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HUMAN CAPITAL DEVELOPMENT: THE CASE OF EDUCATION AS A VEHICLE FOR AFRICA'S ECONOMIC TRANSFORMATION

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Abstract

The paper attempts to rekindle the debate of low human capital base as a bane of Africa's economic transformation. It overviews human capital base in Africa and attempts to explain the reasons behind low human capital base in Africa and attributes developmental gap between Africa and the rest of the world to its relatively weak human capital base. Low public investment in education culminating in limited access to education, poorly motivated teachers and overstretched tools and facilities remain key challenges to Africa's human capital development. The paper takes a walk through the theoretical consideration of economic transformation and the relevance of human capital development for economic transformation and sustainable development. A simple quantitative analysis to capture the relationship between economic transformation and human capital development suggests a significant correlation between education and structural transformation of an economy. The paper makes recommendation to the effect that Africa's human capital base can be enhanced through improved public investment in education in the area of teacher motivation and provision of adequate teaching and learning materials. Measures to reduce pupil-teacher ratio and review of curricula to meet the development needs of countries are also essential in improving quality and relevance of education in Africa. It is also critical for Africa to encourage private sector participation in the provision of education, enhance effective collaboration between educational institutions and industry and adopt measures to reverse brain drain to enable Africa reap the benefit of education for development.

Introduction

Forty years ago, Ghana and the Republic of Korea had virtually the same income per capita. Estimates of Gross National Income per capita at current Purchasing Power Parity (PPP) put Korea's at about sixteen times higher than that of Ghana. Some reckon that half of the difference is due to Korea's success in acquiring and using knowledge (World Bank, 2009). Indeed, the state of underdevelopment of many countries in Africa is not only due to lack of capital but more importantly because they lack adequate knowledge and skills to enhance productivity and increase national output. Many African countries are endowed with different kinds of natural resources which could be exploited to turn the fortunes of these countries around. The continent accounts for over three-quarters of the world's diamond and manganese reserves and harbours over two-fifths of the world's gold reserves (Amakwah and Anim-Sackey, 2003). The African continent is endowed with considerable amount of oil reserves in Nigeria, Angola, Equatorial Guinea, Libya, Sudan, and recently Ghana among few others. Unfortunately, economic transformation continues to elude the continent due largely to human capital constraints in the form of knowledge, skills and technical knowhow to exploit the natural resources to promote growth and economic transformation.

Clearly, human capital that has been the major driving force of the economies of developed world in the west and some South-east Asian countries has been lacking in Africa. Asian countries such as Singapore, Korea and Japan focused investments in high quality technological innovation and development of requisite human capital which helped them to achieve high growth and economic transformation. Human capital development base of Africa is evidently weak. Adult literacy rates are comparatively low (see Table 1). Inadequate institutions and support mechanisms for education and skill development continue to limit access to institutions of training and learning.

The purpose of this paper is to resurrect the debate and broaden our understanding on low human capital base as a major challenge to Africa's economic transformation, examine the key challenges of human capital development and suggest ways of addressing the challenge. The paper analyses relevant published data related to human capital development globally to argue

that Africa's economic transformation will remain a mirage if the issue of education and skill development is relegated to the background.

Overview of Human Capital Base in Africa

The weak human capital base of Africa is reflected in low literacy rate of many countries in the region. Inadequate institutions and support mechanisms for education and skill development continue to limit access to institutions of training and learning. As shown in Table 1, the average adult literacy rate in SSA in 2010 was marginally higher than South Asia at 63% compared to 98% in Europe and Central Asia, 99% in High Income OECD and at least 91% in East Asia and the Pacific as well as Latin America and the Caribbean regions. The rate among the youth was similarly lowest among all the regions in the world. The continent also has the lowest enrolment rate which is an indication of poor or weak human capital base on the continent. In 2010-2011, the net primary school enrolment rate in SSA was estimated at 76% as against 88% in South Asia and at least 93% in other regions of the world. Similarly net secondary school enrolment rate was remarkably low at 25% in SSA as against 71% in East Asia and the Pacific and 92% in High income OECD countries (Table 1).

Weak human capital base in Africa is also reflected in the educational attainment of adult population. A greater amount of educational attainment indicates more skilled and productive workers to facilitate economic growth and transformation. The abundance of well- educated human resources also helps to facilitate the absorption of advanced technologies from developed economies. In 2010, the average number of years of schooling achieved by the average person aged 15 years and over in SSA was estimated at 5.23 years compared with 7.94 years and 8.26 years in East Asia and Pacific and Latin America and Caribbean respectively (Table 1). In advanced and transitional economies Barro and Lee, (2010), the average number of years of schooling was 9.76 and 9.68 years. In terms of educational attainment of adult population, only 27% of adults in SSA had tasted or completed secondary education or better compared with 52% in East Asia and Pacific, 45% in Latin America and Pacific and 40% in South Asia. In terms of higher education, only 2.5% in SSA has had some level of higher education compared with 5.5% in South Asia and at least 10% in other regions (Table 1)

