

**EDUCATION, TECHNOLOGY AND INNOVATION FOR GLOBAL  
COMPETITIVENESS: EVIDENCE FROM GHANA AND NIGERIA**

KEYNOTE ADDRESS

BY

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## 1.0. PREAMBLE

More than ever before, African countries need to explore knowledge-based, technology-driven and innovation-focused approaches to diversify their economies as they face increasing threats resulting from their lifelong dependence on natural resources. Necessity is the mother of invention is an English-Language proverb meaning that the primary driving force for most innovations is a need. Although Ghana and Nigeria got their political independence in 1957 and 1960 respectively, Ghana and Nigeria fall within the same cluster of countries with similar economic structure and they both desire to join the league of the 20 foremost world economies by the year 2020. Nevertheless, Ghana and Nigeria pursue different development trajectories regarding investments in education, technology and innovation owing perhaps to differences in what they considered as their national needs and priorities within their available resources. To this end, this paper aims at

1. Reviewing the desire of Ghana and Nigeria to be globally competitive and the determinants of global competitiveness.
2. Reconstructing the dynamics among education, innovation, technology on one side and economic development in terms of the size, the spread and the speed or competitiveness of the economy on the other side.
3. Reporting, through concrete evidence, the differences between Ghana and Nigeria with respect to:
  - a. size of the economy (measured by Gross Domestic Product or GDP per capita),
  - b. speed of the economy (measured by Global Competitiveness Index or GCI as different from the use of economic growth rate),
  - c. spread or distributive equity of national resources measured in terms of Inequality weighted Human Development Index or IHDI, Global Peace Index or GPI and Africa Attractiveness Index or AAI
  - d. education (in terms of access and quality at primary, secondary and tertiary level),
  - e. technology (measured by technological readiness) and
  - f. Innovation (non-technological-based and technological based).
4. Reinstating evidence-based arguments on the disservice from low priority for education, technology and innovation
5. Reinforcing earlier declarative statements about the importance of education, technology and innovation in national development

### **1.1. The desire of Ghana and Nigeria to be globally competitive**

It is the shared determination of Ghana and Nigeria to join the 20 top competitive economies in the world by 2020 (International Monetary Fund, 2012 and Federal Republic of Nigeria, 2010). Ghana and Nigeria believe that the attainment of the Vision would enable them achieve a lofty size of the economy in a speedy manner and an equitable spread of the national resources to improve standard of living for their citizens. To achieve this vision, both countries crafted different „home-grown“ medium-term development strategies with technical support (in form of poverty reduction strategies) from the International Monetary Fund (IMF). The “Ghana Shared Growth and Development Agenda (GSGDA, 2010-2013)”, as the medium term strategies in Ghana is called, laid emphasis on the following trajectories: (a) expanding access to potable water and sanitation, health, housing and education; (b) reducing geographical disparities in the distribution of national resources; (c) ensuring environmental sustainability in the use of natural resources through science, technology and innovation; (d) pursuing an employment-led economic growth strategy that will appropriately link agriculture to industry, particularly manufacturing; and (e) improving transparency and accountability in the use of public funds and other national resources (International Monetary Fund, 2012).

On the other hand, Nigeria’s National Economic Empowerment and Development Strategy NEEDS embraced the macroeconomic framework with emphasis on (a) reforming governance and institutions, (b) growing the private sector (security, infrastructure, finance and trade) and (c) enforcing a social charter based on human development such as education and employment as contained in the Nigeria’s poverty reduction document (National Planning Commission, 2004:10). Thus, Ghana seems to have emphasized physical, human and knowledge capital development, while Nigeria tends towards the development of physical and human capital only. The focus of this paper is to unearth the consequences of each of these strategic choices on the size, the speed and the spread of national resources in Ghana and Nigeria. To do this, it is important to know the major determinants of economic growth and global competitiveness

### **1.2. The determinants of economic growth and global competitiveness**

Traditionally, it is believed that appropriate investment in physical, human, managerial and knowledge capital is capable of raising national productivity and prosperity in a speedy manner. Nevertheless, it has also become a common knowledge that high national resources might not improve the standard of living of majority of the citizens if national resources are not equitably spread. Twelve determinants of national productivity and prosperity have been grouped into basic requirements, efficiency enhancers and innovation (World Economic Forum, 2010). The basic requirements are institutions, infrastructure, macroeconomic environment or stability as well as health and primary education. Moreover, the efficiency enhancers are higher education and training, technological readiness as well as size and efficiency of market (good, labour and financial). Innovation is made up of the non-technology-based business sophistication and the technology-based innovation.

