

China's Infrastructure Development and Its Impact on Africa Economic Growth

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Abstract

In Sub-Saharan Africa (SSA), the lack of infrastructure or modern infrastructure has been the major obstacle for the development of the region. Most countries rely on infrastructures inherited from colonial times, which are nowadays out of date because of lack of renewal and maintenance funds or because the available funds are too scarce to meet the needs. This predicament affects negatively the investment climate and jeopardizes both economic development and the poverty reduction strategy, bearing in mind that over 40% of Africa's populations live in extreme poverty. In recent years, a number of emerging economies have begun to play a growing role in the finance of infrastructure in sub-Saharan Africa. Chinese players are now Africa's key partner for its infrastructure sector (including water supply projects), providing approximately two-thirds of investments since 2007. This paper aims at examining China infrastructure investment in Africa. The analysis also paid attention to Nigeria infrastructure challenges and how China is assisting in closing the gap.

Keywords: Africa; China; Economic growth; Finance; Infrastructure, Nigeria

1. Introduction

The pronouncements of the World Bank and the International Monetary Fund (IMF) at the 2014 Annual Meetings¹ together with those of the G-20 at the 2014 Heads of Government Summit² have converged on the importance of infrastructure to the world economy and to the sustainable and equitable growth of nations. Infrastructure is an asset that is often taken for granted in developed countries — until you are stuck in traffic or you lose power in a storm or your drinking water gets contaminated. Developing countries, however, face the unreliability or, indeed, total lack of access to these and related essential services on a daily basis. For sub-Saharan Africa, lack of infrastructure serves as one of the most significant obstacles to sustaining and distributing the trajectory of growth and poverty alleviation on the continent.

In 2009, the World Bank and major donors and multilateral institutions investigated this challenge of addressing the region's glaring infrastructure gap.³ That comprehensive regional analysis aimed to establish "a baseline against which future improvements in infrastructure services can be measured" and guide priority investments and policy reforms. The analysis estimated that the region needed \$93 billion per year to fill the infrastructure gap.

In the five years since the study, the response in tackling the infrastructure gap has been unprecedented, especially in terms of increased financing. In recent years, a number of emerging economies have begun to play a growing role in the finance of infrastructure in sub-Saharan Africa. Their combined resource flows are now comparable in scale to traditional official development assistance (ODA) from Organization for Economic Cooperation and Development (OECD) countries or to capital from private investors. These non-OECD financiers include China, India, and the Gulf states, with China being the largest player.

This new trend reflects a much more positive economic and political environment in sub-Saharan

¹ See World Bank and IMF Annual Meetings Communiqués, October, 2014 in IMF, (2014a)

² See the conference paper titled "G-20 Agenda for Growth and Resilience in 2014" in G-20 (2014).

³ This study, Foster and Briceno-Garmendia (Eds.) 2009, Africa's Infrastructure: A Time for Transformation, was a part of the Africa Infrastructure Country Diagnostic (AICD) project by the World Bank and co-sponsored by ICA partners; also referred to in this paper as the 2009 World Bank Report

Africa. Real gross domestic product (GDP) growth in the region has been sustained at 4 to 6 per cent now for a number of years, and has benefited from an improved investment climate. The rise of the Chinese and Indian economies has fueled global demand for petroleum and other commodities. Africa is richly endowed with these and faces a historic opportunity to harness its natural resources and invest the proceeds to broaden its economic base for supporting economic growth and poverty reduction. In this context, south–south cooperation provides a channel through which the benefits of economic development in Asia and the Middle East can be transferred to the African continent, through a parallel deepening of trade and investment relations.

Chinese finance often goes to large-scale infrastructure projects, with a particular focus on hydropower generation and railways. At least 35 African countries are engaging with China on infrastructure finance deals, with the biggest recipients being Nigeria, Angola, Ethiopia, and Sudan. The finance is channeled primarily through the China Export-Import (Ex-Im) Bank on terms that are marginally concessional, though significantly lesser than those associated with ODA. A large share has gone to countries that are not beneficiaries of recent debt relief initiatives. In some cases, infrastructure finance is packaged with natural resource development, making use of a mechanism known as the “Angola mode.” Chinese finance is on a scale large enough to make a material contribution toward meeting Africa’s vast infrastructure needs. As such, it offers an important development opportunity for the region.

The paper is structured in the following way. Section 2 provides the literature on infrastructure assistance in Africa. Section 3 focus on the Infrastructure Development in different fields, especially on power and transport. While Section 4 discusses about the impact of Chinese infrastructure in Africa, and how it works in Nigeria. Section 5 concludes the paper.

2. Literature review

According to the World Bank’s vice-president for Africa, Obiageli Ezekwesili, observed that “Africa’s infrastructure deficit is hindering economic growth and sustainable development”. In the same vein also, Escribano et al (2008) maintains that lack and absence of Infrastructure has remained a major constraint to doing business with countries in Africa and is found to undermined output by around 40 percent. This is especially true with lower-income countries. Whereas, in other countries, the negative impact of infrastructure deficiency is comparable to and as large as that associated with crime, corruption, and financial market constraints. For some other countries, power/energy emerges as one the most limiting factor, being cited by many firms in more than half of countries as a major business obstacle. However, inefficient functioning of ports and associated customs clearance is an equally significant constraint for a second group of countries. On the contrary, deficiencies in broader transport infrastructure and infrastructure for information and communication technologies (ICT) are less prevalent but nonetheless substantial in some cases. Below is a table showing Africa’s infrastructural deficit.