Table1: Literacy and Enrolment Rates across Regions in the World

Region	2010		2010 – 2011		2010			2010	
	Literacy rates		Net enrolment		Educational Attainment			Mean yrs. of	
	Adult	Youth	Primary	Sec	None	Primary	Sec+	Higher	schooling
SSA	63.0	72.0	76.0	25.0*	32.6	37.9	26.9	2.5	5.23
Middle East & North Africa	76.0	91.0	93.0	68.0	24.5	24.4	39.6	11.6	7.12
East Asia & the Pacific	94.0	99.0	96.0	71.0	7.9	30.1	51.7	10.3	7.94
Latin America & Caribbean	91.0	97.0	94.0	76.0	7.7	34.5	45.1	12.6	8.26
South Asia	62.0	79.0	88.0	50.0*	33.2	21.5	39.8	5.5	5.24
Europe & Central Asia	98.0	99.0	94.0	84.0	1.3	16.4	65.5	16.9	9.65
High Income OECD	99.1	100	97.0	92.0	---	---	---	---	---

* figures in 2005 for SSA and 2008 for South Asia

Source: World Bank (2013) and Barro and Lee (2010),

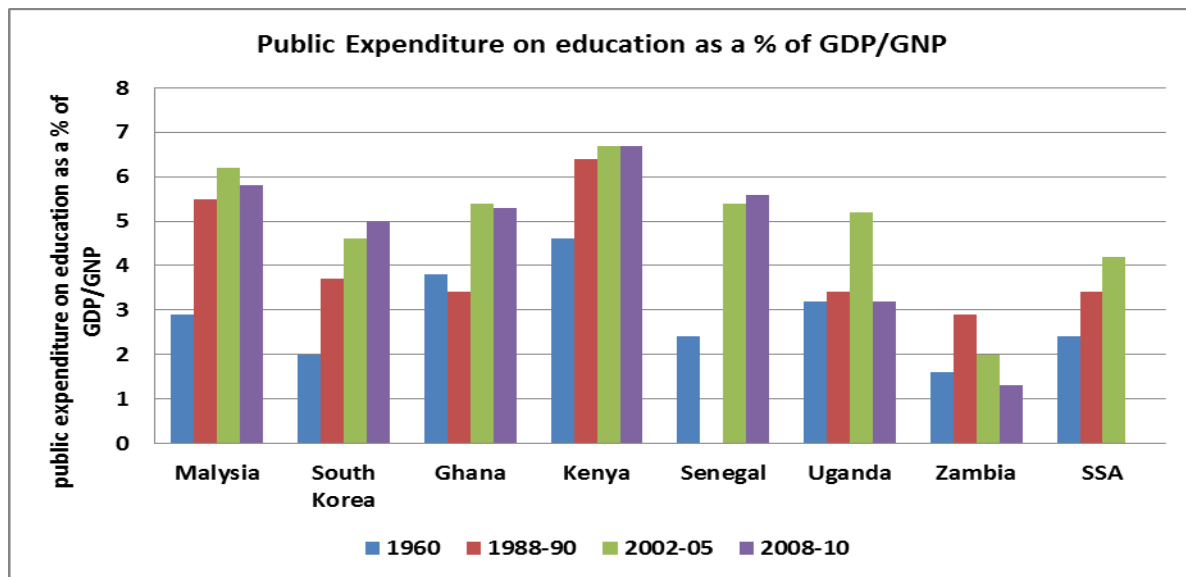
The low quality of human capital base continues to be a major constraining factor in the economic development effort of many African countries. The ability of SSA countries to take advantage of new technological innovations in the fast changing globalised world to transform the economies are often constrained by poor quality of the labour force. According to Adams (2002) human capital affects the structure of the national production and the technological level. Economies endowed with more educated people are able to improve local technologies since the use of new technologies requires a high quality workforce. A common feature of African economies is low productivity in all sectors on account of poor labour quality resulting in the lack of structural economic transformation.

Why low human capital base in Africa?

Many underlying factors have been blamed for the low human capital base of many countries in Africa. On top of the list are the lack of access to institutions of training and learning which are rather limited and inadequate and support mechanisms. Access to education has been largely constrained by inadequate training institutions in many SSA countries. Over the years, the

increase in the number of educational and training institutions has not kept pace with the rate of population growth. The expansion of educational infrastructure has often been slow while the few institutions available are ill-equipped in terms of facilities and personnel to carry out effective training. Low investment in education partly on account of lack of political will for human resource development can largely be blamed for the inadequate educational institutions and poor educational infrastructural base. In contrast, South-east Asian countries of Malaysia, South Korea and Singapore focused their priorities and commitments (measured in terms of actual resources allocation) towards the education sector to boost the supply and quality of human capital base of the countries.

Figure 1: Public expenditure on education in some selected countries.



