ICT goods exports
	Foreign direct investment		Researchers in R&D	ICT goods imports
	Gross capital formation		Scientific and technical journal articles	Internet users
	Inflation		Technicians in R&D	Investment in telecoms with private participation
				Mobile-cellular telephone subscription
				Secure Internet servers
				Telephone lines

Our quantitative analysis includes data reflecting the behavior of Ghana and its peer countries in their respective ICT sectors. We collected data according to the following criteria: data must reflect socio-demographic and institutional performance; hard data, not surveyed data; data in base year 2000, and in 2009; and the availability of the data for the 11 countries. We track traditional indicators for innovation such as number of patents and investment in R&D, but also include indicators related to a country's institutional and demographic situation. We also recognize the absence of some indicators such as tertiary enrollment rates in education due to the lack of data based on the previous criteria.

Using the data available in our database, we created a comparison table among the 11 countries, comparing figures in the base year of their indicators (2000), and then comparing it to the most recent year available (2009). We standardized all the indicators in order to compare them. Then, we weighted the deviation from the mean for each indicator. Weights are based on the correlation between indicators (indicators such as ICT exports and imports are highly correlated so we reduced the weight of these indicators to avoid essentially double counting them) and the importance of each sub-indicator category towards the ICT sector in a country similarly positioned to Ghana (see Quantitative Appendix for weights). Each country's score is a percentage of the top ranked country for each indicator. In other words, the score is the percentage of a hypothetical "perfect country" that ranks first on all indicators. Figure 12 shows the rankings and compares these rankings to the World Bank's 2012 *Doing Business Index* and the World Economic Forum's *Global Information Technology Report*.

	Figure 12:	Comparing l	ndices	
Country	2012 Score CMU (percent NIS of Index perfect)		World Bank Index	WEF Index
South Korea	1	73.87%	1	1
Mauritius	2	53.11%	4	3
Botswana	3	49.04%	6	9
Malaysia	4	47.44%	2	2
Thailand	5	36.93%	3	6
South Africa	6	29.74%	5	5
India	7	25.98%	10	4
Ghana	8	24.43%	7	11
Indonesia	9	22.59%	9	7
Philippines	10	17.93%	11	8
Kenya	11	5.23%	8	10

Not surprisingly, South Korea ranks first in our NIS ranking. South Korea has been developing rapidly since the 1980s and is much farther along than most of the other countries we are comparing. Indeed, South Korea was primarily included in the ranking to indicate a "best practices" country. South Korea ranked first in ten of the 22 indicators. The NIS ranking is reasonably similar to indices created by the World Bank and the WEF, with a few exceptions. Most notable are the second and third place ranks of Mauritius and Botswana. Some of the competitive advantages of Mauritius are a large working age population (first-place rank) and a robust basic telecommunication networks, particularly in telephone lines (secondplace rank). Botswana ranks fourth in Foreign Direct Investment (FDI), although this investment is predominately in the mining and energy sector. However, Botswana leverages its resource endowment to move up the value chain through ICTs (as is seen in its growing manufacturing sector). CCXXXI Where Mauritius and Botswana really shine is in institutional factors. Of the countries studied Botswana and Mauritius rank first and second in the World Bank's political stability index and first and third in the Transparency International's Corruption Perception Index (CPI), respectively.<sup>ccxxxii</sup> Part of the CPI score is certainly related to recent efforts by each government to increase ministerial level transparency (see country analysis for more detail).

### **Relevance to Ghana**

Ghana ranks eighth in current NIS structures, above Indonesia, the Philippines, and Kenya. Several financial indicators, such as access to capital, inflation and non-performing bank loans restrict Ghana's development. Ghana does well in the FDI indicator, with most financial flows currently focused in the recent discovery of oil. One question is whether or not Ghana can learn from the lessons of Botswana and use its natural resource endowment to springboard into higher value ICT services. Ghana also does very well in some ICT infrastructure areas. Ghana ranks number one for private sector telecommunication investment 2007-2009, with 3.3 percent of GDP going to this area. This percentage is nearly 0.64 percent higher than Kenya, the second highest investor in this area.

### Rate of Progress 2000-2012

One of the shortcomings of traditional indices (such as those used by the WEF and the World Bank) is that they are usually static, capturing a snapshot of global competitiveness or ICT leadership. However, as Ghana considers how it measures up to peer countries, the speed at which competitors are advancing is as important, if not more important, than static rankings. In order to address the dynamic nature of global competition in the BPO and ICT sectors, we also evaluated the rate of progress countries have made over the last decade across the 22 indicators. Weights used in the NIS Index are also used for the Rate of Progress index.<sup>ccxxxiii</sup> Figure 13 indicates the rate of progress for each country between 2000 and 2012.

Figur	Figure 13: Rate of Progress 2002-2012										
Country	Rate of Progress	World Bank	WEF								
Indonesia	1	9	7								
Ghana	2	7	11								
South Korea	3	1	1								
India	4	10	4								
Botswana	5	6	9								
Mauritius	6	4	3								
Kenya	7	8	10								
South Africa	8	5	5								
Philippines	9	11	8								
Thailand	10	3	6								
Malaysia	11	2	2								

The rate of progress index paints a different picture than the overall 2012 ranking. Indonesia and Ghana rank first and second amongst the countries evaluated in terms of progress made over the last decade. Both countries have rapidly increased investments in ICT infrastructure, worker training, and access to credit and employment. In particular, Ghana leads the pack in rate of change in access to mobile devices, Internet penetration rates and private sector investments in ICTs. One potential critique levied against our approach is that Ghana is improving so fast because it started with such a low base in 2000. There are a couple responses to this criticism; first, because we sum absolute change with percentage change it is harder for countries with low bases to see large absolute changes. For example, it is harder for Ghana to go from two percent penetration rates to seven percent, compared to South Korea moving from sixty percent to sixty-five percent-despite both countries seeing increases of five percent. Second, short of South Korea, none of the countries evaluated are approaching "hard ceilings" in any of the indicators. Indeed, because we study developing economies, there is no reason to believe that ceteris paribus any of the countries evaluated should not be able to make equal progress across the indicators. This is especially true when one considers South Korea, despite being the only upper-middle income country, still ranks third in terms of progress.

What Ghanaian policy makers can take away from the change score is that Ghana is moving in the right direction on many levels and at a faster pace than many of its peer countries.

# Rankings for 2012

Country	Overall Rank	Overall Score	Bank nonperformin g loans to total gross loans (%)	Rank	Domestic credit provided by banking sector (% of GDP)	Rank	Firms offering formal training (% of firms)	Rank
South Korea	1	73.9%	1.2	1	109.4	4	39.5	5
Mauritius	2	53.1%	3.3	4	106.8	5	25.6	9
Botswana	3	49.0%	3.1	3	-1.0	11	51.9	2
Malaysia	4	47.4%	3.6	6	137.4	2	50.1	3
Thailand	5	36.9%	5.3	8	137.0	3	75.3	1
South Africa	6	29.7%	5.9	9	184.2	1	36.8	6
India	7	26.0%	2.3	2	70.4	6	15.9	10
Ghana	8	24.4%	16.2	11	28.7	10	33.0	7
Indonesia	9	22.6%	3.3	5	37.0	9	4.7	11
Philippines	10	17.9%	4.1	7	48.7	7	31.1	8
Kenya	11	5.2%	7.9	10	43.1	8	48.5	4

Country	Overall Rank	Overall Score	Fixed broadband Internet subscribers (per 100 people)	Rank	Foreign direct investment, net inflows (% of GDP)	Rank	Gross capital formation (% of GDP)	Rank
South Korea	1	73.9%	34.1	1	0.3	11	26.3	4
Mauritius	2	53.1%	5.3	3	2.9	3	21.2	6
Botswana	3	49.0%	0.5	9	7.1	1	31.8	2
Malaysia	4	47.4%	5.5	2	0.7	9	14.4	11
Thailand	5	36.9%	4.6	4	1.8	6	21.2	7
South Africa	6	29.7%	1.0	6	1.9	5	19.5	8
India	7	26.0%	0.6	8	2.6	4	36.6	1
Ghana	8	24.4%	0.1	10	5.5	2	22.9	5
Indonesia	9	22.6%	0.8	7	0.9	8	31.0	3
Philippines	10	17.9%	1.9	5	1.2	7	16.6	10
Kenya	11	5.2%	0.0	11	0.4	10	19.4	9