Three studies carried out by Aschauer in 1989 emphasized, among other things, the difference between productive and unproductive public expenditures, and helped catalyze an empirical debate on the effects of government expenditures on productivity. An interesting summary of the empirical results of this literature appears in the World Development Report (World Bank 1994), and shows that infrastructure seems to have no effect on economic growth in some cases and appears to generate returns in excess of 100 % per year in other cases. These strongly contrasting findings may be explained, in part, by the extent to which researchers have successfully tackled various econometric challenges in estimating the relationship between infrastructure and growth. Both Estache and Fay (2009) and Gramlich (1994) pinpoint significant econometric problems arising in the macroeconomic time series models used to estimate aggregate production functions. These include: common trends in capital per capita and output per capita, omitted variable bias (e.g. energy prices), reverse causality, network effects, heterogeneity and poor data quality.

Reviewing the relevant studies in the literature on the infrastructure-growth nexus, and acknowledging that the connection between infrastructure and growth appears to vary across countries and over time as well as within countries and within sectors themselves, Estache and Fay (2009) suggest that increasing empirical agreement exists regarding the growth-enhancing effect of infrastructure. For instance, in a review of evidence produced by Romp and de Haan (2005, p. 6), 32 of 39 studies on OECD countries find a “positive effect of infrastructure on some combination of output, efficiency, productivity, private investment, and employment.” Moreover, 9 of 12 studies on developing countries indicate a significant positive impact (Estache and Fay 2009, p. 15). In addition, by employing an econometric technique that accounts for biases arising from omitted variables and that explicitly accounts for the government budget constraint, Bose et al. (2007) find that government capital expenditures as a share of GDP are positively and significantly related to per capita income growth across a panel of 30 developing countries over the 1970–1980 period. However, current expenditures are shown to have an insignificant effect on growth in the countries over this timeframe.

In this context, it is important to highlight the various transmission mechanisms through which infrastructure affects growth. The most conventional channel, first described in Aschauer (1989) and Barro (1990), is that public infrastructure investments enhance private sector productivity. Indeed, Aschauer (1989)

attributed the 1970s U.S. productivity slowdown to the lack of infrastructural investment. This direct productivity effect of infrastructure investment captures the idea that an increase in public capital stocks (relative to private capital) has a positive but decreasing impact on the marginal product of all factor inputs (such as capital and labour). Hence, the cost of production inputs falls and the level of private production increases. As Agenor and Moreno-Dodson (2006, p. 9) point out, “this scale effect on output may lead, through the standard accelerator effect, to higher private investment – thereby raising production capacity over time and making the growth effect more persistent.”

Agenor and Moreno-Dodson (2006) identify two additional conventional channels through which infrastructure may affect growth, namely complementarity and crowding out effects. The first channel promotes growth through private capital formation. That is, public infrastructure raises the marginal productivity of private inputs, thereby raising the perceived rate of return on private capital and possibly also increasing private sector demand for physical capital. The second channel, crowding out, captures the idea that, in the short run, an increase in public capital stocks may displace or crowd out private investment. This negative crowding out effect of infrastructure may turn into a long-term negative effect if the decrease in private capital formation persists over time.

In addition to the three ‘conventional’ channels above, recent studies have also identified a variety of other channels through which public infrastructure may impact growth. Estache and Fay (2009) suggest that, in addition to the channels mentioned above, investment in public infrastructure can also impact investment adjustment costs, the durability of private capital, and both the demand for and supply of health and education services. In the same vein, Agenor and Moreno-Dodson (2006) argue that infrastructure may reduce investment adjustment costs via two channels: through complementarity between public capital and private investment and through the decreased costs associated with capital reallocation between sectors following a shock.

Maintaining the quality of public infrastructure may positively affect growth by improving the durability of private capital. That is, increasing government infrastructure maintenance spending allows the private sector to spend less to maintain its own capital and thus to allocate its investment capacity to other uses, thereby generating an additional growth effect. Better infrastructure is also found to improve access to health care and education. By improving health and education outcomes, the impact of public infrastructure on growth is magnified or compounded due to the interconnected relationship between education and health (Agenor and Moreno-Dodson 2006). Healthier individuals tend to study more, while more educated individuals also tend to be healthier.

Moreover, Agenor and Moreno-Dodson (2006) add labour productivity as another channel whereby public infrastructure indirectly increases growth. Better access to infrastructural facilities means that workers can get to their jobs more easily and perform their job-related tasks more rapidly. Other studies have also found evidence of various positive externalities induced by public infrastructure, including increased competitiveness, greater regional and international trade, expanded FDI, and finally higher profitability of domestic and foreign investment flows which raises investment ratios and boosts growth in per capita income (Fourie 2006; Fedderke et al. 2006; Richaud et al. 1999).

