The impact on development of technology and knowledge transfer in Chinese MNEs in sub-Saharan Africa: The Ghanaian case

ABSTRACT

The presence of Chinese multinational enterprises in Africa brings with it new technology and knowledge. Yet there is a lack of research on the impact of this on development in African countries. China's recent industrial development may be more appropriate for Africa's development than Western models, and the adoption of technological knowledge from Chinese firms may provide a more sustainable path to Africa's future development because of cultural, institutional, social and historical synergies. However, there may be major barriers to transferring appropriate technology and knowledge. Findings from our study in the construction industry in Ghana suggest an absence of specific technology and knowledge transfer policies and strategies, with human resource development practices, language and some cultural issues also creating barriers. Bidding practices of Chinese firms investigated also appear to militate against successful technology and knowledge transfers to local partners and staff. Yet there appears unrealised potential that has not been addressed by firms. We suggest measures that may be taken to realise this potential and point to implications for policy and future research on the development potential of China in Africa.

Keywords: Technology and knowledge transfer; policy implications; China in Africa; Ghana

1. Introduction

Foreign direct investment (FDI) influences economic and social development in host countries (Ma & Delios, 2010; Osabutey, Williams, & Debrah, 2014). The growing literature has primarily concentrated on FDI's effect on technology and knowledge (T&K) transfer and economic performance with little emphasis on development in a broader sense (Costantini & Liberati, 2014). National policies of developing countries have sought to stimulate T&K transfers from investments by multinational enterprises (MNEs) (Hoekman, Maskus, & Saggi, 2005) and efficient states fulfil a role in developing technological adoption by domestic firms (Bessant & Rush, 1995). Yet technologies from the North may not always be appropriate for the developing South. Fu, Pietrobelli, and Soete, (2011), for example, argue that technologies developed in comparable labour-rich emerging economies could be more appropriate for Africa. With FDI from China to African countries having increased rapidly in recent years, emerging literature suggests greater compatibility between China and Africa with respect to knowledge because of shared cultural values and historical relations (Jackson, 2012). However, despite the potential for T&K transfer between China and Africa, and the Chinese Government's professed policy of friendship and mutual learning (MOFA, 2006), evidence of transfer is low. Understanding the extent to which the potential Sino-African T&K transfer is being achieved or hindered is important.

This article first examines this potential within the framework of existing T&K transfer literature, and how theory can be developed to understand the Sino-African context. We focus on the differences between North-South and South-South transfers and their implications. We argue that the assumption of modernization theory that informs North-South transfer may not apply to South-South transfer. New thinking is needed to understand issues associated with T&K transfer between Chinese and African firms. We also evaluate how the potential China-Africa cultural and institutional synergies could influence such transfers. We take advantage of the prevalence of Chinese construction firms in Africa to examine the potential transfer. Secondly, we examine the conflicting interests of Chinese MNEs in Africa and how this confounds T&K transfer. The majority (84.5 per cent) of Chinese MNEs in SSA are state owned (Alden and Davies, 2006) and likely to be influenced by official government policy. Gill, Huang and Morrison (2007) suggest that such firms are driven by motives aimed at accessing resources and new markets for development and economic growth. Thirdly, as a country in SSA with historical and modern-day links with China, we focus on Ghana's policy framework. Prevailing policies appear to be stifling the development of local firms and are not fostering partnerships

with Chinese MNEs to facilitate T&K transfer (Osabutey, 2010). We review policy implications after examining our empirical findings. Fourthly, we focus on the internal dynamics of Chinese construction MNEs in Ghana, drawing out lessons for the wider SSA. Of particular importance is the deployment of staff, and the relationship between the use of Chinese and local labour. Here we explore the extent to which these internal policies facilitate or hinder T&K transfer.