Globally, countries are classified into five main categories based on the degree of their dependence on basic requirements, efficiency enhancers and innovation as drivers of their economies (World Economic Forum, 2013:6). First, there are factor-driven economies such as Ghana and Nigeria where 60%, 35% and 5% of the productive forces are driven by basic requirements, efficiency enhancers and innovation factors respectively. Second, there are 3 countries transitioning from factor-driven to efficiency-driven economies such as South

Africa where 40%, 50% and 10% of the economic structure are driving by basic requirements, efficiency enhancers and innovation factors respectively. Third, there are the efficiency-driven economies such as Algeria, Botswana, Egypt, Gabon, and Libya where the structural mix is made up of basic requirements (40%-60%), efficiency enhancers (35%-50%) and innovation factors (5 %-10%). In Africa, only Seychelles is transitioning to innovation-driven economy characterized by basic requirements (20%-40%), efficiency enhancers (50%), and innovation factors (10%-30%). Lastly, there are innovation-driven economies in which 20%, 50% and 30% of the economic structure is made up of basic requirements, efficiency enhancers and innovation factors respectively. As at 2013, there was no African country in this category.

Following the proposal of WEF (2013), after a due consideration for their specific context and challenges, Ghana and Nigeria as factor-driven economies are expected to prioritize provision of sound macroeconomic policies, effective institutions, adequate infrastructure, and the means for ensuring a healthy and literate workforce before moving on to the next stage of efficiency-driven economy which will require them to move into more efficient production processes and increase product quality to maintain growth. However, if they aim at transitioning into the next higher level(s), they need to prioritize appropriate factors to enhance efficiency and/or boost innovation.

With respect to their contexts (in terms of revenue-base and export diversification), Ghana is a “transition” economy while Nigeria is an oil and gas exporting country (Leke, Lund, Roxburgh, and van Wamelen, 2010). Ghana as at 2010 was already making efforts to building on her current gains to diversify her economy. Although Ghana has low GDP per capita and small unsustainable markets, agriculture and resource sectors together account for about 35% of GDP and for about 66% of exports; overall costs of production are high because of poor infrastructure and poor regulatory systems and therefore, could not compete globally, The local service sectors (such as telecommunications, banking, and retailing) are expanding rapidly but have relatively low penetration rates. Ghana necessarily depends on diversified sources of income. She therefore prioritized policies to encourage expansion of intra-African trade through regional integration because of the small size of markets as well as on the improvement of infrastructure and regulatory systems to be able to compete globally with other low-cost emerging economies like China and India. Thus, the economic environment appears to have motivated Ghana to aim at investing in education, technology and innovation.

In contrast, Nigeria is an oil and gas exporting country with high GDP per capita but also the least diversified economies in Africa. Rising oil prices lifted export revenues which are spent to reduce budget deficits, fund investments and build foreign exchange reserves. Economic growth remains closely linked to oil and gas prices such that the share of manufacturing and services in GDP has remained as low as 33%. Her dependence on oil and gas revenue appears to have lowered Nigeria’s incentive at investing in innovative activities to diversify her economy. The focus of this discourse is to evaluate Ghana and Nigeria based on a systematic model discussed in the next section of the paper. 4

## **2.0. PERCEPTION ON EDUCATION-ECONOMY DYNAMICS**

The background of this paper has focused on the concern of Ghana and Nigeria to join the league of the top 20 economies. Twelve pillars have been identified as crucial in boosting global competitiveness of a nation (WEF, 2010/2011 and 2014/15). Out of these twelve determinants, education (primary, secondary and higher), technology and innovation form three and half pillars. This means that although education, technology and innovation are necessary conditions to boost the size, the speed and the spread of national prosperity, other factors outside education are also required to enhance national productivity, prosperity and proactivity.

Figure 1 concentrates on the influence of education, technology and innovation system on the size, the spread, the speed and sustainability of national prosperity. Each of these elements will be briefly discussed in turn.

### **2.1. Education**

As education, technology and innovation are just three out of twelve pillars of global competitiveness, schooling is only a small part of education since education can take place through incidental or subconscious, informal, nonformal and formal routes (Obanya, 2012). A school is a formally organized complex comprising a set of classrooms in which there are organized chairs, tables and writing boards for learners and teachers to interact for the purposes of learning. Depending on the resource situation of the provider (public or private), these classrooms might be built with blocks; mud, bricks or fabricated materials. In some cases, classes might be held under shades and sheds. A school is also made up of offices for teachers, administrators and the head teacher. Some schools might contain a field where learners carry out physical exercises and in most cases with network of pathways or roads laid with side flowers or trees. Some schools might contain some health facilities to take care of the health needs of the learners. Occasionally, a school might have a fence to enhance security and safety of learners. Generally, a school is a former and organized environment consisting mainly of learners, sizable numbers of teachers and few administrators. Therefore, the economic impact of education in a country with low qualities of educational inputs and process cannot be the same as another country with high qualities of educational inputs and process just because learners are exposed to the same years of schooling. Thus, six years of schooling in Ghana might not yield the same economic result as six years of schooling in 5

Nigeria. Consequently, education received in schools (basic, secondary, tertiary, teacher training, technical and vocational, technological, etc) is a necessary but not a sufficient condition for economic development owing variation in the qualities of input and delivery. The prerequisite to enhance the economic impact of general, scientific and technical education is an inclusive and quality primary education which stands as the foundational level in the education system.