Country	Overall Rank	Overall Score	ICT goods exports (% of total goods exports)	Rank	ICT goods imports (% total goods imports)	Rank	Inflation, GDP deflator (annual %)	Rank
South Korea	1	73.9%	21.9	3	13.0	4	3.4	6
Mauritius	2	53.1%	0.8	9	5.3	9	-0.2	3
Botswana	3	49.0%	0.4	10	4.6	10	-5.5	2
Malaysia	4	47.4%	36.5	1	30.1	2	-6.9	1
Thailand	5	36.9%	19.8	4	15.7	3	1.9	4
South Africa	6	29.7%	1.3	7	8.7	6	7.7	8
India	7	26.0%	3.5	6	7.8	7	6.0	7
Ghana	8	24.4%	0.0	11	4.6	11	16.6	11
Indonesia	9	22.6%	5.9	5	8.9	5	8.3	9
Philippines	10	17.9%	36.4	2	33.2	1	2.8	5
Kenya	11	5.2%	1.1	8	6.3	8	9.2	10

Country	Overall Rank	Overall Score	Internet users (per 100 people)	Rank	Investment in telecoms with private participation from 2007 to 2009 (% of GDP)	Rank	Population ages 15-64 (% of total)	Rank
South Korea	1	73.9%	79.6	1	-	-	72.3	1
Mauritius	2	53.1%	22.8	3	0.1	10	70.9	2
Botswana	3	49.0%	6.2	9	0.5	7	63.2	8
Malaysia	4	47.4%	55.9	2	0.4	8	64.6	6
Thailand	5	36.9%	20.1	4	0.3	9	70.4	3
South Africa	6	29.7%	10.1	5	0.8	3	65.1	5
India	7	26.0%	5.1	11	0.7	5	64.2	7
Ghana	8	24.4%	5.4	10	3.3	1	57.5	10
Indonesia	9	22.6%	6.9	8	0.6	6	67.2	4
Philippines	10	17.9%	9.0	7	0.7	4	60.6	9
Kenya	11	5.2%	10.0	6	2.7	2	54.9	11

Country	Overall Rank	Overall Score	Research and development expenditure (% of GDP)	Rank	Researchers in R&D (per million people)	Rank	Scientific and technical journal articles as (per GDP)	Rank
South Korea	1	73.9%	3.4	1	4946.9	1	44.1	1
Mauritius	2	53.1%	0.4	7		-	0.1	11
Botswana	3	49.0%	0.5	5	-	-	1.8	7
Malaysia	4	47.4%	0.6	4	364.6	3	1.0	9
Thailand	5	36.9%	0.2	9	315.5	4	3.8	6
South Africa	6	29.7%	0.9	2	395.6	2	8.5	3
India	7	26.0%	0.7	3	128.3	5	5.5	4
Ghana	8	24.4%	0.2	8	17.3	9.000	1.7	8
Indonesia	9	22.6%	0.1	11	89.6	6	0.3	10
Philippines	10	17.9%	0.1	10	78.5	7	13.0	2
Kenya	11	5.2%	0.4	6	56.2	8	4.7	5

Country	Overal I Rank	Overal I Score	Secure Internet servers (per 1 million people)	Rank	Technician s in R&D (per million people)	Rank	Telephon e lines (per 100 people)	Rank	Unemploy ment, total (% of total labor force)	Rank
South Korea	1	73.9%	918.5	1	824.8	1	56.1	1	3.6	2
Mauritius	2	53.1%	62.0	2		-	29.0	2	7.3	6
Botswana	3	49.0%	3.5	7	-	-	6.9	8	17.6	10
Malaysia	4	47.4%	33.0	4	53.9	6	16.2	3	3.7	4
Thailand	5	36.9%	9.7	5	139.6	2	10.5	5	1.2	1
South Africa	6	29.7%	40.4	3	127.5	3	8.7	6	23.8	11
India	7	26.0%	1.5	8	97.0	4	3.1	9	4.4	5
Ghana	8	24.4%	0.7	11	15.1	7	1.1	11	3.6	3
Indonesia	9	22.6%	1.3	9	-	-	14.7	4	7.9	8
Philippines	10	17.9%	5.3	6	10.9	8.000	7.4	7	7.5	7
Kenya	11	5.2%	1.3	10	63.0	5	1.7	10	9.8	9

Country	Overall Rank	Overall Score	Corruption Perception Index**	Rank	Political Stability/ Absence of Violence	Rank	Mobile- Cellular Telephone Subscriptions per 100 inhabitants	Rank
South Korea	1	73.9%	5.5	2	50.7	3	100.0	2
Mauritius	2	53.1%	5.4	3	69.2	2	84.1	6
Botswana	3	49.0%	5.6	1	82.9	1	94.6	4
Malaysia	4	47.4%	4.5	5	43.1	5	107.9	1
Thailand	5	36.9%	3.4	7	11.8	8	96.0	3
South Africa	6	29.7%	4.7	4	41.2	6	93.3	5
India	7	26.0%	3.4	8	10.4	9	43.5	11
Ghana	8	24.4%	3.9	6	45.5	4	63.4	9
Indonesia	9	22.6%	2.8	9	21.3	7	68.9	8
Philippines	10	17.9%	2.4	10	7.1	11	82.4	7
Kenya	11	5.2%	2.2	11	9.5	10	49.1	10

# Rate of Progress

		Bank nonperforming loans		Domestic credit provided by banking sector (% of GDP)		Firms offering formal training (% of firms)	
Country	Overall Rank	Percentage Change	Rank	Percentage Change	Rank	Percentage Change	Rank
Indonesia	1	-90%	1	-39%	10	-80%	11
Ghana	2	36%	9	-27%	9	0%	6
South Korea	3	-87%	2	46%	2	0%	4
India	4	-82%	4	37%	3	-11%	8
Botswana	5	82%	10	-99%	11	38%	2
Mauritius	6	21%	8	51%	1	-59%	10
Kenya	7	-76%	6	10%	5	0%	5
South Africa	8	83%	11	21%	4	-43%	9
Philippines	9	-83%	3	-16%	8	43%	1
Thailand	10	-70%	7	-1%	7	-1%	7
Malaysia	11	-77%	5	-1%	6	19%	3

		Fixed broadband Internet subscribers (per 100 people)		Foreign direct investment, net inflows (% of GDP)		Gross capital formation (% of GDP)	
Country	Overall Rank	Absolute Change	Rank	Percentage Change	Rank	Percentage Change	Rank
Indonesia	1	78%	7	-133%	11	39%	2
Ghana	2	11%	10	64%	4	-5%	6
South Korea	3	2567%	1	-85%	10	-14%	9
India	4	64%	8	246%	2	50%	1
Botswana	5	50%	9	604%	1	0%	5
Mauritius	6	533%	3	-50%	6	-19%	10
Kenya	7	2%	11	-56%	7	11%	4
South Africa	8	97%	6	159%	3	23%	3
Philippines	9	188%	5	-58%	8	-10%	8
Thailand	10	461%	4	-33%	5	-7%	7
Malaysia	11	552%	2	-82%	9	-46%	11

