



## **The Imperative of Skills Development for the Structural Transformation of Sub-Saharan Africa: Potential for China-World Bank-Africa Collaboration**

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### **Summary**

China's growing investments in Africa's infrastructure, energy, and, increasingly, light manufacturing and services, sectors have the potential of contributing substantially to the structural transformation of the continent. The increasing trade with China and the possibility of China-Africa global and regional value chains in different sectors also signal new forms of cooperation. Apart from the traditional sectors of investment, the Chinese government has pledged its support to other areas of development such as urbanization, the modernization of agriculture, and green, skills development and low carbon technologies. All of this means that China can play a central role in helping African countries diversify their productive sectors and expand economic opportunities.

Experience from East Asia suggests that the impacts of investments by Chinese firms and greater trade with China in manufacturing, agriculture and services on better quality, more productive jobs could be very large. For this to happen, however, medium- and large-sized domestic firms that can compete in export markets need to emerge. China's market and the transfer of manufacturing tasks from China to African countries could lead to the creation of better quality jobs in the non-agricultural sectors.

Government policy and the business environment are critical ingredients for successful transition. China's own development experience, as well as lessons from other East Asian countries, shows that investment in education and training—good quality basic education with targeted investments in vocational training, higher education and science and technology—to create the skilled labor force and professionals were absolutely essential to support the transformation of their economies.

At present, foreign companies, including Chinese firms, engaged in Sub-Saharan African countries encounter serious skills constraints. In the short term, and especially in order to deliver large scale infrastructure projects on time, Chinese firms have often resorted to importing skilled labor in

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addition to qualified professionals (engineers, architects). This reliance on Chinese skilled workers is a distinctive feature of Chinese investment in Africa. Chinese firms have sometimes also taken African workers to China for training, but this is not a viable long term strategy, because of the associated high labor costs.

The Government of China has responded to requests from African governments, via the African Union and in particular, the triennial Forum on China-Africa Cooperation (FOCAC), for investments in Technical Vocational Centres and universities, additional scholarships for study in China, and joint research. These efforts are much appreciated by African countries and there are some remarkable examples of success. African countries have also indicated a great desire to learn from China's experience in developing a skilled labor force. There is scope for considerable expansion of these efforts. To date, the investments in training, while important, are not yet commensurate with the enormous investments in infrastructure, energy and other sectors. Moreover, they are carried out with several different Government Ministries and agencies, which makes it difficult to assess the total quantum of assistance being provided for skills development. In addition, as the skills development programs in many African countries tend to be of low quality and labor market relevance, for a variety of reasons, there is a great need to focus on improving the quality and content of programs and on the system-level mechanisms required for private sector-oriented skills development. More systematic information about the investment by Chinese firms in training of African workers and the impact of on-going programs to support technical/vocational training, scholarships and the collaboration between Chinese and African universities under the 20-20 program would greatly help to target future support.

Under the Partnership for Skills in Applied Sciences, Engineering and Technology (PASET), launched by several African countries and the World Bank to build partnerships with new Partners, Chinese academic institutions have participated in analytical work and in sharing the experiences of China in the development of capacity in vocational training and science and technology. The PASET is a regional initiative to build the skilled labor force in Africa (from technical vocational to higher education and research) for priority sectors, with clear objectives and targets, and provides a platform to align the investments and efforts of different partners. The most recent regional PASET forum, held in Dakar in June 2014, issued a *Call to Action*, with very specific objectives and targets for building skills for priority sectors. China's participation in PASET is much appreciated by both participating African countries and the World Bank.

This paper proposes three ways in which China and the World Bank could collaborate in the area of skills development in Africa, building on the experience of both and recent efforts at collaboration. First, under the PASET initiative, China and the World Bank could undertake **joint analytical work** to assess the skills needs for different sectors in individual countries, continue the benchmarking of African universities piloted with Shanghai Jiao Tong University, share the development experience of China through targeted learning visits, and share experiences in skills development through regional forums. The participation of Chinese institutions and firms in such events would enable them to learn about the perspectives and concerns of African counterparts. The Partnership Facility Trust Fund that China proposed to set in the World Bank Group could help with financing such activities. While China has traditionally worked with the African Union, the possibility of also collaborating with the World Bank through the PASET combines strong ownership of the agenda by Sub-Saharan African countries with high level impact and visibility.

Second, China could **support the regional initiatives of the PASET** such as the establishment of the Regional Scholarship Fund for postgraduate studies in applied sciences, engineering and technology; the proposed regional TVET centres of excellence; and co-financing of the regional Africa Centres of Excellence project, currently financed by the World Bank. This would supplement China's on-going investments, which could also benefit from the experience of well-designed programs with strong monitoring and evaluation.

Third, China could **co-finance country-level projects** which are being prepared with World Bank assistance, focusing on technical/vocational and higher education. This will enable Chinese Ministries and institutions to learn from the experience of the World Bank and contribute to the development of the education and training system in Sub-Saharan African countries, while also contributing China's experience in a concrete fashion. This may greatly enhance the impact of China's bilateral investments in this area. For the Sub-Saharan African countries, this would be beneficial because there will be alignment of different partners. For the World Bank, there is the opportunity to learn from and adapt China's experience to other countries in the region and across the world.

## 1. Introduction

The scale of China's investments in Sub-Saharan Africa is impressive but these figures will be small if future projections of Chinese investments materialize. Premier Li Keqiang in his recent visit to Africa<sup>2</sup> predicted that trade volume with Africa would double by 2020 to US \$400 billion. Further, Chinese foreign direct investment (FDI) will increase to US\$ 100 billion in the same time period. Not only are the levels of investment rising but the sectors where Chinese firms are investing are becoming more diversified. In the past, investments focused primarily on infrastructure and energy, but in the future, Premier Li Keqiang emphasized that China-Africa collaboration would be in areas such as industrialization, urbanization, modernization of agriculture, and green and low carbon technologies, among others.<sup>3</sup>

A central factor in ensuring that these investments deliver on economic and social returns for both China and Africa depends on the quantity and quality of skills in African countries. These include the competencies (literacy, numeracy, non-cognitive skills such as punctuality, discipline etc) of unskilled workers, which is imparted by basic education, as well as the mid-level skills of technicians and higher level skills of professionals such as engineers, scientists, accountants, and others.

Moreover, for Sub Saharan African countries to embark on the process of sustained structural transformation and attain middle income status, emulating the experience of China and other East Asian countries, including the emergence of 'export capable' domestic firms, is essential (Yusuf, 2014). In the initial stages, the emergence of such domestic firms has been strongly driven by Foreign Direct Investment (FDI). However, many policy ingredients are required for a broad-based transformation, including the creation of the appropriate business environment and investment in infrastructure. Among these policy ingredients, the creation of a skilled labor force, particularly amongst the young, was an important factor in the success of all East Asian countries. FDI itself often contributes to raising the skill level of the labor force, as foreign firms tend to invest more in training of their own workers and of their suppliers, and skilled workers employed in foreign firms migrate to domestic firms. Government policy can often help to reinforce these trends through, for instance, including provisions for employment and training of local workers as well as encouraging foreign firms to invest in broader training efforts that benefit the sector as a whole.

China's investment in infrastructure, energy and in manufacturing and services in Sub Saharan Africa countries can play an even more important role in the process of structural transformation of the region if there is a concerted effort to raise the skill level of the labor force. Both the Government of China and Chinese firms can contribute to this effort.

China has responded positively to requests from African countries for support in vocational/technical training, higher education and science and technology. This assistance could

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<sup>2</sup> Premier Li Keqiang toured Sub-Saharan Africa in May 2014 visiting Ethiopia, Nigeria, Angola and Kenya to discuss developing relationships between China and the region.

<sup>3</sup> <http://www.scmp.com/news/china/article/1505388/trade-africa-will-double-2020-li-keqiang-tells-ethiopia-conference>

have a much greater significant impact on developing skills in the countries if it were closely aligned to their economic potential and priority sectors. In the short run, this assistance could also support the efforts of Chinese firms to invest in Africa by increasing the quantity and quality of labor. Indeed, some Chinese firms have reacted to the shortage of skills in Africa by importing even semi-skilled labor to complete projects on time, and almost exclusive reliance on Chinese technical and professional workers. While this strategy may bring a solution in short-term returns, it is not viable in the long run as the cost of Chinese labor rises and it does not contribute to the structural transformation of African economies.

Enhancing both how skills are delivered and the range and quality of skills will be a critical pillar for the economic transformation of African countries and whether many of them achieve their goal of reaching middle income countries (MIC) status. Separately, both the Chinese Government and the World Bank have directly or indirectly financed initiatives and projects focused on improving the quality of skills in the region. With China being the largest investor in Africa – US\$ 21 billion in 2010 – (Wagle and Paudel, 2014), and the World Bank being one of the larger investors in skills development on the continent, there is a strong case for greater collaboration and synergy of projects and initiatives for the purpose of delivering greater impact and building the basis for long-term prosperity.