Little research on Chinese MNEs in countries in SSA has been undertaken at organizational level (Jackson, 2012). Yet in order to understand the contribution of Chinese MNEs to Africa's development it is necessary to position research at organizational level within its recent historical, institutional, and cultural context. There is the need to evaluate the nature of conflicting motivations of key actors for T&K transfer and the related policy implications. In order to achieve this we have undertaken empirical research using responses from local and foreign (Chinese and non-Chinese) construction industry practitioners and managers operating in Ghana. The objective of the study is to explore how the closer endowment mix of China with countries in Africa relative to the West could present a potential for T&K transfer. We have pursued three related research questions: What key factors positively or negatively influence the potential T&K transfer from Chinese construction firms? Why is T&K transfer from Chinese construction firms low? What are the policy deficiencies and how might policy ensure potential T&K transfer opportunities?

2. Appropriate and inappropriate technology and knowledge transfer

The presence of foreign firms in developing countries is expected to be linked to transfers of more advanced technological and managerial knowledge to domestic host country firms. In addition, the absorptive capacity of the domestic firms is important for effective T&K transfers (Meyer & Sinani, 2009; Osabutey et al., 2014). Developing countries find technological advancement challenging (Dahlman, Ross-Larson, & Westphal, 1987). Earlier literature suggest that North-South trade offers higher potential technology transfer than South-South trade, however, some of the more recent literature argue that emerging Southern economies with advancing technology, skills and industrailisation can potentially transfer technologies (to the rest of the South) that are more appropriate for Southern firms. This is because these southern firms often operate in smaller markets less accessible to Northern suppliers who are used to serving larger markets (Dahi & Demir, 2017; Atta-Akomah, 2014). Production systems in the South are often labour-intensive and allows the use of cheap and abundant labour (Pack

and Saggi, 1997); labour-intensive technologies would be preferred to capital-intensive technologies. In addition, the technologies developed in the North may not suit capital and skill deficiencies within Southern firms. This means South-South trade may allow more technology transfer (Lall, 2000; Acemoglu, 2007). Consequently South-South technology transfer may be more appropriate than North-South transfers. Atta-Ankomah (2014) observes that, in Kenya, as in other parts of SSA, local and Chinese teachnologies are more labour-intensive and engenders higher employment creation and poverty reduction. Other authors such as Amanor and Chichava (2016) argue that South-South technology transfers are not guaranteed and that conflicting priorities, different development objectives, suitablility of other local Southern technologies potentially inhibit South-South transfers; in much the same way limitations of North-South transfers have been trumpeted. This means that to benefit from South-South transfers the receipient country cannot renege on responsibilities. Whilst South-South economic relations have the potential to have significant positive or negative impact on development, there is evident contribution to technology transfer. In this regard, the China in Africa debate needs to move toward a more detailed and nuanced assessment at country and sector levels (Dahi & Demir, 2017).

Demir (2016) and suggests North-South exchanges may have differential effects on institutional capacity building in the global south relative to South-South exchanges. This suggests that there are conditions under which South-South exchanges can be mutually beneficial. South-South FDI is likely to result in better T&K transfer where home country and host country technologies and endowment differences are closer (Dahi & Demir, 2016; Demir & Duan, 2018). Aleksynska and Harvrylchyk (2013) and Demir and Hu (2016) examined the effects of institutional differences between North and South on bilateral FDI flows. Such studies emphasise the comparative advantage with respect to South-South FDI because of shared experience in working in institutionally less developed and risky Southern economies.

The underlying principles of modernisation theory may be problematic in shaping policymaking in developing countries. Modernization theory and links to technology and knowledge transfer. Modernization theory has largely been implicit within the West's policies on international development. This has become institutionalized through multilateral organizations such as the International Monetary Fund (IMF) and the World Bank (Ritzer, 2011). Modernization is characterized by conditionality justifying North-South power relations based on the assumption that the development of the 'South' should follow the same paths previously taken by the developed 'North' (Jackson, 2012). Such expectations appear to ignore