		ICT goods exports (% of total goods exports)		ICT goods imports (% total goods imports)		Inflation, GDP deflator (annual %)	
Country	Overall Rank	Percentage Change	Rank	Percentage Change	Rank	Percentage Change	Rank
Indonesia	1	-51%	10	326%	1	-60%	4
Ghana	2	-77%	11	41%	3	-39%	6
South Korea	3	-37%	8	-40%	10	-32%	7
India	4	105%	3	_ 43%	2	63%	11
Botswana	5	-47%	9	-14%	6	-14545%	1
Mauritius	6	493%	2	-1%	5	-110%	3
Kenya	7	2463%	1	29%	4	51%	10
South Africa	8	-21%	5	-29%	7	-13%	8
Philippines	9	-6%	4	-13%	8	-51%	5
Thailand	10	-31%	7	-33%	9	45%	9
Malaysia	11	-31%	6	-26%	11	-178%	2

		Internet users (per 100 people)		Investment in telecoms with private participation from 1998 to 2000 (% of GDP)		Population ages 15-64 (% of total)	
Country	Overall Rank	Percentage Change	Rank	Percentage Change	Rank	Percentage Change	Rank
Indonesia	1	648%	8	-9%	6	4%	4
Ghana	2	3441%	2	822%	1	3%	8
South Korea	3	82%	3	-		1%	11
India	4	871%	7	289%	2	5%	3
Botswana	5	112%	11	-36%	8	7%	1
Mauritius	6	211%	6	-98%	10	5%	2
Kenya	7	3057%	1	113%	3	4%	7
South Africa	8	85%	10	-42%	9	4%	5
Philippines	9	354%	9	11%	5	4%	6
Thailand	10	445%	5	-24%	7	2%	10
Malaysia	11	161%	4	23%	4	3%	9

		Research and development expenditure (% of GDP)		Researchers in R&D (per million people)		Scientific and technical journal articles	
Country	Overall Rank	Percentage Change	Rank	Percentage Change	Rank	Percentage Change	Rank
Indonesia	1	23%	5	-57%	9	44%	6
Ghana	2	0%	8	0%	8	10%	10
South Korea	3	46%	1	110%	1	133%	3
India	4	-5%	9	17%	5	94%	4
Botswana	5	0%	6	-		-18%	11
Mauritius	6	27%	4	-		63%	5
Kenya	7	0%	7	0%	7	25%	8
South Africa	8	39%	2	55%	3	29%	7
Philippines	9	-10%	10	2%	6	21%	9
Thailand	10	-15%	11	105%	2	206%	1
Malaysia	11	35%	3	33%	4	194%	2

		Secure Internet servers (per 1 million people)		Technicians in R&D (per million people)		Telephone lines (per 100 people)	
Country	Overall Rank	Percentage Change	Rank	Percentage Change	Rank	Percentage Change	Rank
Indonesia	1	386%	11	-	3	370%	1
Ghana	2	1301%	3	0%	10	1%	6
South Korea	3	12507%	1	79%	4	0%	8
India	4	1206%	4	13%	8	0%	7
Botswana	5	554%	8	-	2	-10%	9
Mauritius	6	520%	5	-	1	24%	3
Kenya	7	4127%	2	0%	9	80%	4
South Africa	8	249%	7	72%	5	-22%	10
Philippines	9	513%	9	-4%	11	87%	2
Thailand	10	433%	10	42%	6	18%	5
Malaysia	11	442%	6	37%	7	-18%	11

		Unemployment, total (% of total labor force)		Corruption Perception Index		Political Stability/Absence of Violence	
Country	Overall Rank	Percentage Change	Rank	Percentage Change	Rank	Percentage Change	Rank
Indonesia	1	30%	1	65%	1	526%	1
Ghana	2	-65%	11	11%	5	45%	2
South Korea	3	-18%	6	38%	2	-13%	8
India	4	2%	4	21%	3	-43%	10
Botswana	5	11%	2	-7%	10	5%	4
Mauritius	6	-17%	7	15%	4	-3%	5
Kenya	7	0%	5	5%	7	-36%	9
South Africa	8	-11%	8	-6%	8	14%	3
Philippines	9	-33%	10	-14%	11	-36%	7
Thailand	10	-50%	9	6%	6	-80%	11
Malaysia	11	23%	3	-6%	9	-9%	6

		Mobile-Cellular Telephone Subscriptions per 100 inhabitants	
Country	Overall Rank	Percentage Change	Rank
Indonesia	1	3908%	7
Ghana	2	9226%	2
South Korea	3	71%	11
India	4	12688%	5
Botswana	5	648%	6
Mauritius	6	459%	10
Kenya	7	11868%	3
South Africa	8	401%	9
Philippines	9	887%	8
Thailand	10	1883%	1
Malaysia	11	393%	4

# Findings

## **Demographic Indicators**

The percent of the population ages 15-64 as percentage of the total population serves as a prime indicator for labor potential. Countries with population in workable ages could be more attractive to businesses. On the other hand, the unemployment rate is an important indicator how well those in the labor market are actually able to find employment.

Although South Korea has the best potential labor force, they had the slowest growth during the last decade. Kenya remains the smallest proportional labor force, and Botswana had the best progress in this indicator. Regarding unemployment, Thailand has the lowest rate and South Africa the highest one. Nonetheless, Ghana has reduced its unemployment the fastest, while Indonesia, a BPO competing country, had the worst performance 2000 to 2012.

### **Financial Indicators**

Access to credit from the banking sector and a low non-performing loan rate are important factor when developing an industry with many intangible assets (knowledge, skills, etc.) such as the ICT sector. Similarly, a large amount of FDI proportional to GDP is a good indicator to measure the conditions that an economy offers to foreign investments. The negative effect on foreign capital is measured by the inflation rate. It is also important to measure the increase of investments in the economy using gross capital formation as a proxy. South Africa is providing the most credit to its economy, but showed the worst progress on nonperforming loans during the period. Botswana has the least access to credit. Performance of loans is better in South Korea than in Ghana, which has the largest amount of nonperforming loans. In terms of progress, Indonesia made the most progress in expanding credit, and increasing the performance of loans. The opposite was true in Mauritius, which is the leader in the provision of credit.

FDI as a proportion of GDP is highest in Botswana, which also ranks first in progress; South Korea is ranked last for attracting FDI, but Malaysia had the worst performance during the last decade. India ranks first in gross capital formation, while Malaysia is at the bottom of the list of this indicator. They show the same pattern of progress during the last decade.

In terms of inflation, the lowest and highest rates among the 11 peer countries are in Malaysia and Ghana, respectively. But the rate of progress for these indicators shows us that Kenya struggled most with lowering inflation during the last decade, as opposed to Botswana which lowered rates the most across the 10 year period.

### Institutional

We believe that political stability and low levels of corruption are positive indicators of stability for business and foreign capital to enter into an economy. While Botswana leads as the country with less corruption and more political stability, Kenya ranks as most corrupt, and Philippines as least stable. Indonesia was the country with the best institutional progress; it showed the greatest improvement in political stability and reduction of corruption. The Philippines had the worst progress in terms of reducing corruption, and Thailand in terms of increasing political stability. As expected, Ghana ranks well on the political stability indicator. Evidence of Ghana's stable domestic political climate were recently seen in the smooth and transparent presidential election process on December 7<sup>th</sup>, 2012.

### Science

It is important that firms offer formal training to give more skills to the labor force. Beyond that, traditional indicators such as R&D expenditure, number of researchers and technicians, and scientific and technical journal articles are seen as a good approach for measuring levels of innovation.

In this sense, Thailand comes first in firms offering formal training; Indonesia is last. Botswana shows the best progress during the last decade, as opposed to Mauritius that had the slowest progression in this area.

South Korea leads terms of R&D as percentage of GDP, number of researchers in R&D per million people, and technicians in R&D per million people. The least favored in the ranking were Indonesia in terms of R&D as a percentage of GDP, Ghana for the number of researchers in R&D per million people, and Philippines in terms of technicians in R&D per million people). Thailand shows the least progress in R&D as a percentage of GDP, Philippines in technicians in R&D per million people, and Indonesia in researchers in R&D per million people. When analyzing the number of scientific and technical journal articles published, South Korea leads the index and the rate of progress during the last decade. Mauritius is the least favored country in the index, but Botswana made the smallest progress of the 11 peer countries analyzed.