Source: UNDP (2008), World Bank (2009 & 2013)

Even though the implementation of Poverty Reduction Strategy Programmes (PRSPs) in developing countries in recent years has triggered some degree of expansion in human capital investment in Africa, the rate of expansion is still slow and the level remains low relative to some countries in East Asia such as Malaysia and South Korea. Figure 1 reports that public investment in education measured by public expenditure as a percentage of GDP in SSA rose from 2.4% in

1960 to 3.4% in 1988-90 and surged marginally further to 4.2% in 2006. While public investment in education in Malaysia and South Korea doubled between 1960 and 2008-10, investment in education in most SSA countries either rose by less than 100% over the period except Senegal which increased public investment as a percentage of GDP from 2.4% in 1960 to 5.6% in 2009. In 2002-05 and 2008-10, even though public expenditure as a percentage of GDP in Kenya, Ghana, and Senegal was relatively higher than in South Korea the absolute expenditure is estimated to be remarkably higher in South Korea than in these African countries giving the country's higher value of GDP. In addition, in spite of the increasing public investment in education in some countries in Africa per capita investment is estimated to be low considering the relatively larger population in these countries.

Apart from low investment in education which results in low supply of educated population, the quality is also suspect. In many African schools, educational quality is so poor to the extent that after several years of education children leave school without acquiring skills or become literate on a sustainable basis. This is because many countries in Africa do not have cutting-edge programmes for human capital development. In many cases, the training curricula are not matched with the changing requirement of the labour market rendering the trainee ineffective in the world of work thereby exacerbating the level of productivity in these countries. The educational system in many African countries emphasises academic qualification rather than marketable skills. As a result, the accelerated growth effect of human capital development is often undermined. This observation has some historical underpinnings. In the early years of independence of many countries in Africa, education system particularly at the tertiary level was structured to train local citizens to fill vacancies in the public service created by the departure of the colonial public service workers. This consequently raised the demand for white collar jobs which emphasised academic education at the expense of the supply marketable skills deemed as growth promoting. The fast changing global economy requires Africa to review human capital development programme to meet the changing global economic environment.

Key Challenges of Human Capital Development in Africa

The main challenge facing governments of African countries is how to build human capital through sustained investment in education and training to produce highly qualified and trained workforce who can compete effectively in the global knowledge economy. The effort of countries in Africa to develop their human capital base through education and training to boost growth and facilitate economic transformation is often constrained by limited budgetary resources. In addition, lack of political will on the part of policy makers and the difficulty in retaining those trained with the limited resources are often cited as other major human capital development challenges.

Many countries in Africa are among the least developed countries (LDCs) of the world and a common feature of these countries is low income and limited public resources to carry out many developmental programmes. Consequently, they are unable to provide enough academic and training institutions to absorb the increasing number of people seeking access to education and training. The available educational and training institutions often lack adequate teachers/trainers and the necessary tools and equipment to undertake effective teaching and training towards building productive human capital base. Teachers and available teaching tools and equipments tend to be overstretched by high number of pupils and students thereby compromising the quality of education and training. Available teachers are often poorly motivated with low morale due to low salary and limited training tools and equipment. For instance, Table 2 reports high student-teacher ratio in SSA countries (Malawi, Kenya, Ghana and South Africa) than developed countries. Specifically, while student-teacher ratio in primary and secondary schools of developed and emerging economies stood at 13 or less in 2008-2010, the ratio in primary schools ranged between 17 in Tunisia and 79 in Malawi (Table 2).

In addition, high incidence of school dropout remains a major challenge to the development of human capital base of many African countries. This is often associated with the problem of poverty on the continent. According to UNESCO (2012) 42% of African school children drop out before the end of primary education with Chad, Uganda, and Angola recording very high dropout rate between 68% and 72%. The lowest rate of 2% and 7% were recorded in Mauritius and Botswana respectively. In addition, many basic school leavers are unable to benefit

from secondary education due a combination of factors including limited access as a result of high failure rate at the basic level or insufficient places at the secondary level even when the pupils are able to pass well or high cost of secondary education relative to household income level. Most often, many poor African families find it difficult to support their wards particularly girls beyond the basic level of education. This is reflected in the wider gap between higher enrolment rate in primary and secondary levels of education in African countries (Table 2).

Table 2: Student/Pupil-Teacher Ratio of Selected Countries in the World

Countries	Student-Teacher ratio		Gross Enrolment Ratio			% tertiary students in science engineering etc. 1999 - 2005
	2008 – 2010		2009 – 2010			
	Primary	Secondary	Primary	Secondary	Tertiary	
United States	14	14	102	96	95	---
United Kingdom	18	14	107	105	60	22
Japan	18	12	103	102	60	19
Malaysia	13	14	---	69	42	40
Tunisia	17	13	110	90	36	31
South Africa	31	25	102	94	37	20
Ghana	31	19	107	58	12	---
Kenya	47	30	113	60	4	---
Malawi	79	43	139	33	1	---

Source: World Development Indicators 2012

Besides the resource constraint, African governments often fail to set their priorities right. In the wake of limited public resources, countries in Africa are seen to be indulging in less productive spending particularly on ammunitions to perpetuate the longer stay in power of governments while huge resources are lost through corruption. According to the corruption perception index by Transparency International, only four countries in Africa were listed among the 50 least corrupt countries compared to 22 listed among the most corrupt in the world in 2007. Indeed, the

apparent misuse and misallocation of limited resources by governments could largely be blamed for the weak human capital base of Africa.