Section 2 of this paper discusses the broader trends in Chinese investments and types of Chinese firms investing in Sub Saharan Africa and their implications for skills requirements. Section 3 examines and summarizes the results of a study of Chinese firms in Ethiopia and how they meet their skills needs, comparing them with domestic firms and examining the broader implications of their actions. Section 4 lays out the current skill levels in Sub Saharan Africa and the priorities for skills development. Section 5 presents China's support for skills development in Sub Saharan African countries, based on an analysis of different data sources from China, and suggests ways for increasing the impact of existing modalities of cooperation as well as new modalities. Section 6 proposes some concrete methods for collaboration between China and the World Bank for enhancing skill development in Sub Saharan Africa aligned to the goal of structural transformation.

## **2. Chinese FDI and Firms in Sub-Saharan Africa**

Sub-Saharan Africa has seen a substantial increase in FDI. In the past decade, FDI flows in the region increased from US\$6.3 billion in 2000 to US\$35 billion in 2012 (Wagle and Paudel, 2014). FDI flows to Sub-Saharan Africa only equals 2.5 percent of total global FDI flows but this is greater than capital flows that are generated through remittances and official development aid to the continent. There is a potential for this FDI to contribute to the structural transformation of Africa, if the policy ingredients mentioned above are present, including a skilled labor force which is available to work in growth sectors of the economy.

The largest inflows to Sub Saharan Africa come from Southern investors and China is the largest among this group. Chinese FDI to 15 Sub Saharan African countries (SSA-15<sup>4</sup>, which account for four-fifths of all FDI in the region in 2012) increased by six times between 2004 -2010, from US\$242 million to US \$ 13.88 billion (see Table 1). This compares with an increase in Chinese

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<sup>4</sup> Among the SSA-15, Nigeria and Mozambique are the largest recipients, followed by South Africa, Ghana, DRC, Congo and Sudan.

FDI to Africa as a whole from 317 million in 2004 to US\$21.12 billion in 2010. Detailed figures for each country destination are not available for the latest year but aggregate figures suggest that global flows from China expanded to US\$84 billion in 2012, and based on past trends, the region would have continued to have benefited significantly from these flows. In addition, there may be additional investment from China as offshore investment via Hong Kong and other economies. Although increasing in volume, in 2010, Chinese FDI flows to Africa only accounted for about 2 percent of total Chinese global FDI.

**Table 1: FDI Outflows from China (US\$ million)**

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Total	5498	12261	17634	26506	55907	56529	68811	74654	84220
Africa	317	392	520	1574	5491	1439	2112		
15 SSA countries	242.38	230.76	360.68	1178	5281	849.78	1388		
Angola	0.18	0.47	22.39	41.2	-9.57	8.31	101		
Congo	0.51	8.11	13.24	2.5	9.79	28.1	34.38		
Congo DR	11.91	5.07	36.73	57.3	23.99	227.16	236.2		
Ethiopia	0.43	4.93	23.95	13.3	9.71	74.29	58.23		
Ghana	0.34	2.57	0.5	1.85	10.99	49.35	55.98		
Kenya	2.68	2.05	0.18	8.9	23.23	28.12	101.2		
Madagascar	13.64	0.14	1.17	13.2	61.16	42.56	33.58		
Mozambique	0.66	2.88	-	10	5.85	15.85	0.28		
Nigeria	45.52	53.3	67.79	390	162.6	171.86	184.9		
Rwanda	-	1.42	2.99	-0.41	12.88	8.62	12.72		
South Africa	17.81	47.47	40.74	454	4808	41.59	411.2		
Sudan	146.7	91.13	50.79	65.4	-63.1	19.3	30.96		
Tanzania	1.62	0.96	12.54	-3.82	18.22	21.58	25.72		
Uganda	0.15	0.17	0.23	4.01	-6.7	1.29	26.5		
Zambia	0.23	10.09	87.44	119	214	111.8	75.05		

Source: Statistical Bulletin of China's outward foreign direct investment; UNCTAD (2013)

Note 1: Values in US\$ millions, current price

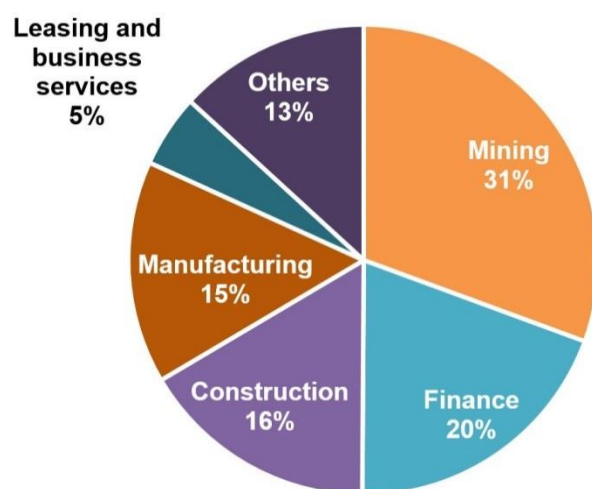
Source: Wagle, 2014

Chinese FDI flows into Sub Saharan African countries are channeled through four main types of firms (Kaplinsky and Morris, 2009). The differences between these firms, which is a distinctive feature of Chinese FDI, also has implications for what the Chinese government can do to encourage Chinese firms to invest in skills development. The four broad categories are (i) Central government State Owned Enterprises (SOEs); (ii) Provincial government SOEs; (iii) private owned enterprises, incorporated in China and Sub Saharan African countries; and (iv) small firms, incorporated in Sub Saharan African countries, often started by Chinese individuals living in the countries. Investment by the latter is probably not captured at all in official FDI statistics.

This proliferation of investor types also accounts for the broad sectoral distribution and segmentation of Chinese FDI and its distinctive impact on local economies. The large SOEs invest primarily in natural resources, infrastructure and construction, receiving financing from China Development Bank, China's EXIM Bank and other Chinese banks, and often supported by government to government agreements. The private owned enterprises are largely self-financed and invest in manufacturing and services (such as telecommunications). The fourth category consists of very small Chinese investors who operate in small scale manufacturing and retail trade, and are themselves the offshoot of the employment policies of large Chinese SOEs.

The total number of Chinese firms operating in Sub Saharan African countries is not accurately known but is estimated to be about 2000.<sup>5</sup> These firms operate in a range of sectors, as mentioned above. Figure 1 provides an estimate.

**Figure 1: China's FDI stock in Africa by end of 2011**



Source: <http://www.wri.org/blog/2014/05/where-are-chinese-investments-africa-headed>.

### 3. How Chinese Firms in Sub Saharan Africa Meet Labor and Skill Needs

Very little is known about the employment profile of Chinese firms operating in Sub Saharan African countries. One estimate indicates that in 2013, approximately 215,000 Chinese workers came to Africa to work, which was 18 percent higher than 2011.<sup>6</sup> The number of Chinese living in Africa is estimated to range between 1 million to 2 million; and it is possible that many of these are former employees of Chinese SOEs who have decided to remain. An early study on the China's role in infrastructure development in Africa, which drew on field work with construction companies in Angola, Sierra Leone, Tanzania, Zambia and China, noted that "Labour has been an extremely contentious issue in all the countries surveyed" (Corkin et al, 2008). The study found that the general perception that Chinese firms bring in their own labor instead of using local labor is not necessarily true; however, local workers tended to be "predominantly employed as unskilled, casual

<sup>5</sup> In 2006, UNCTAD estimated that 700 Chinese enterprises were operating in Africa (Kaplinksy and Morris, 2009)

<sup>6</sup> <http://online.wsj.com/articles/SB10001424052702304788404579519631654112594>

workers” (*Ibid*). Overall, due to lack of data, it is difficult to gauge the local employment effects of the massive investments in infrastructure and energy by Chinese enterprises.

A recent World Bank study of labor and skills issues in Chinese firms in Ethiopia sheds some light on these issues.<sup>7</sup> The study draws on a survey of the universe of Chinese firms known to the Chinese Embassy to be operating operation in Ethiopia in 2012 and compares this to a sub-sample of domestic firms in the World Bank Enterprise survey for 2011 to highlight differences between Chinese and domestic firms.<sup>8</sup> Despite the fact that Chinese FDI has changed in its volume and composition, this study gives some important insights related to the issues of types of firms and labor practices.

The Chinese firms in the sample were overwhelmingly privately owned (the third category of the four categories described earlier) with only 14 percent being government-owned. In line with the broad classification given earlier, government owned firms operated in construction and transportation sectors. The privately owned firms were in manufacturing as well as services. There are relatively few joint ventures with Ethiopians.

This relatively small number of Chinese firms are significant employers in Ethiopia. Chinese firms accounted for 18,368 full-time (FT) jobs equivalent to 6.5 percent of the total FT permanent jobs (282,306) in the formal non-agricultural sector in Ethiopia. Of these full-time jobs, 86 percent are held by Ethiopians as are 99 percent of the temporary jobs created in these firms. Median wages in Chinese firms (US\$2296) are higher than in domestic firms (US\$1380).