### Technology

Access to Internet, mobile, and landlines establish better conditions for a NIS. Similarly, investment in telecoms is important to improve the ICT sector. In addition, wider and active trade of ICT goods exports and imports is desirable to the success of the sector. Finally, security of Internet servers is a proxy to measure is the state of development of the ICT sector.

In terms of fixed broadband Internet subscribers, Internet users and telephone lines South Korea is the leader. Nonetheless, Malaysia ranks first in mobile cellulartelephone subscriptions. Kenya is the least favored in fixed broadband Internet subscribers. India is ranked last in Internet users per 100 people, and Ghana comes last in telephone lines per 100 people. However, this indicator is somewhat misleading as Ghanaians have largely "leapfrogged" fixed phone lines through mobile phones.

Looking at the rate of progress, the story is different. Even if South Korea ranks first in the increase of fixed broadband Internet subscribers, Kenya is leading in terms of increase in Internet users, Thailand in mobile cellular-telephone subscriptions, and Indonesia in telephone lines. The slowest rates of growth went to Kenya in fixed broadband Internet subscribers, Botswana in Internet users, South Korea in mobile cellular-telephone subscriptions, and Malaysia in telephone lines. Regarding the trade activity and investment in the ICT sector, Malaysia is the first exporter of ICT goods, Philippines the first importer of ICT goods, and Ghana is investing the most in telecoms with private participation as percentage of the GDP. On the contrary, Mauritius ranks last in investments in telecoms, and Ghana ranks last as exporter and importer of ICT goods as a percentage of the GDP. Malaysia has the same position when analyzing the progress of the exports and imports of ICT goods. On the contrary, Kenya stands as first in progress on exports of ICT goods, and Indonesia leads progress in imports of ICT goods. Ghana also led the rate of progress of investments in telecoms with private participation, while Mauritius made the least progress.

Finally, South Korea ranks first for secure Internet servers, while Ghana takes the last position for this indicator. South Korea follows the same trend taking the first position in the rate of progress in secure Internet servers during the last decade. Indonesia had the least progress in it.

### Limitations

The quantitative analysis faced mainly two limitations. The first one was the availability of data. The World Bank does not include complete information for all the indicators in very country and year. Therefore, we decided to omit some indicators such as tertiary education enrollment that will bring greater support to the analysis. Second, we had time constraints that impeded us to use sophisticated methods such as multi-criteria decision analysis for refine weights of every indicator according to its importance to NIS.

### **Future Research**

We believe that there should be future research on quantitative methods to approach NIS in developing countries. As mentioned before, our methodology to understand and weight the interaction among diverse variables for NIS for development defies existent indexes. New research should be directed to analyze these interactions, and how they differ between developing countries and developed economies.

# Chapter 8 Recommendations

# **Infrastructure Development**

### **ICT Policy**

In 2003, Ghana identified 14 key pillars for ICT development on which the government would like to focus on improving. Additionally, six more pillars such as green computing, environment, climate change, cyber security, broadband growth, and mobile communications were added to this development goal. We found through surveying ICT experts in Ghana that support for domestic enterprises would help to spark ICT growth in the country. The outputs of the ICT sector are intangible and therefore maintaining and adhering to a detailed implementation plan is critical to the sector's growth and development. We found that Ghana's peer countries like Mauritius developed its ICT sector by identifying critical ICT goals (like those developed by Ghana), but also developed a strategic implementation plan or roadmap that included project champion organizations, very specific and detailed procedures for implementing those goals, strict timelines, milestones, evaluation mechanisms and reporting functions for each project (i.e. broadband growth).

Therefore, we recommend that the Ministry of Communication and the Ghana Investment Promotion center refine its ICT policy to include time-bound actions plans, milestones, timelines, and mechanisms for measuring projects and holding champions accountable for their success. The Ministry of Communication should also consider further developing and comprehensively utilizing public-private partnerships such as academia, trade organizations, consultants, and entrepreneurs to help achieve the overarching mission and vision on a local or regional level. The Ministry of Communication collaborates with the Ghana Telecommunications University College and the Business School of Kwame Nkrumah University of Technology, but this needs to be expanded. The government does not have the resources to incorporate large-scale ICT projects on its own, and therefore can leverage the assistance, expertise, and resources of its private sector partners. These partners can help conduct the necessary research, develop and help implement ICT policy, to achieve the goals on local levels where a true impact can be made in developing a strong ICT sector, educating the workforce, and creating regional jobs. These entities can leverage the best practices found in the ICT policies of Mauritius, and the Industrial Sector Support Program (2011-2015) of Ghana.

### **Technology Park Development**

Currently, there has been limited progress in the development of ICT park investment. A strategy for development was created in 2003, but has yet to be fully realized. Attracting FDI and foreign businesses to operate onshore is a critical factor for success, particularly in the ICT sector. Foreign businesses can incorporate ICT best practices and successes into an economy that may take years to otherwise realize. We found that Ghana's peers such as Mauritius, South Africa, India, Malaysia, and South Korea have developed ICT parks simultaneously with attracting FDI by offering 100% tax exemptions on profits earned and reinvested back into ICT capital expenditures, no repatriation or corporate taxes on foreign companies operating within these ICT zones, and duty-free imports of ICT related equipment.

Therefore, we recommend that the Ministries of Communications and Trade and Industry should continue to construct ICT office parks or special business zones that incorporate several of the following business environment characteristics. These attributes have proven to be successful in helping to grow the ICT sector in other developing countries, and include:

- Income tax holiday on profits from exports, higher rates of depreciation on ICT equipment and infrastructure, duty free imports, and 50% tax exemption for five on profits ploughed back into the local entity;
- 2. 100% tax exemption for ten years after initial period, 100% deduction on capital expenditures, duty free imports of multimedia equipment, and 50% cost reduction on feasibility studies and business planning expenses; and
- 3. 100% corporate income tax exemption for the first 7 years, 100% exemption from dividend withholding tax for foreign investment in technology, and exemption from custom duties, VAT, and excise taxes for companies that were established with foreign investment.

Additionally, some of the basic infrastructure capabilities that should be consistent throughout all ICT parks include:

- 1. Reliable and stable electricity connections, including backup power sources to allow for 24/7 electrification, and possible subsidies for reduced prices;
- 2. Competitive market priced telecommunication services;
- 3. Reliable and stable government or private broadband Internet connections; and
- 4. Proximity to paved roads (or other transportation areas such as airports or seaports), clean water, sewage and affordable housing units.

Best practices for ICT park success have been developed by consulting firms such as Pricewaterhouse Coopers and the World Bank, and implemented in countries India, South Korea, and Malaysia.

# **Business Development**

### Ease of Doing Business

Ghana has developed the Private Sector Development Strategy-II for improving Ghana's business climate. Projects under this strategy received the support of the Government of Denmark's international development agency DANIDA for assistance with project completion by 2014. However, there is little progress being made, tracked, and reported on the projects that meet the goals delineated in the business development plan. As previously reported, FDI and attracting foreign business to operate onshore are critical to country's economy and ICT sector growth. The foreign enterprises can provide the necessary human capital, knowledge transfer, and best practices spark strong ICT growth in developing countries. We found that Ghana's peers such as Mauritius and Malaysia incorporated simplified practices for foreign companies operating onshore in these countries such as fast visas for expatriates (one to two weeks), fewer startup procedures for both global and domestic firms, and loan guarantees for small ICTrelated business projects (e.g. The Reserve Bank of India guarantees small loans for start-up companies in the ICT sector).