The difficulty facing many African countries in their effort to retain trained human resource on the continent continues to be a major setback to the development of human capital in many countries. Labour mobility from developing and least developed African countries to the developed world is often motivated by better job opportunities in developed countries. It is also influenced by the failure of African countries to pursue economic policies that create enough employment opportunities locally for highly educated in modern production, innovation and the adaptation of foreign technology. Africa has long suffered significant losses through “brain drain” from the uncontrollable flight of scarce human capital whose contribution is best needed for domestic economic development. It is estimated for a number of African countries that over 30% of its highly skilled professional are lost to the OECD countries (Carrington and Detragiache, 1998). In addition, nearly 88% of adults who emigrate from Africa to the United States have a high school education or better (see Zeleza, 1998). IOM (2000) estimated that about 50 million (or one-third of all world) migrants are from Africa. The problem is likely to intensify in the wake of increasing globalisation, demographic pressures and reduced cost of international movements. The potential of globalisation to relocate jobs to Africa through FDI can however facilitate the reversal of the phenomenon of “brain drain” into “brain gain”.

Related to the issue of brain drain are the numerous political and civil conflicts experienced by many African countries which have caused the displacement of many productive African workforce. A number of productive Africans from Rwanda, Burundi, Congo DR, Liberia, Sierra Leone, Sudan, Somalia, and Cote d’Ivoire among others are yet to return to their home countries after political and ethnic conflicts forced them out of their country. As noted by IOM (2000) most African migration is intra-continental and that about half of the African migrants are either refugees (5 million) or displaced persons (20 million). It is worth noting that the outbreak of conflicts does not only cause a displacement of educated and productive professionals but also affect the education of those still in school.

Economic Transformation: A Theoretical Perspective

Economic transformation generally involves a change in the structure of an economy over time from subsistence through industrialization to an industrial and service dominated structure. It is the process of economic development that is characterized by a period of rapid per capita growth combined with structural change of the economy. As noted by Syrquin (1988) while structural change can be defined as an alteration in the relative importance of economic sectors, the interrelated processes of structural change that accompany economic development are jointly referred to as economic transformation. In effect, economic transformation is synonymous to economic development to the extent that the economic transformation describes the path to economic development.

Economic transformation characterized by a shift from the dominance of primary production through secondary dominated by manufacturing and eventually gets to the services sector has been observed in a more advanced and currently in the newly industrialized countries in Asia and Latin America. The process of economic transformation that characterizes economic development begins with a significant change in economic structure when industrialization triggers a rapid increase in the share of manufacturing in the economy, and a concomitant decline in agriculture's share (Chenery 1960, Kuznets 1966, Chenery 1968). This is followed by a decline in the share of the total labour force employed in the agricultural sector with corresponding increase in the share of other economic sectors. The stage involves a shift in the centre of the country's economy from rural areas to cities, and the degree of urbanization significantly increases (Kuznets 1966, Stern et al. 2005).

Economic transformation emanates from various sources including technologically driven productivity growth, rapid capital accumulation, and emergence of sectoral linkages. Technological advancement through innovations forms the foundation of productivity growth necessary for economic transformation and this occurs during the industrialization process. This is the process where education and skill development becomes crucial. According to Kuznets (1973) advancing innovation and technology adoption is therefore a "permissive" source, i.e. a necessary condition for development. Technology-led productivity growth is typically accompanied by rapid capital accumulation, as most technologies are embodied in modern capital

goods. Indeed, early writers on economic development in the 1950s and 1960s emphasized the role of capital investment in industry as a means for rapid growth and transformation in low-income countries (Chenery 1960, Kuznets 1961, Rosenstein- Rodan 1964).

Rapid industrialization through the promotion of manufacturing then triggers backward and forward linkages between sectors (see Hirschman, 1958,; Johnston and Mellor, 1961). The transformation process must be guided by effective institutions and governance system. Undoubtedly, the quality of institutions is necessary in explaining the differences in growth and transformation processes by shaping incentives to develop new technologies and innovation (Rodrik et al. 2004, Easterly and Levine 2003).

Some observations in Africa in recent times seem to indicate an element of economic transformation in a different form. Over the past decade, some African countries have experienced what can be termed as “pseudo” economic transformation with a shift from agriculture dominance in GDP and employment to service activities. This is against the backdrop of declining share of manufacturing in GDP within a relatively lower literate and environment with high level of informality. For instance, after a rebasing exercise of the national accounts of Ghana in 2006, the share of services in GDP increased from about a third, to one-half of GDP while agriculture dropped from a little over two-fifth to about a third of GDP. The commencement of oil production in commercial quantities in the country in 2011 has not been able to significantly reduce service dominance in national output which stood at about 48% of GDP in 2012 and employing 43% of the labour force in 2010 translating into a 1-percentage point higher than agriculture employment.

A common feature of this sectoral shift in economic activity is the prevalence of informality dominated by subsistence agriculture and trading of imported goods in the services sector. In 2006, about 86.2% of Ghana’s employment was in the informal sector with the formal sector accounting for the remaining 14%. Indeed this “pseudo” economic transformation is largely inconsistent with the traditional transformation process which starts from primary through secondary to the tertiary sector, an economic transformation that creates decent and gainful employment in a more literate and formalised economic environment.