Despite this significant creation of better quality jobs, relatively few of the skilled and professional positions are held by Ethiopians. Table 3 presents the occupational and skill profile of Chinese firms (with the caveat that data is missing on the occupation profiles of half the firms). 93 percent of all professional positions and 67 percent of skilled production workers in these firms are Chinese. Among all Chinese employees, 46 percent are professional workers while 20 percent are skilled production workers.

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<sup>7</sup> Trang Tran.2014. “Labor issues in Chinese FDI firms in Ethiopia.” Mimeo. All of the discussion in this section draws on this paper.

<sup>8</sup> In total 86 firms were sent questionnaires, of which 69 firms remained in the final sample. Most of these firms were in manufacturing sector (45 percent) with the rest equally distributed in construction and transportation and services. Size-wise, most of these firms were large or medium sized.



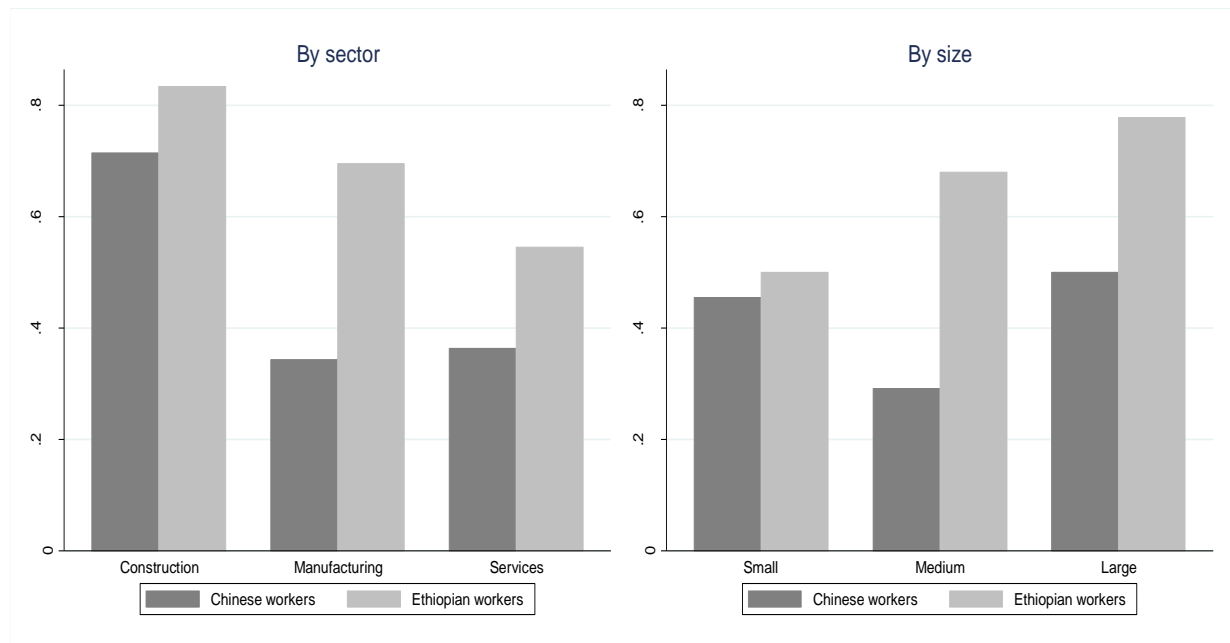
**Table 3: Occupation and Skill Profile in Chinese Firms.**

Variable	Obs	Mean	Sd	Min	Max
Percentage professional employees	30	44.0	26.7	4.3	100
Percentage skilled production workers	31	23.1	27.1	0.0	100
Percentage of professionals among Chinese employees	59	46.2	28.8	0.0	100
Percentage of skilled production workers among Chinese employees	58	19.7	27.2	0.0	100
Percentage professionals staffed by Chinese employees	30	92.9	17.4	40.0	100
Percentage skilled production workers staffed by Chinese employees	18	66.9	48.2	0.0	100

This may indicate the preference of Chinese firms for home workers, but another explanation is that there is an insufficient supply of skilled Ethiopian workers for the types of jobs that are required. More than 50 percent of Chinese firms indicated that an inadequately educated workforce is a major or severe constraint to their operations, compared to just 4 percent of domestic firms. This perception is stronger for manufacturing and construction sectors. This may indicate the fact that Chinese firms operate in different markets and operate on a large scale, and hence demand a different type and quality of skills. What is equally interesting that even those firms that have operated in Ethiopia for a long time—and for whom, hence information about securing better quality workers is presumably not a problem—indicate that the quality of skills is a constraint.

A significantly greater proportion of Chinese firms (75 percent) invest in training of workers compared to domestic firms (27 percent) (see Figure 2). Furthermore, a greater percentage of Ethiopian workers (69 percent) benefit from training, compared to Chinese workers (40 percent). Larger firms tend to offer more training, and training is also positively correlated with several measures of education—both findings are consistent with findings from the broader literature, suggesting that Chinese firms operate according to similar parameters.

**Figure 2: Incidence of training in Chinese FDI firms, by worker national and firm sector and size**



It is difficult to generalize from this study, not only because of the small size of the sample, but also because Ethiopia is different from many other SSA countries in several respects. Even by Sub Saharan African standards, the average education level of its workforce is low, since the country has only started to invest in education during the last twenty five years. Nevertheless, Ethiopia has made considerable efforts to invest in technical/vocational education and to channel tertiary education students into science streams. It has attracted relatively little FDI and also has a small domestic manufacturing sector. Hence, the supply of “skilled” workers in terms of numbers may not be a constraint. What is more likely to be constrained is the quality of the technicians and tertiary education graduates.

Nevertheless, the study’s findings throw some light on commonly held perceptions about the operations of Chinese firms. In Ethiopia, there has been a high level of dependence on skilled Chinese labor, whether due to preference or lack of local supply. This can limit the “spillover” benefits from Chinese FDI. On the other hand, the significant employment creation effects as well as firm level investment in training contradict general perceptions.<sup>9</sup> While firm-based training is useful for firm-specific skills, it is likely that Chinese firms are also investing in training of local workers in generic skills or broader occupational skills. Transferring the training in such skills to local institutions could both lower the costs of training to firms and help firms expand production. At the same, it would help to create a skilled labor force that could benefit a broader group of firms in the sector, both foreign and domestic, and help improve productivity.

<sup>9</sup> It is possible that the employment effect is high in Ethiopia because of the small size of its non-agricultural sector, especially manufacturing.

#### 4. The Magnitude of Skill Shortage in Africa: Current Status and Priorities

Sub-Saharan Africa lags behind other regions in the average skill level of its population. Although this has been increasing in recent years, the pace of growth is relatively slow, and certainly does not match the rapid increase in investment in physical infrastructure in recent years.

One measure of the stock of human capital is the average years of education of the population, aged 25 years and more (that is, when most people have completed their education). Using a world-wide dataset Figure 2 shows the growth in this stock in Sub Saharan Africa compared to other regions of the world.<sup>10</sup>

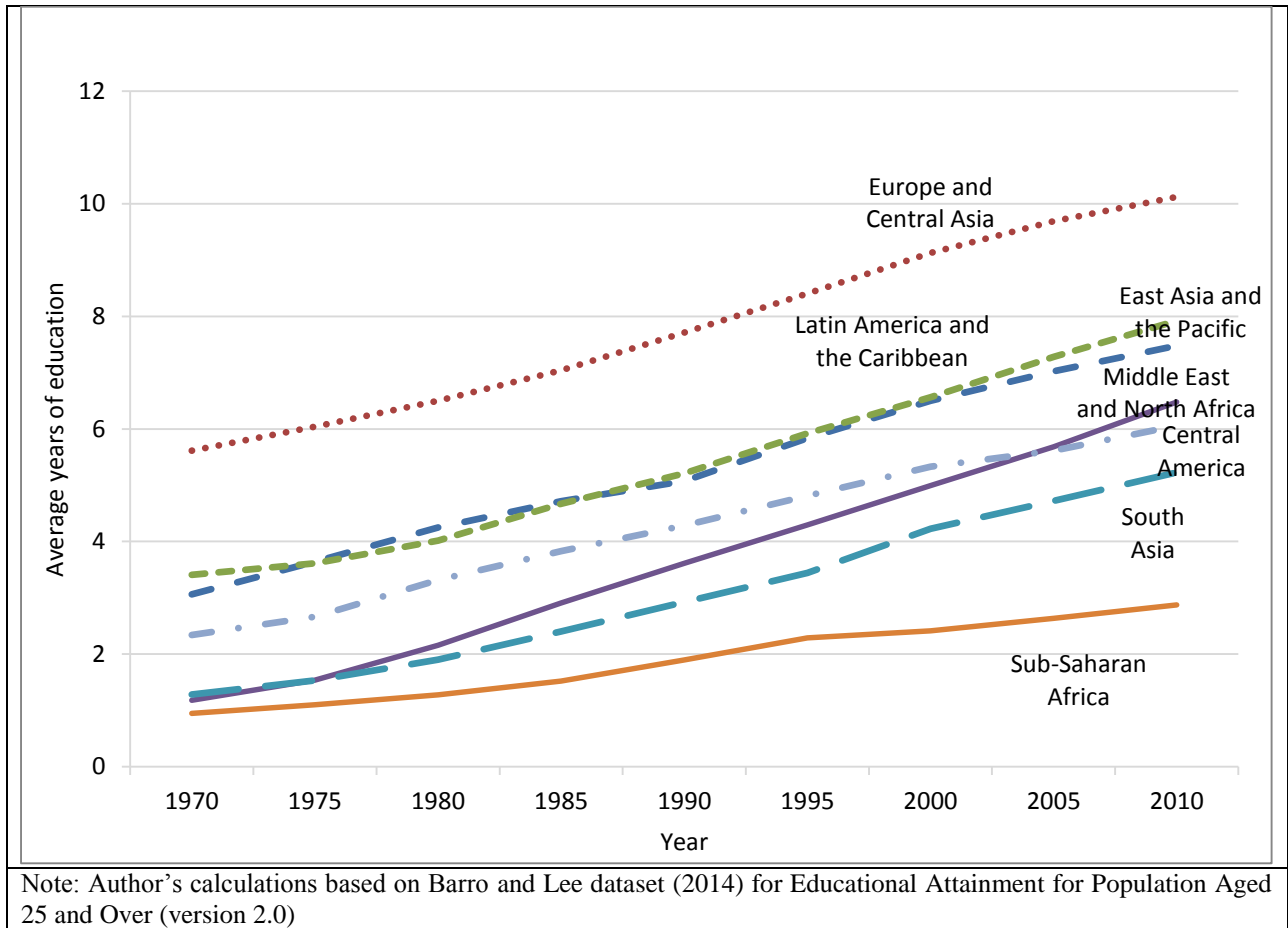
The average years of education is about 3 years, which is similar to the level for South Asia about 25 years ago. It is interesting to note that several regions were at similar levels as Sub Saharan Africa about forty years ago, but have since made significant advances.