Therefore, we recommend that the Ghana Investment Promotion Center and Ghana Free Zone Board focus on two strategies for incorporated easier business practices. The first is a short-term strategy that can leverage the best practices of trade fairs in the ICT sector. These fairs are popular in the Indian state of Gujarat. The Guajarti government developed a program called Vibrant Gujarati in 2009, where many of the companies operating within the state meet for one week and sign investment deals, contracts, and negotiate terms for conducting business. This program allowed over 7,000 Memoranda of Understanding (MOUs) to be signed worth an estimated \$240 billion in business deals. These fairs permitted faster business development by permitted companies to ask each questions, understand the necessary information, and develop best practices that ultimately resulted in much faster deals than if they executed those distant from one another. The second strategy incorporates the longer term approach of regulatory reform in simplifying procedures for faster on-shoring of foreign business operations. These procedures may include those mentioned above, as well as tangible and achievable tax incentives, immigration incentives, and banking incentives. Policies for consideration should include but are not limited to fewer procedures/paperwork required when initiating operations onshore, and lower corporate taxes (special tax zones for ICT companies or minimal corporate tax, dividend repatriation, in additional to the investment incentives and guarantees the government already has in place). Also, the banking incentives can be used to attract foreign business by offering and guaranteeing larger amounts of local credit, but most importantly assisting ICT startups to grow organically by providing easier access to small amounts of local credit for ICT-specific projects, research, or development. These practices have been incorporated and proven to be successful in Mauritius, Malaysia, and South Africa.

Additionally, the government of Ghana should consider negotiating and signing a Double Taxation Agreements (DTA) with the United States and other trading partners as well. DTAs are agreements that define how much money in taxes an international firm pays to each country it operates in. The goal is for a company to pay an equitable rate of tax based on involvement in each country and should result in a firm paying an effective tax rate of somewhere in between the tax rates of countries involved.

### **eGovernance Projects**

Currently, Ghana has incorporated eGhana project into its government operations with the help of the World Bank. These projects were started in 2006, and extended in 2012 with very little progress being made toward their completion. Also, there are other eGovernance projects underway in Ghana like eJustice,

elmmigration, and eParliament. However, these projects have experienced significant delays in execution, reporting, and accountability. We found that Ghana's peers such as India, Botswana, and South Africa worked around these challenges by developing eGovernance strategies that delineate very specific and achievable government goals for enabling growth in the ICT sector. For example, Mauritius' eGovernance strategy for 2011-2016 incorporated eGovernance goals, including procedures for implementation, timelines, milestones, transparent reporting, responsible parties, and accountability mechanisms to ensure its eGovernance program remained on-track. South Africa's eGovernance strategy incorporates specific procedures for gaining political will, and methods for allowing citizens to participate public affairs. South Africa and Botswana also focused their eGovernance strategies significantly around improved eBusiness and transparency features that publically report on and communicate progress. These factors are especially critical for attracting FDI from global ICT businesses.

Therefore, we recommend that the National Information Technology Agency develop a time-bounded national eGovernance strategy that focuses horizontal governance, reducing government procedures and red-tape, and incorporates the World Bank style project reporting structure.

Improving the eGovernance program should also include updating government websites with current information. Without current information a potential investor may decide to go to another country because of lack of knowledge of the advantages that Ghana already provides. For example: the Ghana Investment Promotion Centre lists countries with which it has Investment Promotion and Protection Agreements which are the UK, the Netherlands, Germany, Malaysia, China, Denmark, and Switzerland. As of July 16<sup>th</sup>, 2012 Ghana signed such an agreement, also known as a Bilateral Investment Treaty with the United States. Displaying updated and accurate information is of great importance in attracting potential business partners who are unfamiliar with Ghana. The best practices in this field can be leveraged from those found in the eGovernance strategies of Botswana, India, Mauritius, and South Africa.

### Last Mile Connectivity

Ghana's liberalization of its telecommunication industry has led to higher penetration rates across the country so far. However, Ghana still has a low broadband and data penetration (around 20-25%) due to high cost of these services. A strong and reliable ICT infrastructure is one of the key components for attracting FDI to a country, particularly for mobile data which is a key driver for innovation. We found that Ghana's peers such as Mauritius, India, South Africa, and the Philippines, gained success in lowering their telecommunications costs and thereby increasing penetration by unbundling the local loop. This resulted in greater competition among telecommunication service providers, which lowered prices and increased broadband penetration in the costly last mile.

Therefore, we recommend that the National Communications Authority and Ghana Investment Promotion Center focus on improving the national infrastructure for last mile connectivity by strengthening the national fiber optic backbone. These projects should be properly planned, and progress should be frequently reported which are two key factors for continued success and attracting FDI. One of the best practices for achieving this is the Bharat Broadband program which is a special purpose vehicle funded by the government of India for improving the national fiber optic cable network.

# Institutional development

### Transparency and consistency

Ghana has been working towards achieving greater transparency and consistency in sharing data related to government projects. The Private Sector Development Strategy II focuses on improvement of business climate by developing institutional framework. There have been efforts to make information regarding government services and projects available in the public domain. eGhana project and GIFMIS project stand as examples. Many of the government departments have websites registered in the .gh domain.

However, we have observed that some of the ministries and agencies have been operating with different domain names casting doubts on the credibility of the data being provided such as the National Vocational Training Institute (http://www.nvtighana.org/), Ghana Library Board (http://www.ghanalibraryboard.com), Ghana Investment Promotion Centre (http://www.gipcghana.com) and Ghana Export Promotion Authority (http://www.gepaghana.org). Experts from our survey and World Bank reports indicate that visibility of data and transparency are the key to institutional development. Countries such as Mauritius and Malaysia have developed standards of transparency for public organization and are encouraging data sharing through Open Government data portals.

We recommend that Ghana, in order to strengthen its institutional framework, push to provide transparent and accurate data which is the backbone of Freedom of Information Act. All the government projects can consider adopting a similar project progress reporting mechanism. NITA, which has been in the forefront of eGovernance reforms, should take the initiative and develop standards for information sharing across government websites and domain name registrations.

# **Human Capital Development**

### **Education Policy Focus**

The Government of Ghana has been emphasizing the role of education in ICT sector through its vision document and strategic plans. However there has been a huge gap between policy and on the ground implementation. E-readiness report from 2009 indicates that Ghana has a student to computer ratio of 42:1 against an idea ratio of 1:1 clearly indicating a divide in digital infrastructure.

It has been observed that similar developing countries lay a heavy emphasis on tertiary education and promote development of infrastructure through fast track approval of projects and plans. KERIS in Korea is an example where new and emerging technologies to promote distance and mobile learning are incubated for rapid deployment. Other examples include BECTA, which is the government agency leading the national drive to ensure effective and innovative use of technology through learning in the UK, and NCET, the Chinese counter. These organizations have also demonstrated the ability to maintain close relationships with the private sector in accomplishing their objectives.

The Government of Ghana should utilize these institutional linkages to learn the specific business needs of its workforce. Specifically, companies competing in the BPO sector require a very specialized skillset. The government should assign a specific ministry or private sector partner to research, interview, or survey BPO sector businesses to fully understand the specific skills that these businesses demand. Then, the government can develop education policies and programs to help increase these specific skills in the workforce. These education policies can range from reforming the primary and secondary education curriculum to expose younger children to basic ICT skills (long-term sustainable skills), or providing subsidies or other assistance to vocational/technical schools (to meet short term skills needs). If Ghana desires to build a strong ICT workforce, education and language skills are crucial to achieving these goals. However, the private sector's immediate and long term needs should be strongly considered before drafting or implementing any policies or programs.

We suggest creation of a special branch within the Ministry of Education focused on the ICT sector with coordination with Ministry of Youth and Employment. The special branch will be to authorize decision and coordinating with private sector partner to research technology interventions.

### Training and productivity

Training and productivity play a key role in skill development especially in the knowledge sector like ICT. We performed a curriculum analysis mapping the curriculum and the skill set required across jobs in the IT industry value chain. Our analysis indicates that the present curriculum focused on very basic skills that do not account for technology competency. For example, the current curriculum for ICT in Junior Secondary and Senior Secondary Schools focuses primarily on basic computer usage skills like word processing, browsers, fundamentals of computing, etc. However, based on our review of equivalent curricula in countries that are similar to Ghana and more advanced technology economies, we found that teaching of more advanced technology development skills is essential in building technology capacity at an early stage. Additionally, based on our simple mapping from the industry tasks to the K12 subject competencies, we realized that strong English and Math skills are key to create a skilled talent pool for the ICT sector, and thus need to given special attention.