Generally, China’s international aid is classified into three types: grants (aid gratis), interest-free loans, and concessional loans. There into, “Concessional loans are mainly used to help recipient countries to undertake productive projects generating both economic and social benefits and large and medium-sized infrastructure projects, or to provide complete plant, mechanical, and electrical products, technical services, and other materials.” Chinese aid in infrastructures has many forms: “constructing roads, dams and government buildings; upgrading power distribution systems; installing methane generating plants. Chinese assistance concentrate on these basic infrastructures and education, areas where Western donors have cut back substantially” (Lyakurwa, 2008:17). “Chinese aid is often dispensed in such a way that corrupt rulers cannot somehow use it for their selfish interest . . . [It] is often in the form of infrastructure, such as railroad network in Nigeria or roads in Kenya and Rwanda” (Sautman, 2006). Huge infrastructure projects are costly, but also effectively welcomed by the African people. For instance, the Tanzania Zambia Railway, the railway has created easy access to different regions as well as business opportunity. From a broader perspective, Chinese aid in infrastructure has improved the manufacturing environment, attracting more foreign direct investment (Anyanwu, 2012).

Naturally, investing in infrastructure does not mean the panacea, nor does it mean can be the perfect choice of aid. Firstly, the Chinese Aid system lacks the institutionalized and well developed support services made up of the numerous aid research institutions, evaluation departments of official aid agencies, and the entire consultancy industry that has developed around the Western aid system (Lancaster, 2007). Secondly, the infrastructure aid is confronted with problems of unsustainable projects and small proportion of foreign direct investment.

3. Sectorial Overview of Infrastructure Development in Africa

Infrastructure¹ development in Africa is generally lagging behind other parts of the world, though there are variations between countries and sectors, hampering economic growth² and poverty reduction (for example, Calderón and Servén 2010). One of the serious problems was that the real picture of infrastructure in African countries could not be seen due to lack of data, preventing policy interventions and investment.

The Infrastructure Consortium for Africa (ICA)³ conducted Africa infrastructure country diagnostic studies and published a flagship report titled Africa's Infrastructure: A Time for Transformation in late 2009 (hereinafter referred to as AFD-WB 2009). The values of this report include that current status and problems are analyzed through quantitative data; that infrastructure needs and funding gaps are estimated by sector and country type; and that policy interventions are prioritized through cost-benefit analyses. At the same time, however, it reveals that Africa's infrastructure challenges are overwhelming and complex, and require sustained and concerted efforts by African countries, regional organizations, and development partners.⁴ The current situation of Africa's infrastructure by sector is as follows:

Power: Power is by far Africa's largest infrastructure challenge, with 30 countries facing regular power shortages (AFD-WB 2009, 5) and more than half of the population having no access to electricity except in North Africa, Mauritius and South Africa. SSA countries have low rates of electrification – the average rate for SSA countries is only 32 per cent, compared to the average of low and middle income countries (LMIC) throughout the world, which is 74 per cent as for electricity consumption per capita, the average of SSA countries is only 517kWh, which is substantially lower than the world LMIC average (1,527kWh), with the exception of South Africa (4,532kWh) and Libya (4,170kWh). Furthermore, SSA countries' rate of electric power transmission and distribution loss⁵ (11.2%) is almost the same as the world LMIC average (11.1%). The loss is higher in the whole of the African region particularly in middle-income (35%) and oil-exporting countries (24%), indicating operating inefficiency of power utilities.

Transport: The average roads pavement ratio in SSA countries is only 19% compared with the world LMIC average of 45%. The road pavement ratio in oil-exporting countries is very low. In addition, regarding road density (total road length per land area), the figures in many African countries are lower than the world LMIC average (21.5 km/100km²). It is urgent that African governments should address the poor condition and low density of their road networks. In addition, to keep the road network in good condition, maintenance is another challenging task in Africa since it requires huge investment. Infrastructure development of other transport modes such as airports, seaports and railways in Africa face same challenges and ineffective linkage between different transport modes, declining air connectivity, poorly equipped ports and aging rail networks are key problems facing Africa's transport system (AFD-WB 2009, 233).

Water supply and sanitation (WSS): Only 61% of SSA countries' population has access to safe drinking water, which is below the world LMIC average of 86% and MDG's target rate of 75% by 2015. The rates are below 50% in Somalia, Ethiopia, the Democratic Republic of the Congo, Madagascar, Mozambique and Niger. Urban and rural disparities are also prominent – more than half of the rural population has no access to safe water in SSA countries. Access to adequate sanitation is even worse. Only 30% of the population in SSA countries lives in households with access to adequate sanitation and the rate is lower in rural areas. There are 12 low-income countries where more than 90% of the population has no access to adequate sanitation in rural areas. Irrigation: While more than two-thirds of Africans rely on agriculture for a living, the average amount of arable land developed for irrigation is only 6% for a selected 28 African countries, compared with 39% in Asia and nearly 30% in Latin American countries (Bluffstone and Kohlin 2011, 6). Low levels of irrigation mean that few SSA countries can sustain yield increases, even with abundant rainfall (UNDP 2012). The amount in Egypt is exceptionally high (99.7%) since Egypt's agriculture depends entirely on irrigation. Further improvement is an urgent requirement for sustainable food production in Africa.