This low average education attainment is largely due to the fact that, even as now, a large proportion of young Africans do not complete even basic education. Therefore, the proportion of the population with less than basic education continues to exceed that with higher levels of education. Over the last 20 years, African countries and development partners are investing heavily in universalising access to primary and basic education. With rapid increase in access, quality has deteriorated and poor learning outcomes compromise the gains of expanding coverage, while also limiting the students who can access post-basic education and tertiary education.

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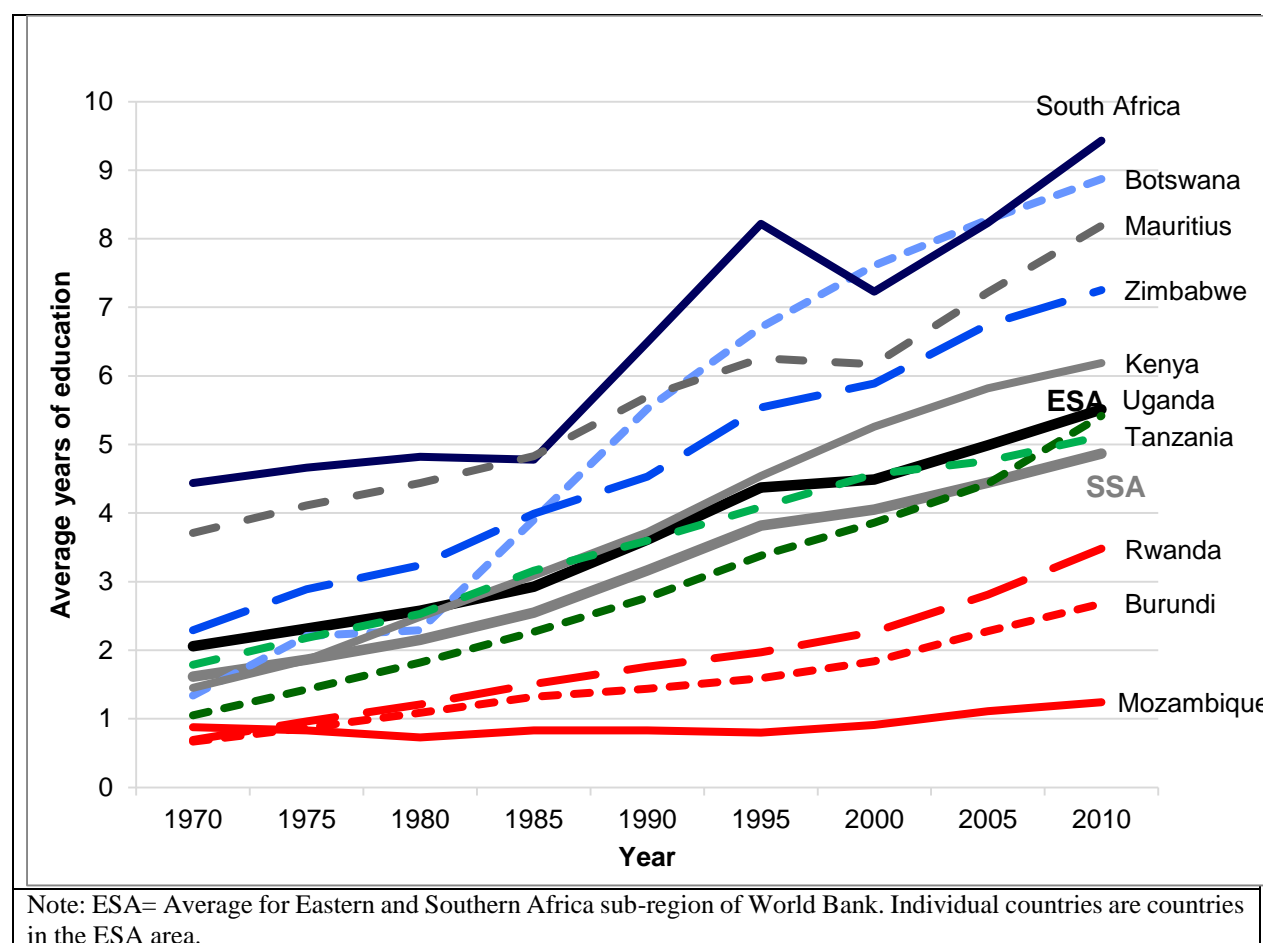
<sup>10</sup> Some countries in the SSA region are not included in the dataset for lack of data.

**Figure 2: Average years of education of population aged 25 years and more (SSA/other regions)**



However, there are enormous differences within the SSA region, reflecting past investments in basic education. Figure 3 shows the range for just some countries in the Eastern and Southern African region.

**Figure 3: Average years of education of population aged 25 years and more – Selected countries in Eastern and Southern Africa**



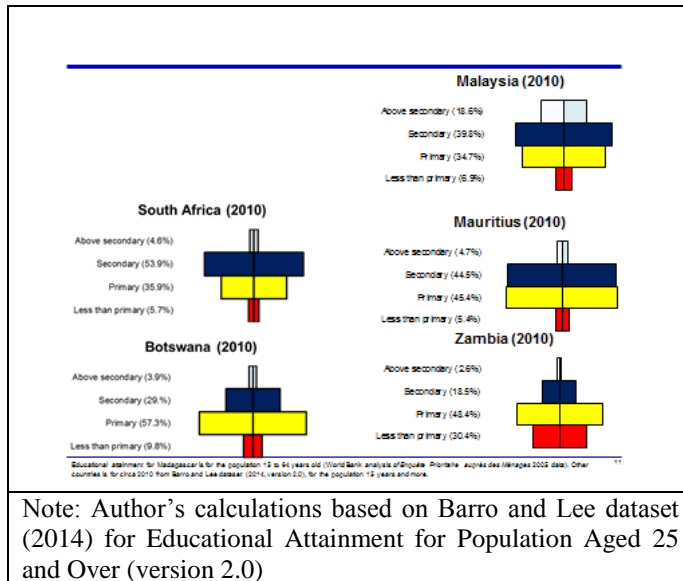
Providing quality basic education (8-9 years) to all African children will continue to be a priority for African governments, as most new employment opportunities during the next decade will require relatively low skills (basic literacy and numeracy and non-cognitive traits will suffice).

However, looking beyond 2025, several of the larger countries, which could potentially diversify into more sophisticated higher technology activities, will be in need of more advanced skills beyond basic education, and especially in the applied sciences, engineering and technology (ASET). Moreover, even in the near term, a “critical level” of these skills will be needed to initiate the process of technological absorption and prepare the groundwork for a broadening of the industrial base. This requires training of workers in tertiary level and technical/ vocational institutions.