Human Capital and Economic Transformation for Development

There is a general consensus among economic development theorists that the quality of human resource of a country has a significant bearing on its economic advancement and growth. The human capital base of a country measured by educational level of its citizens is not only an indicator of the stage of economic development of the country but more importantly, the potential for future growth. It is the national resource that largely determines the success of a country in terms of GDP, investment environment and ultimately facilitates its economic transformation in an increasing competitive global economic environment. According to Lucas (1988), education and the creation of human capital is the critical force that generates differences in productivity and technological progress. The availability of highly educated workforce contributes to development of research and development (R&D) to propel technological innovation and productivity growth (Romer, 1990).

In the traditional neoclassical growth model developed by Swan in the 1950s, the output of an economy grows in response to the larger inputs of capital and labour (all physical inputs) in conformity with the law of marginal returns to scale. The implication of this assumption is that as the stock of inputs increases, growth of the economy slows down, and this requires incessant infusions of technology to technological progress to keep the economy on the path of growth. This makes technological progress an exogenous variable. The endogenous growth model developed in the mid 1980s broadened the concept of capital to include human capital (Romer, 1986). From the endogenous growth model, technology and human capital are both endogenous such that educated, skilled and healthy workers will not make labour more productive but also be able to use capital and technology more efficiently.

Unlike the traditional neoclassical model that focused on the quantity of labour, the new growth paradigm looks at labour input from its quality and thus considers human capital as knowledge, expertise and skill accumulated through education and training. Emphasizing the social and economic importance of human capital theory, Becker (1993) noted the most valuable of all capital is that investment in human being. Indeed, the role of human capital as the driving force in making capital more productive and facilitating technological progress explains the

mysteries of rapid and long sustainable high growth performance in advanced and emerging economies of China, and South Korea among other East Asian economies.

Essentially, human resources rather than natural resources undoubtedly constitute the ultimate basis for the wealth of a nation. It is the single largest type of capital a nation possesses. In the 1960s, human capital was estimated to constitute almost one-half of national wealth of United States and constituted at least two-thirds of growth in the country's GDP (Schultz, 1961). As observed by Yih-Chi (1999) investment in human capital accounted for nearly half of Taiwan's remarkable growth in manufacturing production in recent decades. Indeed, impressive growth of newly industrialised countries such as Hong Kong, South Korea and Singapore was largely due to the dramatic growth and transformation in education and training systems. Indeed, investments in human capital in Japan, Taiwan and some East Asian countries have been the key driving force in the growth and development effort of these countries even though they are not well endowed with the abundance of natural resources as Africa has.

The limited nature of human capital has also been identified as a major factor that hinders the ability of most African countries to attract foreign direct investment (FDI). Undoubtedly, high level of education in Africa enables educated workers to absorb advanced technologies brought through FDI, handle the newer technique of production easily and increase the ability to catch up rapidly with technologically advanced countries. The contribution of FDI to economic growth occurs only when host country has sufficient absorptive capacity in terms of human resource to the advanced technologies that accompanies the investment (see Borensztein et al., 1998). Undoubtedly, investment in human capital is a key factor in attracting FDI since most investors include as one of their most important criteria for investment in a country, the level and capacity of its human capital.

Clearly, a country that is unable to develop the skills and knowledge of its people and to utilise them effectively in wealth creation will be unable to develop. Larger inputs of higher quality labour result in greater production by virtue of labour's status as a factor of production. As Roux (1994) observed, investment in human capital enables a country to effectively exploit the benefits of technical and technological advancement as well as maintaining the advancement.

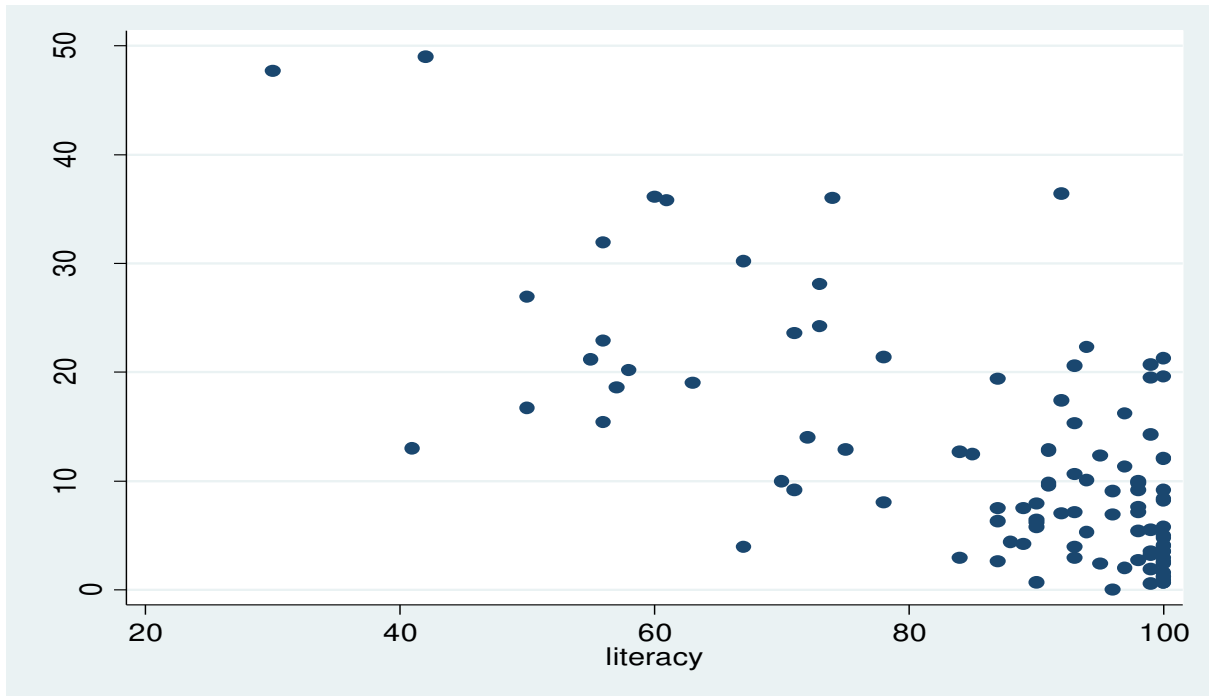
Economic Transformation and Human Capital Development: Empirical Consideration