It has to be noted that the increased internet penetration led to increased learning. Experts indicate that it is through desktops and laptops promote job training and productivity compared to mobile devices. We too recommend focus on learning through traditional devices and strengthening on core English and math competencies. Educational plan of S. Africa aimed at incorporating ICT skills and standards can be considered as a model for development. South Africa's spending on education was 5.3% of their GDP in 2011and ranked 46 out of 132 economies globally. The quality of education in South Africa is different throughout the country, but high quality education and international standard qualifications are offered by many private schools and colleges. In an effort to improve and restructure the education sector, the government has concentrated its efforts on primary school education through action plans. This includes the "Schooling 2025 Plan" to monitor the educational system against benchmarked standards. NASSCOM's NAC-Tech training program can also be considered as another example. NAC-Tech is as an industry standard assessment and certification program to ensure that the workforce in the ICT sector have consistent training and employable skills. NAC-Tech helps the industry through standardization of skill level among incoming students.

### **Industry readiness**

In terms of industry readiness, Ghana has been in the forefront of reforms and the reforms have also translated to the educational sector. Recent Education Sector Policy 2010-2020 highlights ICT as an enabler for the development of ICT education. However the skills imparted are not transferable and not sufficient across the ICT value chain And thus, as a highlight of the goals pertaining to tertiary education policy beginning 2010, the need to "forge partnerships" and "support collaboration between education institutions, business and commerce, and international and local educational institutions" has been given paramount importance. ICT sector employability is contingent on an individual's access and familiarity with ICT in performing core operational tasks, and that is why use ICT as a tool for human capital readiness rather than just an end goal needs to become the prevalent paradigm,.

Value added industries like healthcare will provide great value compared to sectors like insurance. Industry respondents feel that the vocational training needs to be integrated with employability. With all the analysis in the backdrop, we suggest creating a forum to connect businesses with educational institutions to develop curriculum to match industry needs

University academia partnerships which are being developed in India, Mauritius can be considered as good examples. Already existing partnerships and industry training programs like CISCO certification and Microsoft certifications need to be expanded.

Another example, Botswana's 2016 ICT Policy provides a framework to identify specially trained young adults to help spread the knowledge of ICTs to other citizens around the country. Therefore, Botswana developed specialized programs that train young adults in high quality services such as computer skills, internet training, and technical assistance for small businesses, website design, e-Commerce, and troubleshooting call centers. This *Student Connection and Net Corps* initiative will help build new skills in the local population and workforce, and ideally create entry-level employment opportunities that can translate into sustaining employment in the ICT sector, which is a key element of the National

# **ICT Policy**

Mauritius' government identified the need to improve the educational system, or import the skilled employees from other countries. One example of how the Ministry of ICT plans to resolve the lack of skills is by developing the ICT Academy, which will promote the skills and competencies of the Mauritian workforce, and will serve as a global destination of ICT-related business talents.<sup>ccxxxiv</sup> Mauritius is not only developing a specialty ICT vocational school, but is also partnering with existing schools, trade organizations, and private companies to refine the specific types of ICT skills that are needed to meet industry demand.

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<sup>10</sup> For example see Fagerberg and Srholec, "National innovation systems, capabilities and economic development,".

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# Education sector appendix A,B, C, D

# A & B

IT Sector / Curriculum	Formal - ICT					Formal - non- ICT			
Skill / Competency	Introduction to ICT	Word processing	Spreadsh eet	Interne t	Keyboard skills	Math	English	Basic Design and Technolog y	Social Studies
ITES-BPO									
English language strengths							x		
IT (PC) literacy Cultural affinity to US/UK cultures	x	x	x	х	x		х	x	x
Difficult work shifts	NA	NA	NA	NA	NA	NA	NA	NA	NA
led curriculum Analytical skills	NA	NA	NA	NA	NA	NA x	NA	NA x	NA
Vertical									
Cross-verticals									
Indexing	x	х	х		х				
Data Verification	х	х	х		х		х		
Data entry	x	х	х	х	х		х		
Invoice processing	х		х		х	х	х		
Loan processing	х		х		х	х	х		х
Banking									
Check Processing	x		x		х	х	x		
Mortgage	v		×		v	Y	v		×
processing	*		x		*	~	~		~
Insurance									
Application	v	Y	×		v	Y	v		
processing	*	~	x		*	~	~		
Finance & Accounts									
Account payable	x	х	х		х	х	х		
Account receivable	x	x	х		x	х	х		

Health care

Image keying	x				x	x	
anscription	x	х			x		х
Inslation	x	х			х		х
edical billing	x		x		x	x	x
nagement	x	x			x		x
lecom							
erification Order anagement	x	x	x		x	x	х
ing	х		x		x	x	х
iman resources							
me and tendance	v		v		v	v	v
nployee data	^		^		^	^	^
anagement	x	х	х		х		х
ave tracking	x	x	х		х	х	х
ross-vertical							
edium term							
bound/outbound stomer services	x	x	x		×		x
elp desk	x				x		x
oduct inquiries	x						x
ile, services &	x				x		x
cket loaaina	x			x	x		x
lection support	x				x		x
ELECOM QUIPMENT & ERVICES							
ield installation						x	¥
ubleshooting						A Y	×
stomer support						x	x
dministration	x	x	x	x	x	x	x
aintenance tivities				-	-	x	x
presentative	x	х		x	x		х
ARDWARE AND NTERPRISE OFTWARE							
nix fundamentals ardware	х				х		
tallation distribution	x			x	х		
tallation	x			х	х		
repair	x			х	х		
gration	x			х	х		х
oubleshooting	x			х	х		х
ninistration	x			x	x		
			157				

Applications						
ecosystem	х	х	х	х	Х	х

# С

IT Sector / Curriculum	Formal - ICT					Formal - non-ICT	
Skill / Competency	Introduction	Word	Spreadsheet	Internet	Keyboard	Math	English
Skii / Competency		processing	opreausneet	internet	31113	Maur	Ligisi
ITES-BPO							
English language strengths							x
IT (PC) literacy Cultural affinity to US/UK cultures	X	x	x	x	x		x
Difficult work shifts Specific demand-led	NA	NA	NA	NA	NA	NA	NA
Analytical skills		NA	NA	NA	NA	NA X	NA
Vertical							
Cross-verticals							
Indexing	×	~	×		v		
Data Verification	x	x	x		x		х
Data entry	x	x	x	x	x		x
Invoice processing	х		x		х	x	x
Loan processing	x		x		x	x	x
Banking							
Check Processing	x		x		х	x	x
Mortgage processing	x		х		х	x	х
Insurance Application							
processing	x	х	x		x	x	х
Finance & Accounts							
Account payable	x	х	x		х	x	x
Account receivable	х	х	х		х	х	х
Health care							
Image keying	х				x	х	
Transcription	x	х			х		х
Translation	x	x			х		x
Medical billing	х		х		x	х	х
Member management	x	x			х		x

Telecom							
Verification Order							
management	x	x	x		Х	x	х
Billing	х		х		х	х	х
Human resources							
Time and attendance	x		х		х	x	х
Employee data	×	×	×		v		v
	×	*	*		×	v	~
Leave tracking	X	X	X		X	X	X
Cross-vertical							
medium term							
Inbound/outbound							
customer services	x	х	х		x		х
Help desk	х				х		х
Product inquiries	х						x
(Sale, services &							
reminders)	х				х		х
Ticket logging	x			х	х		х
Collection support	х				х		х
SERVICES							
Field installation						х	х
Troubleshooting						х	х
Customer support						x	х
Administration	x	х	х	х	х	х	х
Maintenance activities						х	х
Store representative	x	х		х	х		x
HARDWARE AND							
ENTERPRISE SOFTWARE							
Unix fundamentals	х				х		
Hardware installation	х			х	х		
ES distribution	Y			Y	v		
	X			X	X		
	X			X	x		
Integration	x			X	X		х
roublesnooting	х			х	х		х
Server administration	х			х	х		
ecosystem	x	х	х	x	х		х