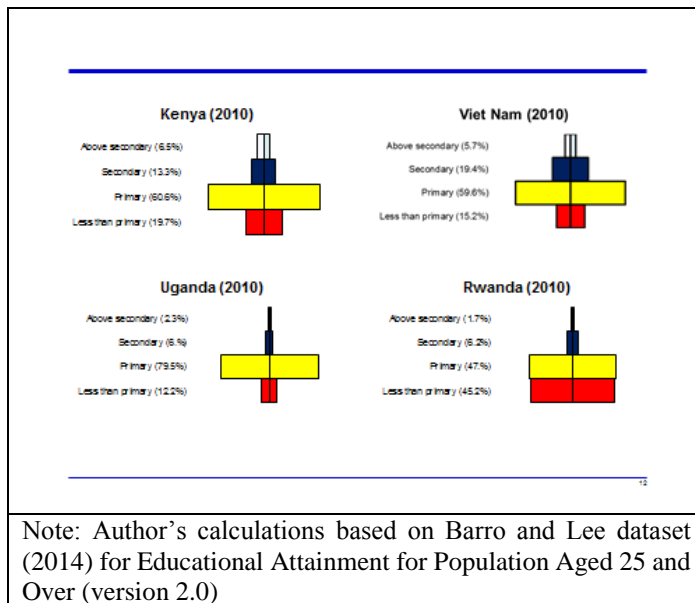
The proportion of the population with higher education is extremely small, even in the middle-income countries as well as in potential middle income countries, compared to comparator countries such as Malaysia or Vietnam (Figures 4a and 4 b). For instance, Malaysia has almost 19 percent of the population with more than secondary education, whereas even South Africa and Mauritius, which have the highest education attainment, have less than 5 percent. Kenya has a

similar profile to Vietnam, but Uganda and Rwanda, which also aspire to become middle income countries, have less than 2 percent of their population with more than secondary education.

**Figure 4a: Malaysia and Selected SSA countries - Proportion of Population Aged 25 years or more with different levels of education**

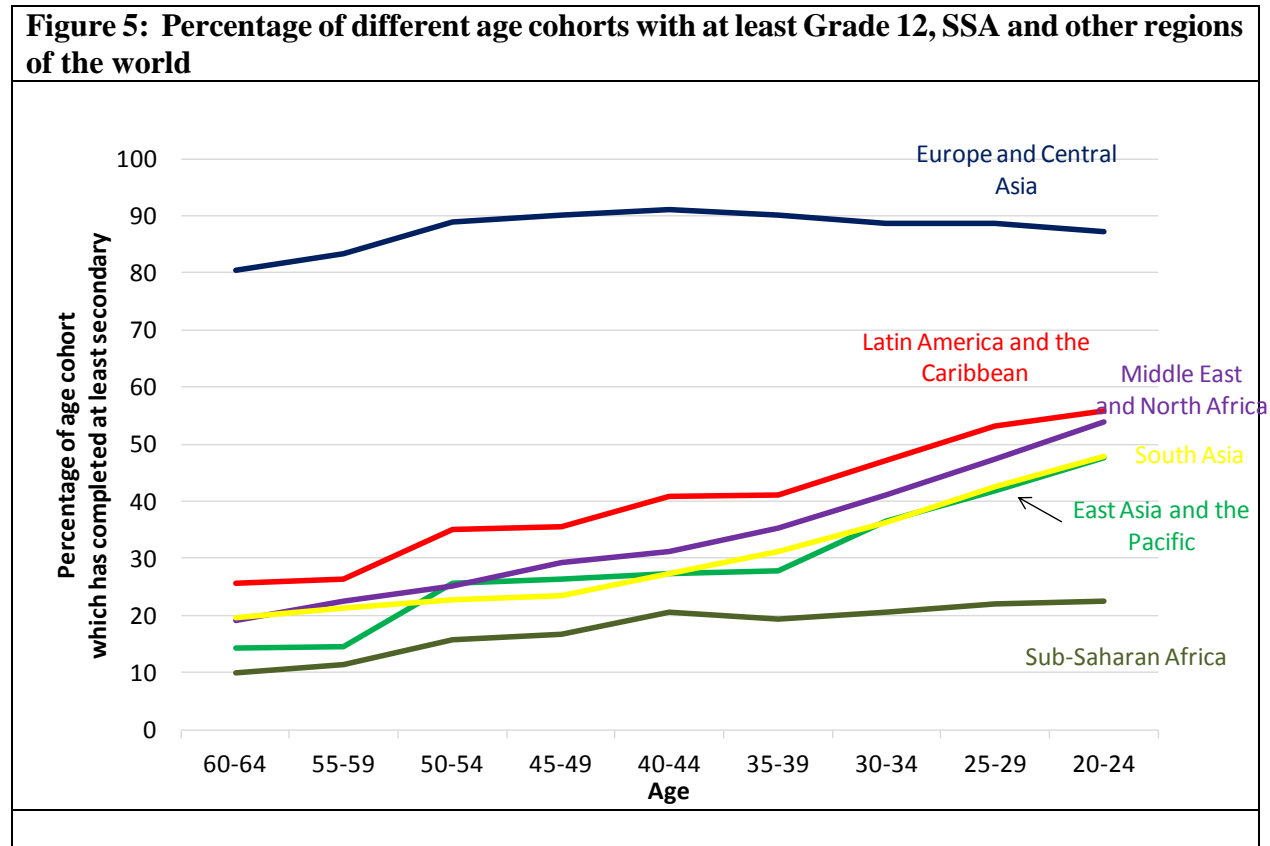


**Figure 4b: Vietnam and Selected SSA countries - Proportion of Population Aged 25 years or more with different levels of education**



The rate at which SSA countries are upgrading their higher level skills is relatively slow. Figure 5 shows the proportion of different age cohorts that have at least 12 years of education for the SSA

region compared to other regions. This proportion has remained more or less constant for the last 20 years, while other regions have accelerated their accumulation of skilled labor.



There is a special dearth of middle level technicians in Sub Saharan African countries. Consistent data are not available, but the proportion of secondary students enrolled in TVET courses is significantly below that in other countries. This reflects the limited relevance of these courses and they are not attractive to students who prefer to continue with academic courses at the tertiary level.

Among those who reach higher education, the proportion who enroll in science and engineering courses is less than 25 percent. In Tanzania, only 14 percent of students are enrolled in science and engineering courses. The proportion enrolled in engineering courses is generally less than 8 percent. At the postgraduate level, except in very large countries such as Ethiopia and Nigeria, most Sub Saharan African countries have only a few hundred students enrolled in science courses. Further, enrollment in the science and engineering courses is not aligned to the sectors of growth, with students taking general science courses that have limited employment potential. A recent study by the Royal Academy of Engineering noted that the lack of numbers is affecting development in every field, from rural sanitation to reduction of poverty (Royal Academy of Engineering (2012)).

The poor quality of their training is as critical as the limited numbers of professional and technical labor. Many Sub-Saharan scientists and engineers are unemployed because they lack the

specialized competencies and skills required by firms. The quality of their training relates to the fact that curricula are outdated, most faculty lack Ph. D training, and students gain little practical experience during their courses.

Skills constraints take about 10-15 years to emerge after periods of sustained growth. If Sub Saharan African countries are to continue on their sustained growth path, the time to address the skills constraints is now. Targeted investments in better quality technical/vocational education and training, higher education, and research are required for creating skills for the emerging growth sectors across the continent.

Creating better quality technicians and professionals also requires establishing appropriate system-level and regulatory frameworks, including governance, quality assurance and financing. Merely investing in infrastructure and equipment does not yield better trained graduates who can be employed. Such requirements include:

- Implementing competency based training.
- Establishing a national qualifications structure based on employer ratified occupational standards.
- Ensuring employer participation in testing and certifying graduates, especially at the TVET level, and include employers in the governing bodies of institutions.
- Creating financial sustainability by mobilizing new sources of financing, from employers and through cost-sharing.
- Making more effective use of current public financing through performance-based transfers to institutions.