the importance of endowment mix and the T&K base of the developing South. Factor endowment such as land, labour, capital, and entrepreneurship contribute to the ability to exploit technology development opportunities. Dependency theory critiques the modernization thesis and explains how the continued underdevelopment of the developing world fuels the development of the developed world (Schech & Haggis 2000). Jackson (2012) has argued that such theories should be questioned when applied to China's relationship with Africa. The recent history of relations between China and Africa is one of non-exploitation and anti-imperialism. China's official policy is one of friendship and mutual learning (MOFA, 2006) and a starting point for exploring current China-Africa relationship should reflect historical precedence. Assumptions of modernization 'see advanced capitalist societies as models for all developing nations' (Kambhampati, 2004: 70). Both 'modern' know-how and values are diffused by education and T&K transfer. Northern MNEs can be seen as vehicles for transferring modern know-how and values. We question, in this context, what Chinese MNEs take to Africa, what they take away (through knowledge sharing) and their impact on Africa's (and China's) development. If we argue that modernization assumptions, such as those infusing Northern MNEs policies, do not apply to Chinese MNEs, then the motivation for transferring T&K may be different to Northern MNEs.

Theories of reverse diffusion suggest that transfer is not a one-way process (Zhang and Edwards, 2007). MNEs from emerging economies learn from advanced economies by taking back knowledge learned to their home countries. Conversely, MNEs from advanced economies may also acquire knowledge from operations in developing economies. Since the Chinese government's policy reflects mutual learning and friendship (MOFA, 2006) China's engagement with Africa could differ from historical relations with the North (Brautigam, 2011). This Chinese government's official assertion of the benefits of South-South cooperation are yet to tested with existing evidence not revealing significant and notable difference between motivations of northern governments in the past and the current relationship between the Chinese government and Africa (Dahi & Demir, 2016). This questions whether approaches to T&K transfer may differ, however, Jackson et al (2013) suggest that potentially greater cultural synergies between China and Africa may provide the basis for mutual understanding and better knowledge sharing. Hence, uncoupling from the modernisation lens, the motives and effects of Sino-African transfers may be quite different.

2.2 Absorptive capacity of firms in Africa, a modernization inflexion

The way Western modernization assumptions inform theories of absorptive capacity of firms in Africa also has implications for technology transfer that may not apply when considering Chinese MNEs in Africa. Absorptive capacity is defined as the ability to recognize, assimilate and utilise valuable external knowledge (Cohen & Levinthal, 1990). This relies on the deployment of international technology often contingent on an adequate supply of engineering and managerial skills, making host country education and training policies important (Hoekman et al., 2005; Osabutey & Jin, 2016). Bonache and Zarraga-Oberty (2008:7) go further in asserting that 'absorptive capacity of a local unit resides with its employees', adding that poor prior knowledge and motivation of local staff will restrict knowledge transfer. In the absence of empirical studies that focus on African staff, the general literature on management in Africa suggests a pejorative view of African staff and organizational capacity and motivation (Jackson, 2004). This is reflected in studies by Osabutey *et al.*, (2014) which attests to regulatory weaknesses in Africa restricting experiential learning and absorptive capacity. Hence, there is general denigrating of such capacity under an assumption that 'modern' management methods, transferred in by Western MNEs, are appropriate to the African context. Inculcating such modern methods and technologies may in a way be seen as a motivation for western firms, within a modernizing project. Yet a lack of absorptive capacity among African employees may be seen as a barrier.

The motivation and perception from the Chinese MNE position may be quite different where there is no modernization intent. But this may provide us with conflicting hypotheses, particularly in the light of literature suggesting a lack of T&K transfer in Chinese MNEs in Africa, which we explore later. Simply because China has no assumption that Africa needs 'modernizing', transfer of technological know-how may be low on the agenda.