The relevance of education and skilled development as major elements of human capital development for economic transformation and development is generally not in doubt. In this section, the paper makes an attempt to ascertain the statistical correlation between economic transformation as a process of economic development and education. We apply two simple correlation methods; the Spearman's and Pair wise correlation technique to ascertain the statistically significant correlation between education as a measure of human capital development and economic transformation measured by the share of agriculture or services in GDP of 104 developed and developing countries of the world (see appendix for the list of countries). The source of data for the estimation is the Key Indicators of the Labour Market (KILM) published by the International Labour Organisation and the latest World Development Indicators (WDI) from the World Bank (World Bank, 2013).

Education as a form of human capital development can be measured by literacy rate while the share of agriculture or service in GDP is used as a proxy for economic transformation. Less developed countries are expected to have low literacy rate and high percentage of GDP emanating from agriculture with an expected negative correlation. Another measure of economic transformation is the share of manufacturing in GDP or employment. However, data on these indicators were not available in many developing countries particularly in Africa. A scatter plot of the relationship between education and economic development are presented in Figures 2a and 2b.

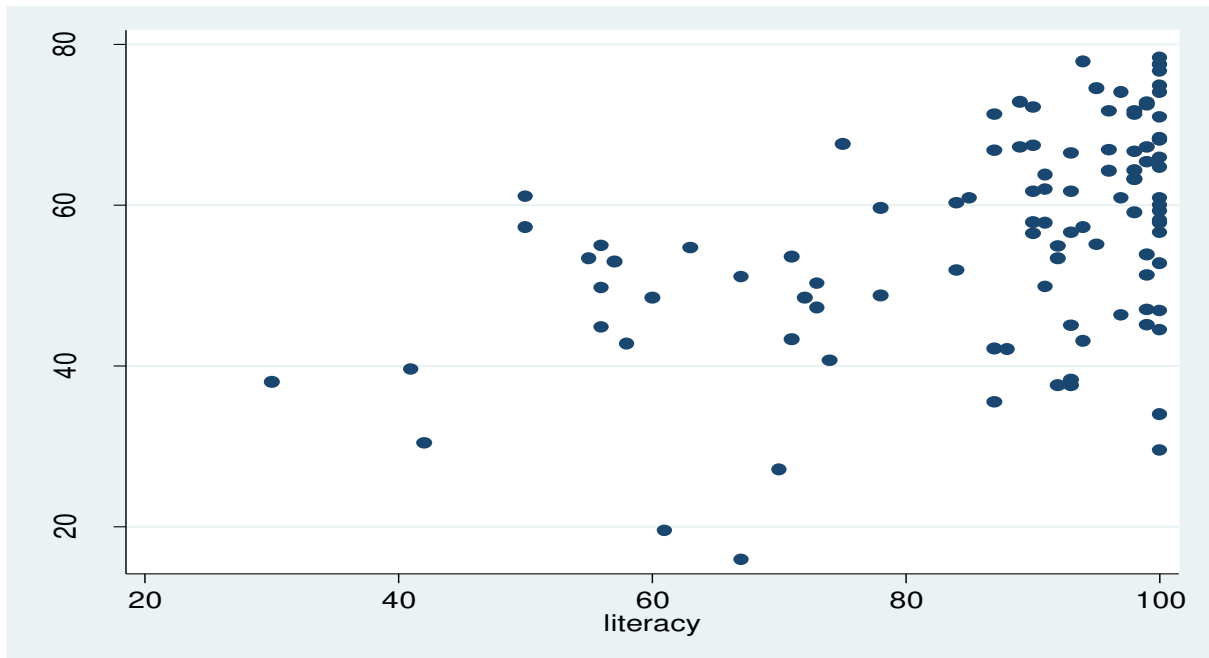
A cursory look at Figure 2a suggests a an obvious negative relationship between literacy rate and agriculture share in GDP confirming the assertion that high literacy rate is associated with development measured by lower share of agriculture in GDP. On the other hand, less developed countries with lower education base measured by lower literacy rate are characterized by a high share of agriculture in GDP. Figure 2b reports a positive relationship between services share in GDP and literacy rate indicating that a high literacy rate is directly correlated with development measured by the dominance of services in GDP.