## **5. China's Contribution to Skill Development in Africa<sup>11</sup>**

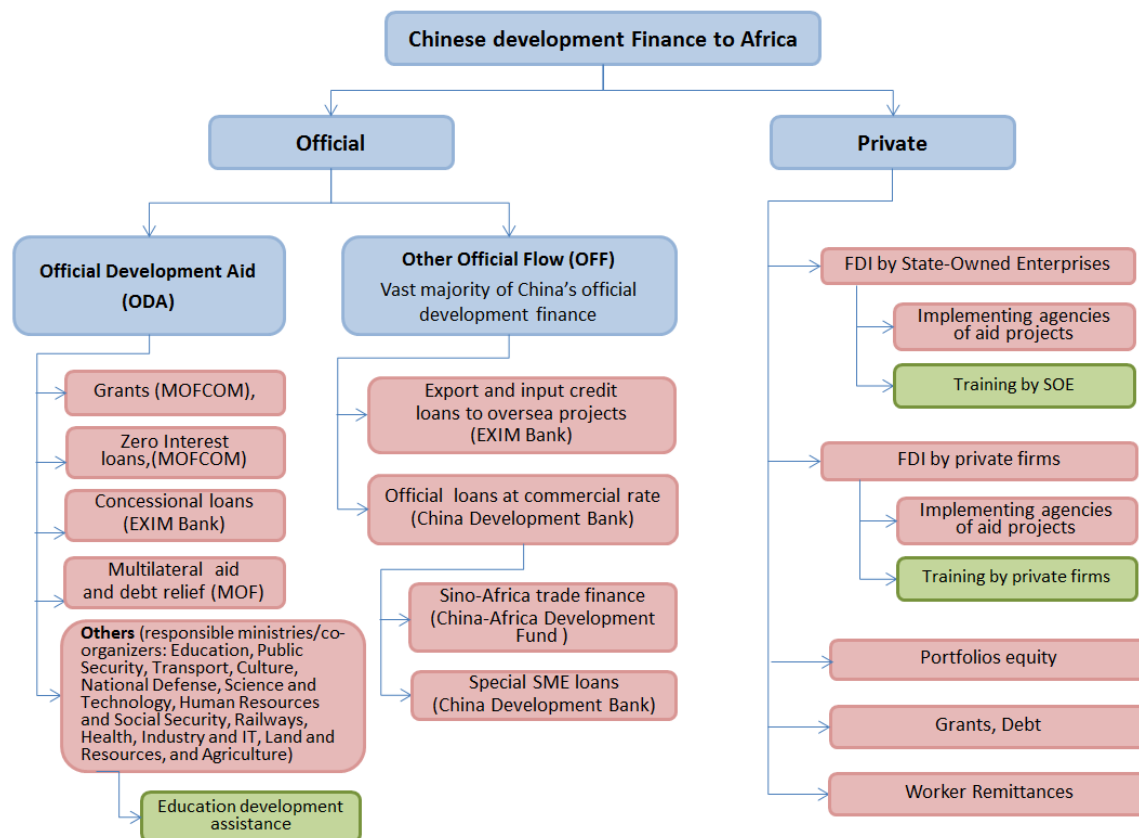
China's involvement in providing assistance to education, training, and research, particularly in science and technology, in Sub Saharan African countries has long historical roots. Traditionally, it has been provided by the Chinese government through bilateral agreements. More recently, this assistance has been undertaken within the framework of the Forum on China-Africa Cooperation (FOCAC). A new set of actors comprises the Chinese SOEs and private firms who are investing in the continent. Figure 6 provides a schematic overview of the channels for assistance/investment in education and training.

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<sup>11</sup> This section draws on Yingquan Song. 2014. "China's Contribution to Education, Training, and Research in Science and Technology in Africa." Mimeo



**Figure 6: China – Assistance for Higher Education and Technical/Vocational Training** <sup>12</sup>



Author’s representation based on China’s Foreign Aid White Paper, various years; Brautigam (2011) ; King (2011); websites of various Chinese Ministries and agencies.

Given the differing modalities through which Chinese aid to education is channeled, precise values on the scale of aid are difficult to gauge (State Council of China, 2013). Based on the latest white paper on China’s foreign assistance, this figure is estimated to be in the range of US\$ 432-850 million in 2010-2012.<sup>13</sup> There is no separate demarcation for education sector, which is included under the ambit of Human Resource Development (HRD). The main ministry coordinating foreign assistance is the Ministry of Commerce, meanwhile a number of Ministries are involved in implementing the specific programs.

A rising trend of cooperation in education and training by the Chinese government can be seen since the launch of Forum on China-Africa Cooperation (FOCAC). Five key modalities are used by the Chinese Government:

<sup>12</sup> Preliminary presentation, subject to review

<sup>13</sup> The figure of US\$ 432 million relates directly to the human development cooperation element of the foreign aid appropriation for 2010-12 and the larger figure of US\$ 850 million also covers agriculture and industry of the foreign aid budget.

- Chinese governmental scholarships for Sub Saharan African students and providing places in Chinese universities for self-financed students from African countries;
- providing training for Sub Saharan African officials and professionals technicians in a range of fields;
- sending professional experts to Sub Saharan African countries to undertake specialized training;
- building education infrastructure;
- partnership programs implemented by various governmental ministries such as the Ministry of Education, Ministry of Science and Technology, Ministry of Foreign Affairs etc.

**Scholarships:** The number of scholarships has grown rapidly since 2006, especially for Africa.<sup>14</sup> (see Figure 7.). The annual increase in scholarships has averaged 835 and in 2011, a total of 6316 scholarships were given to Africans. However, only about 40 percent of these scholarships are in the applied sciences, engineering or technology fields, which are in short supply. The majority continue to be in humanities, social studies and Chinese language.

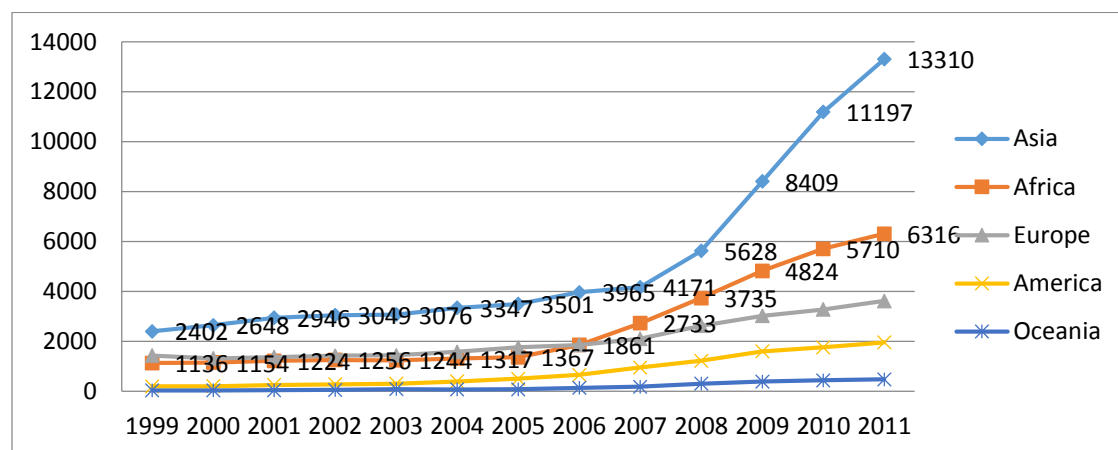
In addition to Central government scholarships, provincial governments and some enterprises also provide scholarships but the numbers are not available.

Equally striking is the rapid growth in self-financing students, which increased from almost nil in 1989 to over 26,000 in 2013. Cumulatively, close to 95,000 African students have studied in China in this period, constituting 78 percent of all students.

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<sup>14</sup> It is not possible to disaggregate the figures for sub-Saharan African countries.

**Figure 7: Chinese Government Scholarship for International Students from Five Continents (1999-2011)**



**Professional training:** This segment has also seen a significant rise, with 27,000 people (mainly administrators and others) being trained in China through short-term courses. The training covers economics, foreign affairs, energy, industry, agricultures, forestry, animal husbandry and fishing, medicine and health care, inspection and quarantine, climate change, security and other subject areas.

**Professional experts:** China has also dispatched professional experts to African countries, especially in the areas of agriculture, vocational and technical education, and health. China has established a close cooperation with Ethiopia in technical and vocational education. Over 400 teachers were sent to Ethiopia to train local teachers working in agricultural, vocational and technical education during 2010 to 2012. Further, China has established the Ethiopia-China Polytechnic college at a cost of \$14 million to train TVET students, which has since 2011 become an institute to train TVET teachers. Tianjin University of Technology and Education is the partner Chinese institution.

**Education infrastructure:** Chinese investment in building schools, technical institutes and universities has also been undertaken. Most of this has been concentrated on infrastructure and equipment. Examples of new universities are those which are being built in Senegal and Malawi. In Malawi, the EXIM Bank provided \$70 million to establish the Malawi University of Science and Technology.

**New partnership programs:** The most significant partnership programs for education and training are those related to higher education under the Ministry of Education (the 20+20 university partnership program), the China-Africa Science and Technology Partnership Plan (CASTEP) under the Ministry of Science and Technology (which promotes joint research), and programs under the Ministry of Agriculture.

### Issues for consideration

The growth in Chinese assistance for education and training is both impressive and much appreciated by African countries, as it is well demarcated and time bound. To build on

achievements to date and increase its impact going forward, several issues could be considered under two main categories:

- whether the existing modalities of aid can be improved for greater impact; and
- whether the current level and scope is aligned to the needs of Sub Saharan African countries, particularly the need for structural transformation of their economies.

### **Improving existing modalities – scholarship and university partnership programs:**

There is considerable international experience on how to design scholarship programs and university partnerships for better impact that could be drawn upon.

Scholarship programs can have an important impact on upgrading the skills of young people. In order to have this impact, they need to operate on scale and pay attention to the following: (i) clear objectives; (ii) needs assessment; (iii) eligibility rules and criteria; (iv) financial characteristics; (v) monitoring and evaluation; and (vi) governance and program management. A regional approach to the scholarship program, targeting clear capacity needs for priority sectors, and relying more on African institutions could have a much greater impact and visibility. Further, using the scholarship program to build capacity of African universities through ‘sandwich’ programs—instead of sending students to China to the entire duration of the program—will also help to build long term capacity on the continent.

Similarly, the partnership program between Chinese and African universities can be a powerful mechanism for building up mutually reinforcing capacity in both universities. The main challenge of any university partnership program is to match institutions with similar missions, forge linkages that are mutually beneficial, and embed capacity building objectives in all joint activities undertaken in the context of the partnership.