2.3 Cultural synergies and technology and knowledge transfer

We have already alluded to South-South T&K transfer being potentially more appropriate than North-South transfer. Jackson (2012) also points to the closeness of the Chinese value of *ren* (humanity) to the African value of *ubuntu* (humanity). The Confucian concept of the person is essentially a social one, through familial collectivism, where the person is defined by his or her relationships. Therefore, identity cannot be understood as something separate from social attachments and place in the hierarchy of social relationships. In other words, a person's interests and goals are shaped by their social embeddedness. Hence, social bonds are a basis of indebtedness and obligations; 'the modern day version of Confucian relationalism': *guanxi*

according to Ip (2009: 465). This appears similar to the communalism of African cultures and contrary to Western individualistic cultures (Jackson, 2004, Horwitz & Budhwar 2015). However, *ren* may not apply to African employees, they may be considered out-groups and not part of Chinese *guanxi* by Chinese expatriate managers. Conversely Chinese managers and employees may be considered out-group members within the African *ubuntu* as pointed out by Mutabazi (2002). Arguably, potential synergies, if realised, may lead to corresponding values between Chinese and Africans that could facilitate appropriate technology transfer within a spirit of mutual understanding and sharing. Yet values involving relationalism often involve concepts of in-group and out-group relationships which may militate against transfer.

Having focus on the potential differences between North-South and South-South T&K transfer as this applies to Chinese MNEs in Africa, we now examine in more detail the conflicting interests of Sino-Africa transfer. Despite the potential to provide African countries with development avenues, through more appropriate technology know-how, these conflicting interests may inhibit potential transfer.

2.4 Conflicting interests in Sino-African technology and knowledge transfer

Ado and Su (2016) observe that the majority of emerging literature suggest negative outocmes for China's presence in Africa with very few studies identifying positive outcomes. There is a growing body of literature that suggests that China's presence in Africa is characterized by a selective combination of resource-seeking, market-seeking and political-seeking motivations (Gill & Reilly, 2007). Kurlantzick (2006) asserts that Chinese investments in Africa are directed towards energy and mineral resources to fuel economic development. China's investment and construction in Africa has links to China's resource dependence on Africa. Therefore, China needs Africa for resources to fuel development goals (Gill *et al.*, 2007), markets to sustain its growing economy, and political alliances to support its aspirations for global influence. However, it is pertinent to explore how firms in Africa have benefited, or otherwise, from the presence of Chinese firms (Ado & Su, 2016).

Although resource-seeking motives may suggest a lower propensity to transfer T&K to African countries, resource-oriented investment may have a positive effect on the development of African countries. Gelb (2005) believes that resource-seeking investments from Asia often increase the supply of entrepreneurs through immigration. He also argues that another important advantage of South-South resource-seeking investments may be that they embody business models which are less corporatized and more informal than Western models, and are often more

appropriate to the host country context in developing countries. With the literature also pointing to China's activities in Africa as market-oriented (Ajakaiye, 2006; Kurlantzick, 2006), although oil, gas and other mineral resources appear to dominate trade (Ado & Su, 2016), Chinese business people are increasingly looking at Africa as a new market destination for their products (Marafa, 2007). Again, maintaining competitive advantage for Chinese firms in Africa does not suggest a motive to transfer T&K to local partners and employees.

Dunning, Kim, and Park (2008) posit that country-specific ownership advantages determine outward FDI from emerging economies such as China. Cuervo-Cazurra and Genc (2008) also argue that MNEs from emerging economies enjoy a competitive advantage over counterparts from developed economies with respect to navigating institutional barriers not significantly different from their experiences at home. To understand how this competitive advantage may influence the level of T&K transfer, it is necessary to understand the role of Chinese firms in Africa's infrastructure development.

China's prominence in the development of SSA has been prompted by the sub-continent's significant shortfalls in infrastructure (Adem, 2010). Chinese construction firms are playing an integral role in China's engagement with Africa (Burke, 2007; Tull, 2006). For more than a decade these firms in the region have increasingly responded to the 'going out' national strategy of China; characterized by active, harmonized and innovative financing approaches between the government, banks, and business associations (Chen, Goldstein, & Orr, 2009).