Information and communication technology (ICT): Approximately three-quarters of the world's inhabitants have access to mobile phones (World Bank 2012b, 23). The number of mobile subscriptions in use worldwide has grown from 1 billion in 2000 to over 6 billion in 2012, of which nearly 5 billion are in developing countries (ibid.). This trend is also true for some African countries. The number of mobile subscriptions per 100 people has increased dramatically since 2000; in 2010, North Africa (111 subscriptions) and some middle-income countries exceeded the world average (78 subscriptions). As for the penetration of telephone lines and the

¹. Infrastructure includes: power; transport (roads, seaports, airports, and railways; water supply and sanitation; information and communication technology (ICT); and irrigation

². Infrastructure development would promote economic growth through industrial development while removing the cost penalties of economic activities

³. ICA was established in 2005, following the G8 Gleneagles summit at which assistance for Africa was one of the main agenda topics. For details of ICA, see <http://www.icafrica.org/en/>

⁴. Development partners here include non-traditional funders such as China and Korea

⁵. Measured in percentage of electricity power output (World Bank.2012a)

Internet, Africa still has low rates especially in oil-exporting countries and low-income countries, suggesting the digital divide is a critical issue. It is still essential for African governments to develop the telecommunications sector.

3.1 Sectoral Distribution of Chinese Infrastructure Finance

In terms of sectorial distribution, a large share of the Chinese finance is allocated to general, multisector infrastructure projects, within the framework of broad bilateral cooperation agreements that allow resources to be allocated in accordance with government priorities. However, it is clear that the two largest beneficiary sectors are power (mainly hydropower) and transport (mainly railroads). In the power sector, China's activities have focused on the construction of large hydropower schemes. By the end of 2007, China was providing at least US\$3.3 billion toward the construction of 10 major hydropower projects amounting to more than 6,000 megawatts (MW) of installed capacity. If completed, these schemes would increase the total available hydropower generation capacity in sub-Saharan Africa by around 30 percent. There have also been some activities in thermal generation and transmission, but on a much smaller scale.

China has made a major comeback in the rail sector, with financing commitments on the order of US\$4 billion for this sector. They include rehabilitation of more than 1,350 kilometers of existing railway lines and the construction of more than 1,600 kilometers of new railroad. To put this in perspective, the entire African railroad network amounts to around 50,000 kilometers. The largest deals have been in Nigeria, Gabon, and Mauritania. In the information and communication technology (ICT) sector, China's involvement mainly takes the form of equipment sales to national incumbents, either through normal commercial contracts or through intergovernmental financing tied to purchases of Chinese equipment by state-owned telecom incumbents. An important focus has been the development of national backbone infrastructure. In total in 2001–2007, Chinese telecom firms supplied almost US\$3 billion worth of ICT equipment, mainly in Ethiopia, Sudan, and Ghana.

In the road and water sectors, China has been involved in financing a significant number of projects, but the sums involved are much smaller than in the other three sectors; no more than US\$900 million overall has gone to the two sectors combined.

3.2 Geographic Distribution of Chinese Infrastructure Finance

In terms of geographic distribution, Chinese finance has been highly concentrated, with about 70 percent going to just four countries: Nigeria, Angola, Ethiopia, and Sudan. China's involvement in Nigeria, dating back to 2002, began relatively modestly with a number of projects in the telecom and power sectors. A substantial scale-up took place in 2006, when US\$5 billion of infrastructure projects were agreed upon, including the 2,600 MW Mambilla hydropower scheme and two major projects to upgrade and modernize the country's railway system. However, the status of these major rail and hydropower projects agreed to in 2006 is currently under review by Nigeria's new administration.

In Angola, Chinese involvement dates back to the peace accords in 2002. The engagement was substantially scaled up in 2004, when a very substantial line of concessional credit was agreed on with the China Ex-Im Bank to allow the government to repair infrastructure and other sectors damaged in the country's 27-year civil war. This US\$2 billion loan is known to have been backed by 10,000 barrels per day of oil exports. In 2007, China Ex-Im bank issued another US\$2 billion loan to Angola, reportedly devoted entirely to infrastructure needs. China's engagement in Ethiopia amounts to a total of US\$1.6 billion. The main focus has been on the ICT sector, particularly the Ethiopia Millennium Project to create a fiber-optic transmission backbone across the country and roll out the expansion of the Global System for Mobile Communication (GSM) network. Most of these were financed under export seller's credit arrangements with the Chinese telecommunications operator ZTE for the supply of equipment to the Ethiopian national telecommunications incumbent. In Sudan, China has financed close to US\$1.3 billion of infrastructure projects, including the development of more than 1,400 MW of thermal generating capacity, the 1,250 MW Merowe hydropower scheme, and a number of other significant investments in the rail and water sectors.

3.3 Economic Complementarities

The growing ties between China and Africa, including China's emerging role as a major financier of infrastructure in the region, can be understood in terms of the economic complementarities that exist between the two parties. On the one hand, Africa counts among its development challenges a major infrastructure deficit, with large investment needs and an associated funding gap. China has developed one of the world's largest and most competitive construction industries, with particular expertise in the civil works critical for infrastructure development. On the other hand, as a result of globalization, China's fast-growing manufacturing economy is generating major demands for oil and mineral inputs that are rapidly outstripping the country's domestic resources. Africa is already a major natural resource exporter, and with enhanced infrastructure could develop this potential even further, accelerating economic development in the region.

3.4 Meeting Africa's Infrastructure Needs

Sub-Saharan Africa lags behind other developing regions on most standard indicators of infrastructure development, prompting African leaders to call for greater international support in this sphere. By far the largest gaps arise in the power sector, with generation capacity and household access in Africa at around half the levels observed in South Asia and about a third of the levels observed in East Asia and the Pacific. Unreliable power supply leads to losses in industrial production valued at 6 percent of turnover. Furthermore, Africa's limited infrastructure services tend to be much costlier than those available in other regions. For example, road freight costs in Africa are two to four times as high per kilometer as those in the United States, and travel times along key export corridors are two to three times as high as those in Asia. It is estimated that Africa's deficient infrastructure may be costing as much as 1 percentage point per year of per capita GDP growth.