The quantity and quality factors aside, the education system (including technology and innovation) requires an inclusive and efficient labour market to make the needed impact on the economy and the society. The catalyst for a functional education system is an inclusive and efficient labour market development (De Ferranti, Perry, Gill, Guasch, Maloney, Sanchez-Paramo, and Schady (2003). The labour market is needed to apply skills, technology and innovation embodied in the educated citizens. When a substantial proportion of educated people are not allowed to participate in the labour market owing to a narrow spread of job opportunities, a nation stands to lose in terms of size and speed of productivity and prosperity.

All hands inside and outside of the education system are therefore expected to be on deck to enhance an effective link among education, technology, innovation and national prosperity. Adequate inputs should be provided and efficiently managed to enable the formal education system perform its expected roles in national development and global competitiveness.

Generally speaking, to make a school effective, the provider of education would make available the required number of equipped classrooms, hire sufficient number of qualified teaching and non-teaching staff, supply the curriculum as well as other learning materials, and ensure that a critical mass of learners enrol and continue to attend their classes till they attain the expected permanent learning outcomes. Thus, in addition to provision of inclusive quality inputs, an effective quality-assurance system should be in place to ensure an efficient process of scientific knowledge capturing (absorption), creation (generation) and communication (application) to industry and commerce so as to enhance global competitiveness of a nation. The formative aspect of the quality assurance system is more or less a technological process particularly if the scientific information produced is applied innovatively to solve practical problems in the education system and/or in the society. What then is technology and how does it translate to global competitiveness?

## **2.2. Technology**

It has become a common knowledge that the four main problems of most countries in Africa is undiversified economic base, deindustrialization, low agricultural productivity and product as well as exclusive system of wealth distribution. In spite of the progress in respect of the growing strength of African economy, economic growth in the continent is neither inclusive (in term of the spread of the fruits of the economic growth) nor sustainable owing to (a) the general dependence on rapidly depleted and erratically priced natural resources most of which are non-renewable, (b) relatively low per capita agricultural output and productivity; and (c) deindustrialization in the face of growing urbanization (UNCTAD, 2011). To address these challenges, technology is needed in Africa.

This is because technology is the purposeful application of scientific knowledge to invent and/or adapt things so as to solve practical problems especially in industry and commerce. According to De Ferranti, et al (2003), macroeconomic stability and incentive regimes are the prerequisites to the absorption of foreign technology and creation of indigenous technology. Foreign technology gets easily transferred through training and networking in the processes of foreign trades, foreign domestic investment, licencing of patents, Intellectual Property Rights and adaptive Research and Development (R&D). At the same time, macroeconomic

stability and incentive regimes are prerequisites to domestic generation of scientific knowledge through advanced indigenous human capital development such as creative R&D, registrations of patents and other Intellectual Property Rights. An efficient capital or financial market is however, required for a purposeful application of scientific knowledge for national development and global competitiveness.

### **2.3. Innovation**

Innovation can emerge from (a) new non-technological knowledge and (b) technological knowledge. Non-technological innovation is related to improvement in productivity (expertise, experience and engagement) owing to adoption of the existing technologies that are embedded in the business sophistication of organizations. Technological innovation is related to improvement in productivity resulting from new scientific breakthroughs as experienced during the industrial revolution with the invention of steam engine and electricity and digital revolution with the invention of the computer. Although less-advanced countries like Ghana and Nigeria can still improve their productivity by adopting existing technologies, for those that have reached or are transitioning into the innovation stage of development (like Seychelles) adaptive research is no longer sufficient for increasing productivity. Firms in innovation-driven countries must design and develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities. This progression requires an environment that is conducive to innovative activity and supported by both the public and the private sectors. In particular, it means sufficient investment in creative research and development (R&D), especially by the private sector; the presence of high-quality scientific research institutions that can generate the basic knowledge needed to build the new technologies; extensive collaboration in research and technological developments between universities and industry; and the protection of intellectual property, in addition to high levels of competition and access to venture capital and financing. In the face of hardship as currently being experienced in most African countries like Ghana and Nigeria, it is important that public and private sectors resist pressures to cut back on the R&D spending especially, the African target of 1% of GDP) that will be so critical for sustainable growth going into the future.