# D

Skill / Competency	Java, VB.Net, C, ASP.Net, Drupal, PHP/MySQL	Software Engineering	Linux	Network Security	CCNA	Diploma in Business Computing	International Computer Driver License (ICDL)	Foundations of Web Technology
ITES-BPO								
English language strengths								
IT (PC) literacy Cultural affinity to US/UK cultures			x		x			
Difficult work shifts Specific demand-led	NA	NA	NA	NA	NA	NA	NA	
curriculum		NA	NA	NA	NA	NA	NA	
Analytical skills						х		

#### Vertical

I

Cross-verticals
Indexing
Data Verification
Data entry
Invoice processing
Loan processing
Banking
Check Processing
Mortgage processing
Insurance
Application
processing
Finance & Accounts
Account payable
Account receivable
Health care
Image keying
Transcription
Translation
Medical billing
Member management
Telecom
Verification Order
Billing
ышыў
Human resources
Time and attendance

 Employee data management							x
Leave tracking							х
Cross-vertical							
Inbound/outbound							
customer services							х
Help desk							х
Product inquiries (Sale, services & reminders)							x x
Ticket logging							x
Collection support							х
TELECOM EQUIPMENT & SERVICES							
Field installation							
Troubleshooting							
Customer support							
Administration							х
Maintenance activities							х
Store representative							х
HARDWARE AND ENTERPRISE SOFTWARE							
Unix fundamentals	x	х	x	x	x	х	х
Hardware installation ES distribution					х		x
installation	x	х				х	х
PC repair							
	х	х	х				х
I roubleshooting							х
Server administration Applications ecosystem			х	х	х	Y	x
0000301011						^	^

#### **Survey Appendix**

<u>Questions 5 and 6</u>: Respondents were asked whether government should promote primarily large stable firms or small dynamic firms to help a small developing economy grow. All 19 respondents of question 5 agreed that small, dynamic firms are more effective. However, when asked the same question, but with the end goal to develop the ICT sector (question 6), **14/18** respondents answered small firms but **4** answered large firms. <u>When</u> <u>considering ICT development, some respondents believe that characteristics of large stable</u> firms (economies of scale, big employee base, geographic reach) are crucial to the rise of <u>an ICT sector</u>. **Respondents:** In question 6, 2 NGO experts called for the promotion of large stable firms. Questions 7 and 8: Again, respondents are asked for their views on a general economic principle for developing nations, and then whether their views change when considering the ICT sector specifically. Question 7 asks whether the government should promote foreign companies or domestic (Ghanaian) companies. All 19 respondents here agreed that domestic firms should be the focus. When asked in the context of the ICT sector (question 8), 11/17 of respondents were in favor of domestic but 6 respondents (from all employment sectors) were in favor of international firms housed in-country. <u>Attracting FDI and foreign businesses are more important when focusing on the development of an ICT sector than on an economy in general.</u>

#### Question 9 and 10:

These questions are designed to understand whether respondents believe that a government should focus on exports or domestic production in developing countries. 12/21 (or 57%) of experts felt the government should promote export-oriented industries to grow a developing economy (NGO and education experts were the only ones calling for domestic-oriented industries). However, when asked about growing the ICT sector (question 10), 13/19 (68%) answered 'domestic industries'. Notably, the government and private sectors shifted their answer from export to domestic. <u>Outputs of an ICT sector are not as tangible and harder to trade; ICT outputs could be very specific to usage in Ghana; Ghana's ICT sector should support domestic enterprises; the Asian export-oriented model may not work in Ghana.</u>

#### Question 11:

Respondents were asked which characteristics of a domestic sector are most important to consider when investing in the ICT sector specifically. Overall, of the 19 who answered, 13 ranked "most productive, value-added industry" as the most important factor to consider when investing in ICT. 17 respondents agreed that the sector with the "largest share of low-wage employment" was the least important or second least important attribute to consider. ICT policy is closely tied to productivity, and the respondents tend to agree that policy should focus on increasing efficiencies and spillover effects. On the other hand, the effects of a developed ICT sector do not necessarily correlate with poverty reduction.

<u>\*\* Question 12</u>: (poor question phrasing)

Respondents are presented with three statements about how firms and innovation interact with external institutions. This question was badly phrased. We gave two extremes as answer choices and the third choice was a balanced answer that most respondents ended up choosing. Interestingly, 3/5 education experts felt that innovation is drive through ecosystems, not firms alone.

Most respondents expect that the private sector (firms) will drive innovation (with external institutions playing a complementary role).

#### Question 13:

Respondents are presented with four telecommunication infrastructure areas and asked which of them the government should invest in to induce the most growth? These areas include mobile calling, fixed high speed, mobile data, and satellite data. <u>Of the 18</u> respondents, 15 found mobile data to be the most important or second most important area, while 15 found satellite to be the least important or second least important

**Respondents**: 3/4 NGO respondents agreed that mobile calling was most important. All 3 private sector experts chose fixed high speed data as the most important area.

\*\* Question 14 (no consensus)

Respondents are presented with four areas for improvement in the telecommunications industry, including improving penetration rates, improving quality of service, lowering the

cost of service, and increasing connectivity speeds. <u>There is tentative agreement that speed</u> of browsing is of lowest importance, with 12 out of 19 respondents ranking it third or fourth. Cost and quality of service dominate slightly over other options.

**Respondents**:Education experts seem most concerned with lowering the cost of service, with 3/5 choosing it as the most important area for improvement.

<u>\*\* Question 15</u> (no consensus)

In order to determine how respondents believe ICT will impact the rest of a small developing economy, they are asked which group of ICT users will have the strongest impact on economic growth. They can choose from household consumers, firms outside of the ICT sector, ICT producing firms, large multinational corporations, and the government. The only clear finding was that 9/18 respondents chose 'firms outside of the ICT sector'. ICT for ICT's sake is not the answer for Ghana; the way to consumer use and R&D is first by getting other industries to adot ICT. **Respondents:** Tellingly, none of the government respondents chose 'government' as the group to benefit from ICT. 3/5 education experts chose 'ICT producing firms' as their answer.

### Question 16:

This question was designed to get the respondents' perspectives on what domestic industries will benefit from increased productivity as a result of a stronger ICT sector. They are asked to select their top three choices from predefined options which include defense, manufacturing, retail, healthcare, agriculture, fishing, transportation, oil and gas, and mining. 20 experts tackled this question. Healthcare, manufacturing, and agriculture were the top choices with 15, 12, and 10 responses, respectively. Mining, fishing, defense were the three least popular sectors. Respondents may have answered according to Ghana's competitive advantages and prevailing industries to begin with; relatively more value-added industries are coming out on top, more productive industries; more human-capital intensive industries are winning. **Respondents**: 5/6 government, 4/5 education, and 3/3 private sector experts chose healthcare as one of their three choices. 3/5 NGO experts chose 'Manufacturing', an otherwise unpopular choice.

## Question 17:

This question aims to define what Ghana's policy priorities should be with regard to ICT development. Respondents are asked to choose from ICT for education, ICT for rural areas, ICT for export, and creation and protection of proprietary technology. <u>ICT for educational services comes out as primary policy (9/16 respondents)</u>. **Respondents:** No NGO experts chose 'ICT for educational services', but 3/4 of them chose 'ICT for rural and remote areas'. NGO's may well be the answer to extending ICT access to remote users. Questions 18 and 19:

These questions asked which ICT specialties Ghana should hone in on to promote short term (5 years) and long-term (5+ years) economic gains in ICT. Respondents were asked to choose from BPO & ICT services, ICT hardware manufacturing, and R&D. For question 18, 13/16 respondents agreed on BPO & ICT services. For question 19, responses were split between services, hardware, and R&D. <u>BPO and ICT services are ICT winners in the short-term; Ghana has a competitive advantage in services and could become world-known for that.</u> **Respondents:** In question 19, 3/6 government experts chose ICT hardware manufacturing as a long-term focus for Ghana.