Since 1999, China's construction sector has seen annual growth of over 20 per cent, making China the largest construction market in the global economy. The competitiveness of Chinese contractors can be gauged by examining how well they fare in international tenders for projects funded by multilateral aid agencies such as the World Bank and the African Development Bank. In recent years, they have accounted for more than 30 percent by value of civil works contracts tendered by these two multilateral agencies, which makes them substantially more successful than contractors of any other nationality. Chinese contractors have been particularly successful in the road and water sectors and in countries such as Ethiopia, Tanzania, and the Democratic Republic of Congo. Below is a table showing Africa's infrastructural deficit.

Table 1: Africa's Infrastructure Deficit

Index	Sub-Saharan Africa LICs	Other LICs	Middle-income African countries	Other middle-income countries
Paved road density	34	134	284	461
Mainline road density	9	38	142	252
Mobile coverage	48	55	277	567
Internet density	2	29	82	235
Electric power coverage	14	41	37	88
Improved water coverage	61	72	82	91
Sanitary installation coverage	34	53	53	82

Source: AfDB-Africa Infrastructure Country Diagnostic (AICD)

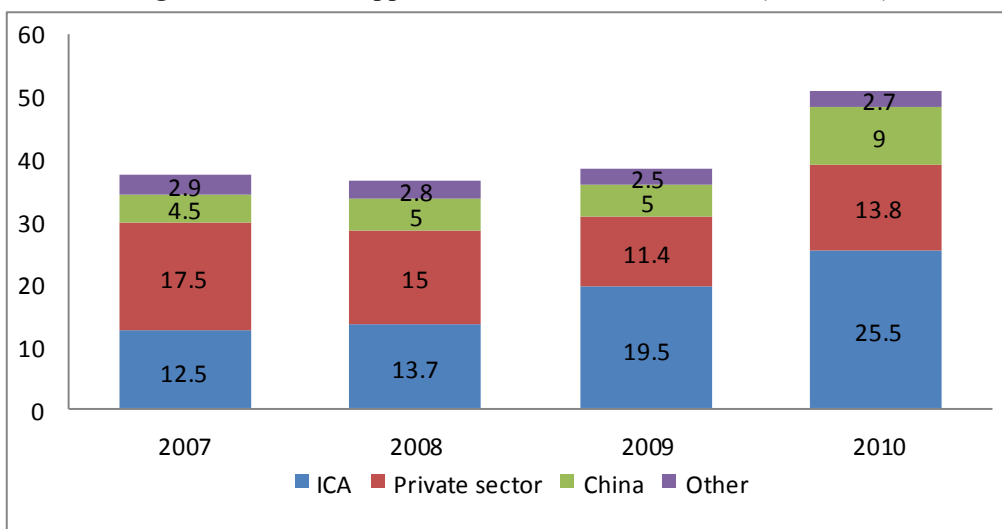
*Note: Road density is in kilometers per kilometer squared; telephone density is in lines per thousand populations; generation capacity is in megawatts per million populations; electricity, water and sanitation coverage are in percentage of population. LIC = low-income country

4. The impact of Chinese infrastructure investment in Africa

Investment in infrastructure, including in transportation (e.g. roads and rails), power generation, and telecommunications (e.g. Internet) is essential to alleviate supply-side impediments to African integration. The small population and market size of the majority of African countries limits opportunities for economies of scale and increases border stop-related transportation costs, so that regional cooperation can contribute to reduced trade transactions costs. The 12TH African Union (AU) summit held in February 2009 identified infrastructure development, cheap energy and regional transport networks as priorities (African Union, 2009)¹ The Africa Infrastructure Country Diagnostic (AICD) estimates that an additional \$93 billion in annual spending over the next 10 years is required to meet the Millennium Development Goals (MDG) and achieve national development targets in Africa (IBRD/World Bank, 2010). Almost half of this amount is needed to address the continent's current power supply crisis that is hindering Africa's growth potential. It is estimated that the increase in power supply could add 2 per cent of GDP per year and raise business productivity by 40 per cent.

¹. The theme of the Summit was "Infrastructure Development in Africa, with emphasis on Transport, Energy and Investment"

Figure 1: External support to the infrastructure sector (2007-2010)