Figure 2a: A Scatter plot of the relationship between literacy rate and the share of agriculture in real GDP) of 104 countries across the world



Source: Constructed by Author

Figure 2b: A Scatter plot of the relationship between literacy rate and the share of services in real GDP) of 104 countries across the world



Source: Constructed by Author

Table 3 reports the outcome of the Spearman's and Pairwise correlation between education measured by literacy rate and economic transformation proxied by the share of agriculture and services in GDP. The correlation coefficients obtained were all statistically significant at 1% indicating that the correlation coefficients obtained are statistically different from zero. Thus, a significant relationship exists between economic transformation and human capital development. A negative correlation coefficient of 0.57 and 0.68 between literacy rate and agriculture share in GDP confirms that countries that have undergone economic transformation with a reduced importance of agriculture relative to other sectors also have well educated population measured by high literacy rate. On the other hand, a positive correlation coefficient of 0.45 and 0.47 between literacy rate and services share in GDP also confirms direct relationship between economic transformation or development (measured by high share of services in national output) and education.

Table 3: Simple Correlation of Literacy Rate with Agriculture and services share in GDP

Correlation Method	Agriculture share in GDP	Service share in GDP
Spearman's Correlation	-0.5729**	0.4484**
Pairwise Correlation	-0.6759**	0.4709**

Number of countries 104; * statistical significance at 5%; ** statistically significant at 1%

How Africa must Proceed

The main route through which economic transformation can be achieved in Africa is by increasing human capital. A major step towards the realisation of this objective is to address the challenges in human capital development on the continent. This includes increased commitments of African governments to the development of human capital base of their respective countries through increased budgetary allocation to education. Thus, African governments must have unwavering political will to make tough decision of deploring the requisite resources to develop human capital in their respective countries. Given the numerous demands on their meagre

budgets, African governments will have to convince numerous stakeholders that investing in human capital is an investment towards accelerated growth and transformation.

Stepping Up Public Investment in Education

Africa's commitments to developing its human capital base could be measured by the increase in public expenditure on education as a percentage of GDP, or as a percentage of total public expenditure, and per capita expenditure on education. Access to quality education in Africa could be improved through a surge in educational expenditure for the establishment of new schools and improving existing ones by increasing the provision of educational infrastructure, recruitment of more teachers and providing them motivational packages. Emphasis in the enhancement of access to education and skill training must be placed on a more equitable distribution of educational opportunities and on the reduction of existing inequalities based on sex, economic status, and geography.

As much as possible, increased public investment in education must be skewed towards training of young people in science, technology and engineering to meet modern growth and development challenges in this globalised and competitive world. Generally, science and technology are unquestionably indispensable to modernisation and economic transformation, and that failure to master science and technology implies a dismal future for Africa in the emerging post-industrial and information revolution now blowing across the rest of the world. Undoubtedly, Africa is ranked lowest in the scale of the growing science and technology due largely to the fact that the supply of tertiary graduates in these disciplines has historically been low.

In recent period however, some African countries have stepped up investment in education and training in science, engineering, manufacturing and construction as reported in Figure 1. Invariably, the establishment of many more additional schools and implementation of policies to increase access to education and improve school enrolment must not compromise quality. Indeed, the quality of the products of educational and training institutions in Africa has been observed to be low in many respects. This needs to be addressed to enable trained labour force compete effectively in the increasing competitive world. Measures to reduce student-

teacher ratio and increase the provision of materials such as books, equipments and teaching aids for the promotion of effective teaching and training should be a priority.

Enhance Private Sector Participation

Governments' effort in the development of human resource base could be complemented through increased private sector participation in the provision of education particularly at the secondary and tertiary level. In recent times, there has been proliferation of tertiary institutions in many countries on the continent. The concern however is that, almost all these private tertiary institutions have been concentrating on training in liberal arts and social sciences with limited or no training in science, technology and engineering. While suggesting that government create conducive environment for increased private sector participation in the development of human resource base, it is also important that the regulatory mechanisms to uphold quality of training is seriously adhered to.

The significant impact of these measures on the supply of human capital may not be realised without putting in place pragmatic measures to encourage parents to get their children in school and reduce dropout rates that has become a common feature of school systems in Africa. Many countries in Africa have in recent times pursued free and compulsory basic education strategies that have helped to boost net enrolment in primary school where skill development is very limited. At the secondary and tertiary level however, enrolment rates have consistently remained low largely because of high school dropout. In the absence of free education beyond the basic level, the implementation of targeted policies at the poor but brilliant young people in the form of scholarships at higher level will be the best option to improve enrolment rate at the secondary and tertiary level, and supply of highly skilled workforce to boost economic growth. In addition, effort must be made to bridge the gap between the gender differences in enrolment at all levels of education in Africa where more boys go to school than girls. Thus, every capable basic and/or secondary school graduate regardless of sex, religion or ethnic origin should have an opportunity to receive the requisite support whether it is bursaries or other forms of financial aid to pursue higher education.