## Question 20:

In order to understand how respondents assess the current demand-side problems for users of mobile data, they are asked to rank the following options from most to least important in consideration: digital literacy, high cost of cell phones, high cost of connectivity, lack of applicable tools, and absence of other mobile users. 15/19 respondents chose 'high cost of connectivity' as most important and second most important. 17/19 respondents ranked 'absence of other online mobile users' as least important and second least important.

<u>Users still struggle with the high cost of owning and operating a mobile. This backs an</u> <u>earlier observation that low-cost options for ICT was a barrier.</u> **Respondents:** 4/5 Education experts and 2/4 NGO experts rank digital illiteracy as most important or second most important.

<u>\*\* Question 21</u>: (poor question wording)

This question was poorly worded, and should not be included in the analysis. 85.7% of respondents believe the government is capable and should use public funds. The wording is too soft and "believing" the government is capable does not mean it is. **Respondents**: Only 3/6 government experts believe in the capabilities of the government. <u>There may be too much reliance on the government (i.e. too many announcements of new policies have rendered other sectors complacent).</u>

\*\* Question 22: (no consensus)

This question asks with whom Ghana should collaborate to boost trade and develop the ICT sector. Options include neighboring countries (ECOWAS), countries which are potential trading partners, countries with an already developed ICT sector, and countries with a promising customer base. The winner here is split between countries which are potential investors (6/17 responses) and countries with developed ICT sectors (7/17 responses). Respondents believe in the power of FDI and foreign business to grow the sector and the economy; a relationship with a solid ICT performer could result in a transfer of skills to benefit Ghana. **Respondents:** 4/5 NGO respondents answered 'countries which are potential investors'. Education experts were divided among all answer choices, which could indicate lack of knowledge in the topic.

#### Question 23:

This question asks about the role that international organizations should play in helping Ghana build an ICT sector. Here, answers are more or less split between policy recommendations, financial support, and implementation assistance. None of the 18 respondents believed international organizations should not be involved in ICT development. International organizations are beneficial to ICT growth, but there is lack of consensus as to how they should help. **Respondents:** 2/3 private sector experts chose "assisting in implementation". 3 government exports chose 'specific policy recommendations' and another 3 chose 'financial support'.

#### Questions 24 and 25:

These questions ask respondents about strategies for reducing costs ICT services first in developing countries in general, then in Ghana specifically. Respondents were allowed to pick the top 3 of the following choices: Government regulation and legal framework, industry competition, R&D for creation of cheaper technologies, private sector incentives, stronger ICT infrastructure, stronger non-ICT infrastructure, trade, and industry clustering. For question 24, government regulation (15/19) and ICT infrastructure (13/19) came out on top. In question 25, less respondents were concerned with government regulation (7/19) and more with industry competition (8/19). For both questions, trade, industry clustering and non-ICT infrastructure were unpopular choices. <u>Government regulation is more important in a general context than in a Ghana context, perhaps because Ghanaians can better "navigate" their own system.</u> **Respondents:** All 3 private sector experts chose ICT infrastructure as a top three choice in both questions (only 1 chose private sector tax

incentives). 4/6 government experts included 'industry competition' as a top 3 choice in question 24 (general). It is telling that 5 out 6 government respondents included 'government regulation and legal framework' as a top choice for question 25. Once again, education respondents were spread over all answer choices for question 25. \*\* Question 26 (no consensus)

6/17 respondents chose tax incentives for ISP's and another 6/17 chose 'Establish a Service Obligation Fund'. The lack of consensus on any one choice implies there is no standalone reason for providers to go in remote areas. Furthermore, tax incentives and partnerships might not be enough, the government has to step in and obligate these firms to move. This is is an area of policy where the government might have more leverage (the top two choices are actions taken by the government). **Respondents:** 2/3 private sector experts chose tax incentives for ISP's. 3/6 government respondents chose Service Obligation Fund but 2/6 chose tax incentives (split in priorities).

### Questions 27 and 28:

This question asks what top 3 characteristics deter FDI in the ICT sector, first in a developing economy generally, then in Ghana specifically. 19 respondents answered question 27 and 14 answered question 28. ICT infrastructure (15 responses) and weak institutions (12 responses) come out on top. Regulatory landscape (10 responses) could also be included with institutions, because they tend to go hand in hand. In question 28, ICT infrastructure remains the most popular choice (13 responses). The response percentages for question 28 are similar. The barriers for FDI in the developing world (ICT infrastructure, weak institutions and regulations) also hold true for Ghana.

**Respondents:** In question 27, 3/4 NGO experts identify weak institutions as a top barrier. <u>Question 29</u>:

12 respondents answered this question on the top 3 most important barriers for domestic entrepreneurs in Ghana's ICT sector. 11/12 chose 'lack of access to capital' as a top concern, and another 9 responses were recorded for 'telecom costs are too high'. Only 1/12 respondents chose 'corruption and red tape'. For small-scale Ghanaian ICT start-ups, lack of access to capital combined with high starting costs are creating barriers to entry. **Respondents:** The top choices for private sector experts were high telecom costs (3/3 respondents), lack of access to capital (2/3 respondents), and lack of access to global markets (2/3 respondents). Both government (3/6 respondents) and education (3/5 respondents) experts chose "other costs are too high".

#### EDUCATION

#### Questions 30 and 31:

This question asked respondents to choose which level of education (primary, secondary, tertiary, voluntary vocational training, and mandated vocational training) is most important for Ghana's ICT sector in the short and long term. There is no clear consensus in the short term (question 30), although only 1/17 respondents agree that primary education is most important. In the long-term (question 31), 8/16 respondents agree that tertiary education is most is most important.

**Respondents:** Although government experts could not agree on one level of education in the short term, 5/6 of them chose tertiary education in the long-term. NGO respondents answered all over the board for both questions, which may indicate that they operate at different levels in the education system. In question 31, 2/3 private sector experts chose 'primary education' as the most important education level.

There seems to be a consensus around long-term ICT policy to focus on skill-building at the tertiary level of schooling; Ghana's ICT and general universities may be the key to ICT sector growth.

#### Question 32:

This question asked respondents to gauge the relevance of current tertiary level education in Ghana to current jobs available in the ICT sector. Of 14 respondents, 11 felt that tertiary education was somewhat relevant or very relevant to jobs in the ICT sector. The government, especially, feels that current education is very relevant (3/6 respondents). The curriculum of tertiary level education is at least somewhat relevant (in public opinion) to ICT sector jobs in Ghana.

\*\* Question 33: (no consensus)

There is no clear consensus on this question at the general and respondent sector level. <u>Question 34</u>:

This question asked participants to rank devices from 1 to 4 in terms of promoting job training and productivity. 14/16 respondents ranked 'desktop/laptop' first or second. 14/16 respondents ranked mobile feature phone third or fourth. <u>Respondents rank</u> <u>desktop/laptop in the top 2 spots and mobile feature phones in the last 2 spots, however</u> there are variations by respondent sector.

**Respondents:** All NGO experts ranked mobile smartphones as first or second most important. While the education, government, and NGO experts ranked 'typed of hardware is less important than internet speed' in fourth place, the private sector ranked this issues first.

Weights									
Indicator	# of Indicators	Category Weight	Indicator Weight						
Demographic	2	2	1						
Financial	5	2	0.4						
Institutional	2	3	1.5						
Science	5	1	0.2						
Technology	8	2	0.25						
Total	22	10							

#### Quantitative Appendix

<sup>ccxxxiv</sup> National Information & Communication Technology Strategic Plan (NICTSP) 2011-2014, Drafted 2010, p10