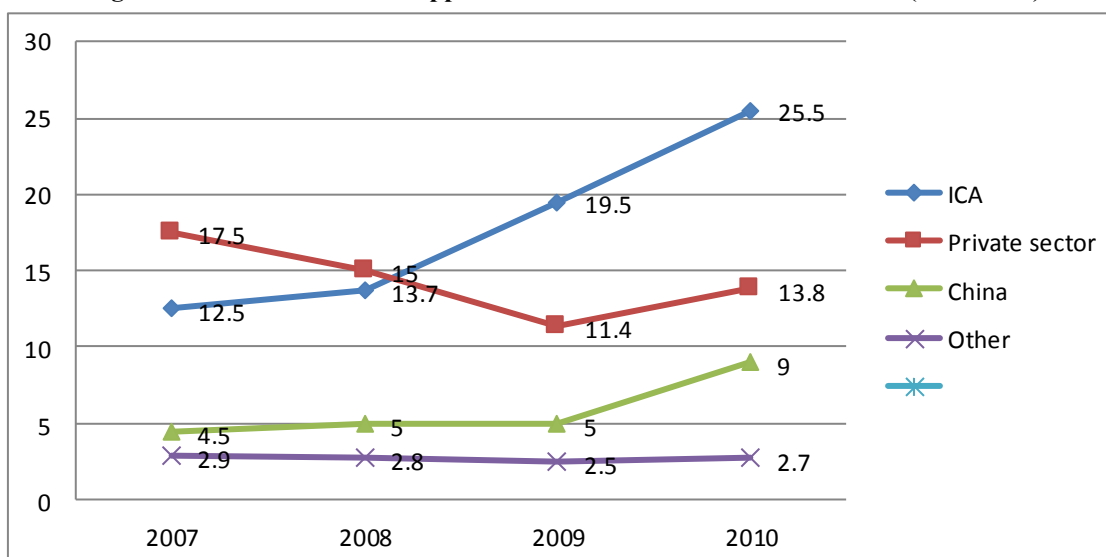


Source: ICA 2011

In 2010 total commitments for African infrastructure projects were \$50.7 billion – increasing significantly from previous year level by 32 per cent (\$38.4 billion) in 2009 (see figure 1). Commitments made by ICA members in 2010 were \$25.2 billion, half of the total volume and increasing by 29.3 per cent (\$5.7 billion) from 2009.

After the dip of private sector support in 2009—caused by the financial crisis, private commitments increased to \$13.8 billion in 2010. Typically, 90 per cent of private support is allocated to ICT funding. Examples of private sector infrastructure investment include the Dakar Container Terminal and the Main One Cable system. The latter would increase Internet access at lower cost to West Africa. Commitments from Other¹ donors such as India, Arab Funds and African Regional Development Banks remained on a stable level of \$2.7 billion in 2010.

Figure 2: Trend of external support to the African infrastructure sector (2007-2010)



Source: ICA 2011

China’s investment in African infrastructure remained also stable at around \$5 billion per year in the period from 2005 to 2009. Investments from China to Africa do not appear to have declined due to the international financial crisis. This is in part because of the limited impact of the crisis on the financial sector in China as well as the country’s \$2 trillion in foreign currency reserves, but mostly because Chinese investments

¹. Other donors include: India, Arab Donors (IsDB, Abu Dhabi Fund, Saudi Fund, Arab Fund for Econ. and Soc. Dev., BADEA, Kuwait Fund for Econ. and Soc. Dev., OPEC Fund for Int. Dev.); African Regional Development Banks (BIDC, BOAD, BDEAC, etc.). DBSA included in the ICA member figure

are intended as a long-term commitment. For 2010 the ICA estimates a significant step-up of Chinese investments in African infrastructure by 80 per cent to \$ 9 billion (see figure 2). Chinese activities are totalling at \$ 15.9 billion¹ according to ten articles published throughout 2010 by Reuters Africa. The biggest commitment of \$ 9.87 billion was made to Ghana through the China Exim Bank for “road, railway and dam works”² and “to finance Ghana's oil and gas infrastructure and agricultural development”³ with \$ 3 billion through the China Development Bank.

Chinese investment can make an important contribution to improving African infrastructure. Recent examples are roads and bridges in Democratic Republic of Congo (DRC), railways in Angola, and power stations in Zambia. China is building high-voltage power transmission lines to interconnect countries in Southern Africa, thereby strengthening African integration. In the rail sector China's largest deals include the construction of mass transit systems as in Nigeria, and the construction of new lines linked to mining developments in Gabon and Mauritania. The largest ICT project with Chinese involvement comprises the rollout of a national communications network in Ethiopia.

Chinese investment is beneficial to Africa also through competitive pricing, as shown by China's receiving 21 per cent of the AfDB's total procurement contracts and 35% of its civil engineering projects in 2008. China's comparative advantage is particularly evident in hydropower project construction. By the end of 2007 China had committed at least \$3.3 billion towards 10 major hydropower projects (World Bank and PPIAF, 2008). Once completed, these projects will provide a combined generating capacity of more than 6,000 megawatts.

One of the key challenges in analyzing China's infrastructure investment in Africa is that Chinese investments are fragmented across several government institutions, including the China Development Bank, China EXIM Bank, and the Ministry of Commerce. In addition, the China- Africa Development Fund (CADF) is supporting business partnerships between Chinese and African entrepreneurs, and has participated in 20 projects and invested over \$500 million of its own resources while promoting investment of more than \$20 billion by Chinese companies (Business Day, 2009), including Sinosteel Corporation, China National Building Material, and Hainan Airlines. China has also acquired African banks, which could extend financial services, such as trade finance, to Chinese companies. The most prominent example is the acquisition of 20 percent of South Africa's Standard Bank for \$5.6 billion by the Industrial and Commercial Bank of China, China's largest lending institution (Centre for Chinese Studies, 2007). Other Chinese banks that are active in Africa include the China Construction Bank, which has entered into a strategic partnership with FirstRand of South Africa. However, benefiting from Chinese acquisitions will require addressing key structural challenges for the banking sector in Africa, including the lack of property rights, slow bankruptcy procedures and weak rule of law.