## **3.0. PROFILING THE DIFFERENCES BETWEEN GHANA AND NIGERIA**

Realizing that right articulation might not always translate to the right action, this section explores concrete evidence from Ghana and Nigeria in respect of how they have translated their Vision 20:2020 into action between 2010/11 and 2014/15 and the consequential effect of their development trajectories on national prosperity.

### **3.1. Economic (size and speed) Profiles of Ghana and Nigeria (2010-2015)**

Table 1 reveals that Ghana outperformed Nigeria in respect of the size and the speed of national prosperity. Ghana's GDP per capital (PPP) as a percentage of the global income increased by 5 points while that of Nigeria increased by 0.7 points between 2010/2011 and 2014/2015. Within these periods, Ghana's moved three rungs up the ladder in her race to join the 20 foremost economies in the world while Nigeria remained stagnant. This might be as a result of the differences in development strategies adopted. Nevertheless, the specific context and the unique challenges faced in each country are likely to determine the development trajectories adopted. Notwithstanding, both countries are factor-driven economies that are expected to prioritize, among other factors, basic prerequisites such as institutions 7

infrastructure, macroeconomic stability as well as health and primary education. These countries are not however, limited to these minimum requirements since they are free to go above the minimum and deploy higher factors of national productivity and prosperity such as efficiency enhancers and innovation factors. The gap in national incomes of Ghana and Nigeria can further be explained by differences in their respective medium-term development strategies. As earlier discussed, Ghana specifically aimed at expanding access to education and ensuring environmental sustainability in the use of natural resources through science, technology and innovation (physical, human and knowledge capital) while Nigeria aimed at physical and human capital development (Table 1). **Table 1:**

**Determinants of Global Competitiveness in Ghana and Nigeria**

Global Rank by Country		Change (□) (2010/11 – 2014/15)				
Determinants by Country		2010/11		2014/15		
Ghana	Nigeria	Ghana	Nigeria	Ghana	Nigeria	
GDP per capita (PPP % Share)*	671 (5%)	1,142 (4.8%)	1,730(10)	1692 (5.5)	+5	+ 0.7
<b>Global Competitiveness Index**</b>	<b>114 (3.6)</b>	<b>127 (3.4)</b>	<b>111 (3.7)</b>	<b>127 (3.4)</b>	+3	+ 0
<b>(a) Basic requirements</b>	<b>122 (3.5)</b>	<b>136 (3.1)</b>	<b>123 (3.7)</b>	<b>140 (3.2)</b>	-1	- 4
Institutions	67 (3.9)	121 (3.2)	69 (3.9)	129 (3.0)	-2	-8
Infrastructure	106 (2.9)	135 (2.0)	108 (3.0)	134 (2.1)	-2	+1
Macroeconomic environment	136 (3.0)	97 (4.3)	133 (3.4)	76 (4.6)	+3	+21
Health and primary education	122 (4.3)	137 (3.0)	121 (4.5)	143 (3.0)	+1	- 6
<b>(b) Efficiency enhancers</b>	<b>96 (3.6)</b>	<b>84 (3.8)</b>	<b>89 (3.8)</b>	<b>82 (3.9)</b>	+14	+ 2
Higher education and training	108 (3.3)	118 (3.0)	106 (3.5)	124 (2.9)	+2	- 6
Goods market efficiency	75 (4.1)	87 (4.0)	67 (4.3)	87 (4.2)	+8	+ 0

Labor market efficiency	93 (4.2)	74 (4.3)	98 (3.9)	40 (4.5)	-5	+ 34
Financial market development	60 (4.2)	84 (4.0)	62 (4.1)	67 (4.1)	-2	+ 17
Technological readiness	117(2.8)	104 (3.0)	100 (3.1)	104 (3.0)	+17	+0
Market size	83 (3.3)	30 (4.6)	69 (3.7)	33 (4.7)	+14	- 3
<b>(c)</b>	<b>100 (3.2)</b>	<b>83 (3.3)</b>	<b>68 (3.6)</b>	<b>103 (3.3)</b>	+36	- 20
<b>Innovation &amp; sophistication</b>						
Business sophistication	97 (3.5)	76 (3.8)	70 (3.9)	87 (3.8)	+27	- 11
Innovation	99 (2.8)	98 (2.9)	63 (3.3)	114 (2.8)	+36	-16

**Data Sources:** World Economic Forum (WEF, 2010 and 2014)

**Notes:** (1) Figures in parentheses under the GDP per capita are percentage shares of world total GDP (PPP) while figures in parentheses under the Global Competitiveness Index are scores out of seven; (2) \*\* Global Competitiveness Index (GCI) is the dependent variable being a function of three clusters of factors (a) basic requirements, (b) efficiency enhancers and (c) innovation and sophistication;