The first characteristic of any university partnership program should be its strategic focus. In each case, the program should be fully anchored in the strategic plan of the participating African universities. For that purpose, programs need to be jointly designed and based on consideration of the priority capacity building areas of the concerned universities.

The need to initiate and nurture effective partnerships would be the second characteristic. Rather than adopt a broad approach, African universities should concentrate on a small number of carefully chosen partnerships that would make most sense in terms of academic complementarity between Chinese and African universities and opportunities for mutual learning.

To increase the impact of the partnerships in the larger African countries, “cascade” capacity building arrangements could be envisaged. This refers to cases where the lead university in an African country would serve as intermediary between the more advanced Chinese partner university and weaker institutions in the same African country. This approach was successfully tested during the last World Bank financed tertiary education development project implemented in China in the early 2000s, allowing for a two-step transfer of capacity, first from a foreign university to a lead Chinese university in Beijing or Shanghai, and then from the lead Chinese university to less developed universities in the Western provinces.

### **Aligning the scope and orientation of assistance in education and training to SSA needs.**

Although China's assistance in this domain has increased, it is still small relative to Chinese FDI and trade with Sub Saharan African countries. One quarter of the projects undertaken under Chinese foreign aid can be broadly categorized as supporting human resource development. As the skills development programs in many African countries tend to be of low quality and labor market relevance, for a variety of reasons, there is a great need to focus on improving the quality and content of programs and on the system-level mechanisms required for private sector-oriented skills development.

At present, China's approach to foreign assistance to Sub Saharan Africa involves many government bodies and is channeled through various modalities. Although the Ministry of Commerce (MOFCOM) is the leading coordinating body for foreign aid and assistance, human resource development projects are implemented across a number of ministries, higher education intuitions, enterprises and other agencies. The involvement of a range of entities allows for specific areas of expertise to be drawn upon, by strengthening the coordination among different bodies and developing an overall strategic framework for provision of assistance, it can contribute to the specific goal of human resource development for transformation on the continent.

The most important issue is whether the investments are aligned with the needs of the Sub Saharan African countries, in particular the skills needs of the priority sectors of growth. This is a challenge faced by many development partners. Where African countries have developed their overall strategies and action plans, alignment of assistance with needs may be possible, but in reality, many countries have broad strategies for education, higher education and science and technology, but often lack specific operational plans. They also lack much of the analytical work required to develop such plans (including assessments of skill needs, stocktaking of current capacity, benchmarking of institutions etc). This often leads to duplication of efforts by different partners, or investment in infrastructure and equipment without commensurate attention to quality, governance and financing mechanisms.

An example of possible fragmentation and duplication is the case of Malawi. Malawi has very limited capacity in higher education and technical/vocational education. As indicated earlier, the Chinese EXIM Bank reportedly provided \$70 million to establish the Malawi University of Science and Technology, largely financing the buildings and equipment. In parallel, the World Bank prepared a \$50 million project for skills development in Malawi, to enhance the capacity of the existing four universities and TVET institutions to create skills for particular sectors. This project was based on extensive prior analytical work and included components to strengthen the governance of the higher education and TVET sub-sectors. The project also aims to improve the performance of the participating institutions by linking disbursements to achievement of specific results. It does not appear that the new Malawi University of Science and Technology is benefitting from these studies or the governance reforms introduced under the Bank-supported project. While the responsibility of ensuring coordination and complementarity of development partner investments lies with African governments, greater sharing of information among partners themselves could also lead to greater synergy among investments and enhanced results on the ground.

### **Investment by Chinese firms in TVET and higher education**

There is some evidence that Chinese firms are starting to invest in these areas. Two such examples are ZTE and Huawei, both telecommunications firms. ZTE University has set up training centres in a number of countries and a telecom college in Equatorial Guinea. Huawei has built seven training centres and one research and development centre in South Africa. An especially interesting example is the agreement between the government of the Democratic Republic of Congo (DRC) and Chinese enterprises in 2007-8 relating to investment in the mining sector, which included agreements on local content so that no more than 20 percent of the workforce is Chinese; at least 0.5 percent of the investment is allocated to training, and 12 percent of the work is sub-contracted to local firms. China also agreed to build 2 universities along with hospitals and health centres, and other social infrastructure (Kaplinksy and Morris, 2009).

A framework which encourages Chinese firms to invest at the system level in vocational/technical education and higher education, particularly for the priority sectors would stimulate action. In many cases, helping the countries to develop such a framework for the entire private sector could be the best investment.

### **China Development Bank's Assistance for Skills Development in Africa<sup>15</sup>**

In addition to assistance provided by the Chinese government, China Development Bank (CDB), which is China's leading cross-border financier, has invested mainly in short-term training through different modalities. These included (i) *CDB Training sessions* for management-level staff from various government departments, financial institutions, and corporate partners in Africa. A diverse range of program content included financial and economic reform, capital markets, local currency settlement, industry cooperation, agriculture and infrastructure development, and support for small and medium enterprises (ii) *Joint Training Sessions* organized jointly with the Ministry of Commerce and the World Bank, covering China's experience with economic reform and development, new trends in microfinance, micro-lending financial evaluation and review methodology, micro-lending client assessment, CDB microfinance models, and microcredit platform development (iii) *Corporate Leadership Program* under which CDB funded an Executive MBA program for African entrepreneurs (particularly women entrepreneurs) at the China Europe International Business School (CEIBS) and (iv) *CDB Scholarships* for African students to study MA and PhD courses in Chinese, economics, finance, and management. Between 2007 and 2014, CDB organized a total of 57 such programs for beneficiaries from 52 countries.

## **6. Collaboration of the World Bank and China for Africa in Skill Development for Priority Sectors: Vocational/Technical Education, Higher Education and Research**

The educational and skill challenges in Sub Saharan Africa continue to be significant despite important improvements in access to basic education in the past decade. The new challenge is expanding the provision and quality of post-basic education, especially secondary, technical and vocational, and tertiary, education. Success here will be a critical to ensuring that the continent continues to undergo structural transformation. Sub-Saharan Africa could benefit from better

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<sup>15</sup> Information provided by China Development Bank, April 2015. The programs cover all of Africa.

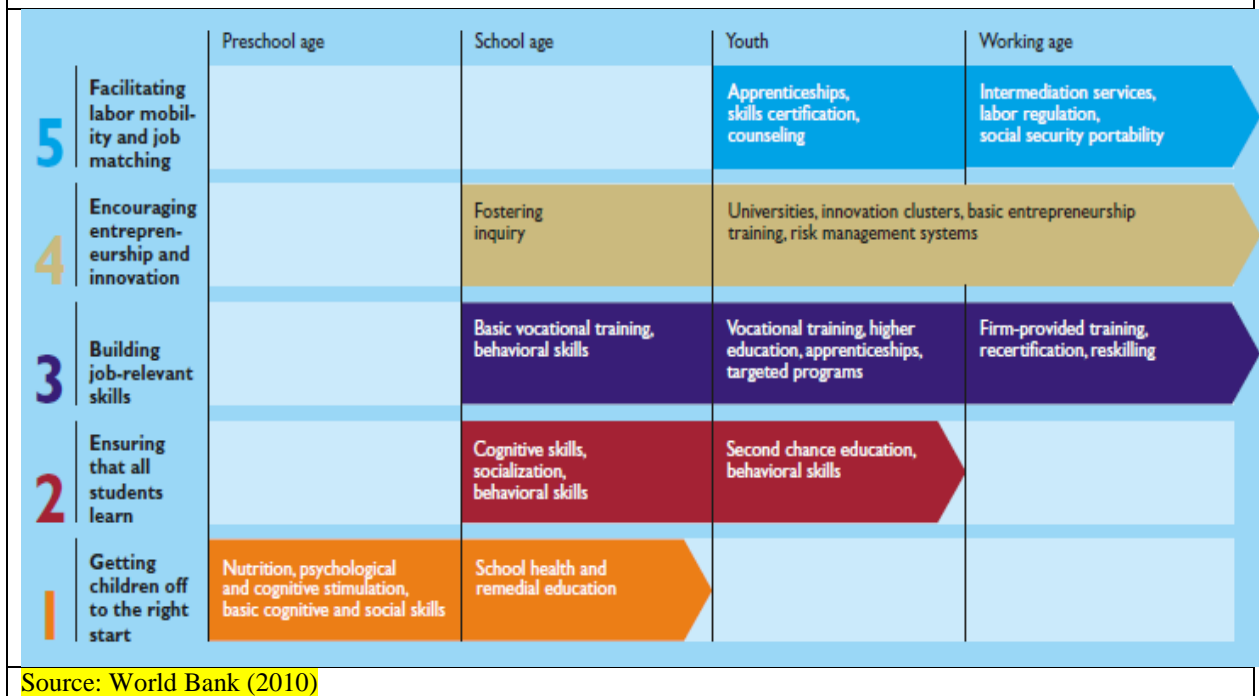
coordination with development partners to ensure that investments in these areas are well targeted and well-coordinated. The World Bank and China, as two of the most significant investors in the region could be first movers in this area, in collaboration with African countries themselves.