China's engagement, based on developing win-win outcomes within the framework of south-south cooperation, has provided very substantial resources for critically-needed infrastructure. China's assistance to Africa has changed from grants and soft loans to commercial loans at competitive rates for projects viewed as financially viable, which has raised concerns that Chinese involvement could impair debt sustainability. The most well publicized example is the case of the DRC, which had to amend the terms of its Chinese assistance package to qualify for completion of its \$6.3 billion HIPC debt relief. To ensure that Chinese investments have a positive impact, African governments need to establish an adequate regulatory framework to ensure transparency in decision-making and the implementation of environmental and social safeguard policies, to encourage the transfer of skills and technology, and to require foreign investors to use local labour and construction materials. These regulations should be applied to all investors, whether from China or traditional development partners.

Maximizing the development impact of China's investments will also require coordination with other investors and development partners, for example, through co-financing projects. For example, Botswana will receive a loan of \$225 million from the African Development Bank Group to finance the Morupule B Power Project, which involves the construction of a 600 MW coal-fired power plant and associated transmission infrastructure, with the goal of achieving energy self-sufficiency. The project is to be co-financed by the World Bank, plus \$825 million from the Industrial and Commercial Bank of China and Standard Bank Consortium (ICBC-SB).

Chinese investments have mainly supported infrastructure projects through direct bilateral relationships with individual African countries. However, China has demonstrated that it can participate in regional projects so as to benefit from economies of scale. Regional African entities could provide a framework for such projects, including in power generation, power interconnections, roads, ports, railways and ICT networks. One major regional infrastructure venture is the planned construction of electricity transmission lines between South Africa

¹. Preliminary ICA estimation: based on web research and compilation of “Chinese project list: Commitments to infrastructure in Africa in 2010” (Annex)

². Reuters Africa, Helen Nyambura-Mwaura: IMF says Ghana's \$13 billion Chinese loan 'good' 25 Oct.2010; link: <http://af.reuters.com/article/investingNews/idAFJJOE69O07120101025?pageNumber=1&virtualBrandChannel=0>

³. *ibid.*

and Mozambique, South Africa and Zambia, and Botswana, Namibia and Zimbabwe. Other positive developments include joint infrastructure programs (with strong trade facilitation components) such as the North-South Corridor, designed to support the Tripartite Arrangement that has been set up between SADC, COMESA, and EAC to create a grand free trade area in East and Southern Africa (Swazi Observer, 2009).

Overall, China's engagement in Africa is positive and will be critical to meet the growing needs of the continent and promote regional economic development. However, it is important for national governments to ensure that China's assistance and investments are aligned to national and regional strategies. Addressing these issues within the FOCAC framework would provide an opportunity to create win-win situations.

4.1 Chinese infrastructural development in Nigeria

Africa with particular reference to Nigeria faces daunting challenges in the development. The challenge is the construction and upgrade of infrastructure. This kind of situation is very common in Africa; the lack of infrastructure and social welfare facilities reduce annual growth rate in Africa by 1%. Nigeria is a country in Africa (West Africa sub-region), with a population of over 177 million people, and accounts also for 16 percent of Africa's population. Nigeria is the biggest oil exporter and has the largest natural gas reserves in Africa. With these large reserves of human and natural resources, it is assumed Nigeria is poised to build a prosperous economy, reduce poverty significantly, and provide health, education and infrastructure services to its population. But these hypothesis has not been realized since independence. The constraints that have militated against development and growth in Nigeria like other African countries includes the investment climate, infrastructure, incentives and policies affecting agricultural productivity etc. Nigeria is considered a failed state by many research reports, the main reason is the lack of infrastructure. The lack and absence of modern infrastructure in Nigeria as those found in developed countries has been a major challenge, and this challenge has become the main obstacle to the overall development.

However, not only have Western donors and investors neglected investment in Nigeria's infrastructure; the Nigeria government have also failed to set up and improve the infrastructure. Some of the infrastructures in Nigeria today were colonially bequeathed, and some were built during the Nigeria oil boom in the 1970s. But, in contrast, the Chinese government is not only encouraging Chinese companies to invest in Nigeria, but fulfilling its aid to Nigeria's infrastructure. Today, China has become one of Africa's main sources of investment. By the end of 2011, China had helped build numerous infrastructure projects, these projects make up about 25 percent of China's total project. Nigeria might be or is the major beneficiary of Chinese infrastructure finance in Africa.

Although is one of the world's ten largest oil producer, Nigeria imports 85 percent of the fuel used in the country. This is due to the lack of infrastructure in the oil sector in Nigeria. In that regard, Nigeria and China signed a cooperation agreement that would permit the Chinese government to build three refineries in Nigeria. In 2010, the Chinese completed the three refineries; economically, the three refineries can increase outputs of oil to at least 750,000BPD and create jobs for approximately 20,000 Nigerians. In health sector, China built a 150 bed hospital in Lugbe, Abuja, under its health-related technical assistance programme in 2012.

In addition to China's contribution to Nigeria infrastructure development, China has also shown its strength in building Africa development through infrastructure in other African countries. Until the end of 2011, China aid about 270 infrastructure projects to Africa in total, this number is about a quarter of China aid Africa projects. The projects include bridges, roads, power, communication facility, among these, transport infrastructure projects' which amounted to over 140 projects by focusing on the transport sectors. In the 1960s to 1970s of the 20th century, though China had huge economy difficulties, it still help Tanzania and Zambia to built the 1860km' Tazara Railway. It has become the history testimony of China and today they are referred to as the leading champion of development. China also help Somalia built 967km' Beletweyne to Blau road. In the 1980s to 1990s of the 20th century, China extended its infrastructure aid Mauritania' friendship harbor and Mauritius' airport terminal etc. These infrastructure projects played an active role in promoting the economic development of these countries.