Reverse Brain Drain

After training highly skilled labour, the obvious challenge of retaining them in the country needs to be addressed. The issue of brain drain could be successfully addressed by drawing useful experience from South Korea, Singapore and Taiwan. These nations established incentive schemes and mechanisms within a pleasant socio-economic framework that helped to attract back home quite a lot of their own highly trained expatriate people from the various industrialised countries. The return of these highly skilled professionals helped to fuel the revival of agriculture, commerce, higher education, hi-tech research within these nations and to transform them into so-called newly industrialised countries. While acknowledging the return of some African professionals back home (in some cases after retirement) in recent years, the reality is that the outflow remains high suggesting a negative net inflow.

The trend could be reversed by addressing the push elements of African talent to greener pastures. These push factors include lack of basic resources and equipment for these trained workforce to effectively carry out their duties and more importantly the political environment in the country or at the workplace. For Africa to retain its human capital or reverse its brain drain, then it must make efforts to provide a conducive environment for its knowledgeable workers and make available to them the requisite resources to enable them do their work effectively. African governments must show commitment to creating and create peaceful and stable socio-political and economic environment through good governance that upholds the rule of laws and devoid of corruption. The outflows of locally trained professionals could be checked and those outside attracted back home through implementation of retention strategies outlined by Dzvimbo (2003) that provide graduates with viable career opportunities, fostering international cooperation with research institutions of developed countries and attracting foreign investment in hi-tech clusters.

Education Institution and Industry Collaboration

Measures to improve employability of educational and training outcomes are critical for the realisation of highly skilled human capital base in Africa. African governments may be required to play a greater role in upgrading the education and skill creation system through close consultation and collaboration between training institutions and industry in the development of

curricula, training methods, enrolment and selection of trainees to increase the relevance of public training in meeting industries' needs. In other words, it is important for African governments to promote the creation of a synergy of the education (particularly the tertiary education sector to formulate demand-driven programmes) and training systems with employment opportunities and economic growth. This will ensure an integration between academic and job-related education in the new economy that requires new skills such as communication skills, IT, ability to learn independently and further personal and social skills (see Miyamoto, 2003). This would help address the issue of mismatch between demand and supply of skills which has been the major underlying reasons for increasing incidence of educated unemployment.

Conclusion

There is no question about the fact that the sure way for Africa to experience economic transformation and be able to compete effectively in the global world is to increase the quantity and quality of its human capital base. This requires serious commitment of African governments to make it happen. Governments must first appreciate the necessity of empowering its people productively through education as a means of putting their economies on the path of transformation. Stepping up investment in education and skill training is a key step to achieving improved human capital base in the region. It is important for more attention to be given to teacher motivation, provision of adequate textbooks and other teaching and learning tools to improve quality of teaching and learning. A review of curricula to reflect changing labour market condition is recommended to make education meaningful for national development. It is also critical for Africa to encourage private sector participation in the provision of education, enhance effective collaboration between educational institutions and industry and adopt measures to reverse brain drain to enable Africa reap the benefit of education for development. Clearly, a good appreciation of the relevance of human resource development by governments would influence their political decisions in this direction.

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Appendix

Countries used in the correlation analysis based on data availability from KILM and WDR

Angola	El Salvador	Macedonia,	Samoa
Argentina	Ethiopia	Malaysia	Saudi Arabia
Armenia	Fiji	Mauritania	Senegal
Azerbaijan	Finland	Mauritius	Serbia
Bangladesh	Gabon	Mexico	Sierra Leone
Belarus	Gambia	Moldova, Republic	Singapore
Belgium	Georgia	Mongolia	Slovenia
Bolivia	Germany	Montenegro	Spain
Bosnia & Herzegovina	Ghana	Morocco	Sri Lanka
Botswana	Guatemala	Mozambique	Sudan
Brazil	Guinea	Myanmar	Swaziland
Bulgaria	Honduras	Namibia	Tajikistan
Cambodia	Hungary	Nepal	Tanzania, United Republic
Chile	India	Netherlands	Trinidad and Tobago
China	Indonesia	Nicaragua	Tunisia
Colombia	Italy	Norway	Turkey
Congo	Jamaica	Pakistan	Turkmenistan
Costa Rica	Jordan	Panama	Uganda
Côte d'Ivoire	Kazakhstan	Papua New Guinea	Ukraine
Croatia	Kenya	Paraguay	United Kingdom
Cuba	Korea, Republic	Philippines	United States
Czech Republic	Kyrgyzstan	Poland	Uruguay
Denmark	Latvia	Portugal	Uzbekistan
Dominican Republic	Lebanon	Puerto Rico	Viet Nam
Ecuador	Lesotho	Romania	Zambia
Egypt	Lithuania	Russian Federation	Zimbabwe