Such a partnership is beneficial for both the World Bank and China. China's own phenomenal structural transformation while productively absorbing its large population, offers important lessons on skills development for partners, including the World Bank. China's experience in forging strong industry partnerships between technical colleges and industry is an important area of learning. In Sub Saharan Africa and other parts of the developing world, establishing credible and sustainable relationships between these two stakeholders continually proves difficult, raising questions about the relevance of qualifications from these institutions. Another area where development partners have a lot to learn from China is how effective decentralized delivery of technical and vocational learning has been, and what lessons can be drawn by African countries seeking to devolve training to a sub-national level.

The World Bank's extensive international experience also offers important learning opportunities for China. As of 2012 the World Bank has invested US\$ 69 billion in education in over 1500 projects (World Bank 2012). The World Bank's private sector arm, the International Finance Cooperation, has since 2001 invested over \$500 million in 46 projects. In 2010, the World Bank investment in education rose to US\$ 5 billion alone (World Bank, 2012). Through this long experience the World Bank has developed strong technical expertise in particular areas of education such as higher education, learning assessment, benchmarking, teacher training, and financing to name a few. Also, the World Bank has developed a significant knowledge base in these areas and has increased its capacity to measure and assess impact.

The World Bank's Stepping up Skills for Employment and Productivity (STEP) framework shows that skills development is a cumulative life-cycle process from early childhood education through working age and includes different types of skills produced by different levels and types of education and training institutions, as well as on the job. Foundational skills (STEPs 1 and 2), comprising physical, cognitive and socio-emotional skills, are built during early childhood and through basic education. Job-relevant skills (STEP 3) can be gained via multiple modalities, including pre-employment TVET at secondary and post-secondary levels; lifelong learning, and second chance programs; on the job training, apprenticeships, informal training and training-related active labor market programs. Higher level professional and technical skills, innovation and entrepreneurship (STEP 4) can be imparted through universities as well as technology support and industrial promotion programs. Finally, in order to ensure that skills can be used for productive employment requires programs to promote job-matching and facilitate labor mobility (STEP 5).

**Figure 8: Analytical Framework- Stepping up Skills for Employment and Productivity (STEP)**



The World Bank’s experience in pre-employment skills development (from the technical-vocational education/training level to higher education) and firm-based training has brought out a number of lessons:

- (i) ***Introduce literacy and soft skill development modules as part of pre-employment programs:*** In most countries, large numbers of school goers drop out early and large parts of the workforce have little knowledge and few skills that would make them eligible for better quality jobs. Introducing modules focused on literacy and soft skills as part of pre-employment training programs and second-chance programs can help break the vicious circle of the unskilled being trapped in jobs that require little skills, and establish accessible pathways for acquiring skills.
- (ii) ***Invest in regulatory and quality assurance mechanisms:*** The government has a critical role to play mainly in regulation, quality assurance, developing qualification frameworks and occupational standards, testing and certification, creating appropriate governance, autonomy and accountability frameworks for training providers, monitoring and evaluation, enhancing public-private partnerships to enhance provision of market relevant skills
- (iii) ***Ensure employers play a critical role in system:*** Involvement of employers is required at the policy level, at the sectoral level and at the institution level. Designing the mechanisms for employer participation at each level is also crucial for ensuring that programs are relevant to the needs of the economy and that there is sustainable financing of training.



- (iv) ***Introduce financing linked to performance:*** Currently, nearly all public funding is input based. A shift in this relationship towards financing linked to outputs/outcomes will be critical to make training more relevant for labor market needs
- (v) ***Encourage private providers:*** A clear regulatory framework is required to encourage private sector participation and this should be combined with a quality assurance and certification system. Public funding can also encourage private provision of programs).
- (vi) ***Invest in Monitoring and Evaluation:*** These can range from simple monitoring data on institutions, programs, students and faculty, to data on labor market outcomes of particular programs (employment, earnings) that can guide household decisions and public funding , to impact evaluations.

Further, the World Bank's experience in SSA countries suggests that these general lessons from global experience need to be tailored to country specific contexts, as the capacity of governments, training institutions and strength of the private sector varies considerably. In all cases, it is necessary to engage the government teams in project preparation and design, support capacity development, provide on-going implementation support and use monitoring and evaluation to adjust project design. Finally, a longer-term engagement is required to enable learning by doing.

## 7. Some Suggestions Moving Forward

The Partnership for Skills in Applied Sciences, Engineering and Technology (PASET) was launched by several African countries and the World Bank, to build cooperation with new Partners. Since its launch, Chinese academic institutions have participated in analytical work and in sharing the experiences of China in the development of capacity in vocational training and science and technology.<sup>16</sup> The PASET is a regional initiative to build the skilled labor force in Africa (from technical vocational to higher education and research) for priority sectors, with clear objectives and targets, and provides a platform to align the investments and efforts of different partners. The most recent regional PASET forum, held in Dakar in June 2014, issued a *Call to Action*, with very specific objectives and targets for building skills for priority sectors.

The Education Units in the Africa region of the World Bank have already initiated collaboration with Chinese academic institutions to build capacity in Applied Sciences, Engineering and Technology (ASET). One example is in higher education in Africa where the World Bank is working with the Shanghai Jiao Tong University to establish a benchmarking system for African universities (see Box 1).

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<sup>16</sup> Various Chinese institutions participated in the two Regional PASET forums held in Addis Ababa (July 2013) and Dakar (June 2014), respectively. These included Tianjin University, Shanghai Jiao Tong University, Beijing Normal University, Zhejiang Normal University, the Chinese Academy of Agricultural Sciences and the Chinese Academy of Sciences.

## **Box 1**

### **China-World Bank Collaboration: Benchmarking African Universities**

The World Bank is collaborating with Shanghai Jiao Tong University to develop and implement a benchmarking instrument for African universities that specialize in ASET. The objective is to compare these universities with peer universities in China in order to identify areas of strengths and weaknesses for purposes of improvement. A pilot project was completed in 2014, covering the following eight universities across SSA: Gaston Berger University (Senegal), the Federal University of Agriculture Abeokuta (Nigeria), International Institute of Water and Environment Engineering (Burkina Faso), University of Abomey-Calavi (Benin), Makerere University (Uganda), the University of Dar-Es-Salaam (Tanzania), the University of Ghana (Ghana), and Kwame Nkrumah University of Science and Technology (Ghana).

Notwithstanding the challenge of generating comparable data and the limited scope of the pilot, this initial benchmarking exercise has brought out a few relevant findings at the national and institutional levels. From the perspective of the higher education systems compared, the data on public spending and enrollment show that the level of funding is not the main driver of enrollment expansion. Across SSA, where public expenditures on higher education range from 0.4 to 1% of GDP, some countries with higher levels of spending achieve much lower enrollment rates. This confirms that institutional configuration matters: spreading enrollment growth across a variety of tertiary education institutions—public and private, universities and non-university—, instead of simply expanding the public university sub-sector, can be an effective strategy for achieving higher enrollment rates in a financially manageable way from a public resources perspective.

At the institutional level, the Chinese universities included in the benchmarking sample tend to have a higher proportion of graduate students (30-35%) than the African ones (5-15%). The Chinese universities have a relatively higher output of PhD graduates, not only because of the higher share of graduate students, but also because of the lower dropout rates. Paradoxically, the proportion of academic staff holding a doctoral degree is slightly higher in the African universities. This could reflect the fact that their teaching load may be too heavy to leave sufficient time for the supervision of graduate students and for research activities.

Cheng and Liu, (2014)

There are three ways in which China and the World Bank could collaborate in the area of skills development in Africa, building on the experience of both and recent efforts at collaboration. First, under the PASET initiative, China and the World Bank could undertake **joint analytical work** to assess the skills needs for different sectors in individual countries, continue the benchmarking of African universities piloted with Shanghai Jiao Tong University, share the development experience of China through targeted learning visits, and share experiences in skills development through regional forums. The participation of Chinese institutions and firms in such events would enable them to learn about the perspectives and concerns of African counterparts. The proposed Trust Fund established by China could help with financing such activities. While China has traditionally worked with the African Union, the possibility of also collaborating with the Bank through the PASET combines strong ownership of the agenda by African countries with high level impact and visibility.

Second, China could **support the regional initiatives of the PASET** such as the establishment of the Regional Scholarship Fund for postgraduate studies in applied sciences, engineering and technology; the proposed regional TVET centres of excellence; and co-financing of the regional Africa Centres of Excellence project, currently financed by the World Bank. This would supplement China's on-going investments, which could also benefit from the experience of well-designed programs with strong monitoring and evaluation.

Third, China could **co-finance country-level projects** which are being prepared with World Bank assistance, focusing on technical/vocational and higher education. This will enable China to learn from the experience of the World Bank and contribute to the development of the system in individual countries, while also contributing China's experience in a concrete fashion. This may greatly enhance the impact of China's bilateral investments in this area. For individual African countries, this would be beneficial because there will be alignment of different partners. For the World Bank, there is the opportunity to learn from and adapt China's experience not only for the specific country, but also to other countries in the region and across the world.

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We suggest that the sentence be deleted, for it has no connection with the "theme" on skills training. WB: OK