5. Conclusion

China can provide an important development opportunity for the continent and can play a great role in Africa's development by alleviating infrastructure bottlenecks and expanding trade. However, for Africa to thrive in a globalized world will require not only addressing the infrastructure gap, but also improving business regulations and customs procedures, as well as broader reforms to strengthen the rule of law. These reforms are the responsibility of African countries, and are essential to diversifying African exports and to economic growth and poverty reduction on the continent.

One of the drawbacks of China's support to Africa is its bilateral approach with individual African countries, which leads to regional issues not being adequately addressed. In this context, this paper has argued in favour of establishing a core group of African countries within the China-Africa Cooperation Forum (FOCAC) which would advocate issues of common concern. In the short term, this group could focus on improving access

to the Chinese market and advocating regional infrastructure projects, while in the long term, this group could emphasize the importance of coordinating debt relief and untying of development assistance. In this manner, the core group of Africa countries would strengthen the FOCAC implementation, thereby deepening China-Africa relationships and creating win-win situations for all stakeholders.

5.1 Policy Recommendations

The following recommendations are offered to policymakers spanning the global, regional, and national levels. They are designed to build upon existing institutional structures and functions rather than invent new institutions; they are based on the progress made over the past five years in mobilizing financing for infrastructure in sub-Saharan Africa:

- I. Enhance collaboration and coordination across traditional and non-traditional sources of finance: When traditional financing sources were limited, the main participants had an established structure for coordination that served those conditions. But as sources of funding — for example, traditional and non-traditional sources and agencies as well as the private and public sectors — become increasingly diversified and complex, the global and regional opportunities for coordination and collaboration are less clear-cut. This evolving financing context, together with a primary focus by sub-Saharan African countries and financiers on the individual project/transaction, creates serious risks for effectively addressing infrastructure needs of sub-Saharan Africa. The AfDB has played a central role in promoting collaboration among sub-Saharan African countries and among traditional donors through the Infrastructure Consortium for Africa (ICA), Africa 2050, and Programme for Infrastructure Development in Africa (PIDA). As the AfDB continues this role, it is important for it to provide leadership in engaging African policymakers, regional infrastructure experts, traditional donors, and non-traditional donors. African stakeholders and traditional multilateral agencies should respond positively and constructively to the opportunities offered such as the BRICS' New Development Bank and the Chinese-led AGTF. It is only through genuine collaboration across the sources that Africa will benefit.
- II. Guide infrastructure investment practices in terms of economic, social and environmental sustainability: Related to the issue of coordination and collaboration is the issue of standards for infrastructure investments, especially regarding economic, social, and environmental sustainability as well as integrity. Again, this has been simpler when the sources of financing were limited. Many lessons have been learned and incorporated by the multilaterals in the evolution of infrastructure projects and finance beyond the original “bricks and mortar” engineering-oriented approach. Clearly the World Bank has played a critical, though sometimes controversial, role in setting standards for investment design, evaluation, and implementation. It should continue as a key contributor, evaluator, and independent monitor of progress in sub-Saharan Africa. Ultimately, however, it is the African nations that must agree on the standards and principles that they will apply. What is needed is a regional discussion of those lessons, the principles, and the standards needed to guide infrastructure investment based on worldwide best practices.
- III. Extend opportunities for private investment: The various multilateral and bilateral agencies involved in promoting private infrastructure investment should take a critical look at the mechanisms available to support private investment beyond the telecom sector — particularly in countries and sectors that have not been able to attract such investment. A substantial review is required of the use of guarantees and related risk-mitigation instruments that assesses the application and extent of leveraging achieved through these efforts and how they can be better applied and monitored in the future.
- IV. Intensify efforts to improve public financing support for infrastructure and launch an initiative for sub-national/urban finance and investment: The lack of information on infrastructure-related public sector budget issues is evident across the region as is the relative infancy in discussing sub-national devolution. The IMF, World Bank, and AfDB should develop and monitor a program of analytical work directed at strengthening public finance for infrastructure in sub-Saharan African countries. This work should pay particular attention to sub-national expenditures and revenue-raising opportunities. They should also explore the formulation of innovative financing models to enhance their support specifically to sub-national and urban entities. Such an effort could be initiated in time for the next replenishment cycle for the concessional lending of the World Bank (International Development Association, IDA), and the AfDB (the African Development Fund, ADF).
- V. Redirect attention to the broader sectoral governance reform opportunities: It remains unclear whether sub-Saharan Africa is achieving the potential efficiency benefits of \$17 billion as estimated in the 2009 World Bank Report. The major attention given to increased financing and to projects/transactions needs to be broadened to include efforts to reform sectoral governance. However, this is a complex task as it requires a focus on individual sectors and how they operate in specific countries. Power Africa is

attempting this task in its target countries, and there are additional reform efforts in various countries. What is needed is a more robust monitoring capability, equivalent to what is being done by ICA with finance. Ultimately, given the amount of years since the 2009 Report and the nature of the changes on the ground, it would be important to update the report.

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