China, unlike the West, has been willing to finance grand projects. These sometimes help sustain the political fortunes of African leaders; as Western participation in infrastructure projects in SSA decline, Chinese involvement increases. Some of these projects are funded through direct Chinese government aid. Significant portions of contracts are won at rates not considered strictly commercial. Pricing does not appear to match market rates and considerably undercut competitors (Tull, 2006). Chen et al. (2009) observe that state and Chinese financial institutions support these firms to win nearly half of the construction projects on international competitive bidding. These, *inter alia,* have led to Chinese construction firms executing most of the large and complex infrastructure projects in SSA to the detriment of both host country and other foreign firms. In the short-term, African governments appear to be paying much less for construction outputs. Although this benefit is welcome, to date, there has been no evaluation of developmental impacts in general and local industry development and T&K transfer.

The predominance of Chinese construction firms calls for a nuanced analysis at individual country level to enhance our understanding. Osabutey and Debrah (2012) suggest

the need for country- and industry-specific studies to develop theory since the issue of T&K transfer and capacity building in SSA remains largely underexplored. Such a specific competitive advantage over both local and foreign firms in bidding for contacts, for example, in the construction industry and other industries, may not be a strong motive for Chinese firms to share technical know-how. Notwithstanding favourable financial advantage through a close relationship with Chinese banks and government, competitive advantage may be lost if T&K is transferred to local staffs and partners. Yet this assertion may be further complicated.

China's presence in Africa still appears overwhelmingly to be through state owned enterprises (SOEs) as the above stated relationship with China's state banks and government suggests: in 2006 there were over 800 Chinese enterprises operating in Africa, at least 674 or 84.25% of these were state-owned enterprises (Alden & Davies, 2006) increasing to an estimated 2372 in 2013 (MOFCOM, 2013). As possible vehicles for Chinese government policy this may suggest the cited third motivation for China's presence in Africa as political-seeking may be important. Certainly, China's interest in Africa may go beyond the continent's wealth of resources and includes important political and diplomatic aspects (Gill & Reilly, 2007). China will, unswervingly, carry forward the tradition of China-Africa friendship; proceeding from the fundamental interests of both the Chinese and African peoples, establish and develop a new type of strategic partnership with Africa, featuring political equality and mutual trust, economic win-win cooperation and cultural exchange' (MOFA, 2006). Therefore, the sharing of T&K may be important to Chinese SOEs, if this friendship is not simply extended to Africa's elites, but filters down to individual firms. Firm and industry level analyses would enhance our understanding of the effects of such multiple influences on the transfer of T&K and the possible effect on Africa's development.

3. Policy framework in Ghana and implications for technology and knowledge transfer

Although there is paucity of data on technology transfer issues in Sub-Saharan Africa, the World Bank (2008), in a report on technology diffusion in the developing world, observed that new technologies and technology transfer are influenced by access to foreign technology through FDI, trade, international migration, and other networks. The report asserts that, predominantly, the ability to absorb technology depends on the financial systems, R&D efforts and the stock of human capital supported by requisite government policy and institutions. Meanwhile, the innovation by MNEs is influenced by home country bias (Tsuge & Bartels, 2003), exposing domestic firms to FDI/MNEs through, *inter alia*, subcontracting or supply

relationships (Bartels, et al., 2009) is necessary but not sufficient to achieve effective T&K transfer. This suggests the need for deliberate policy making towards technology development (Bartels & Koria, 2014; Cassiolato & Lastres, 2000). Osabutey and Debrah (2012), however, observed that since the dynamics of technological knowledge acquisition and utilisation are not fully understood by policy makers in Ghana the resulting policy lacunae has led to low T&K transfer: Fragmented policies show weak links between industrial and technology development, trade and FDI, technology transfer, education and human capital development. Therefore, the T&K transfer expected as a result of the presence of foreign firms has not been achieved. Globalisation and the growth of information and communications technology serve as a challenge for firms operating in Ghana (Ofori, 2012). According to Koria *et al.* (2012), Ghana's national systems of innovation has not influenced the production, distribution and processing of scientific and technological knowledge in the information and communication technology sector. This is due to the absence of adequate reliable policymaking expertise (mapping, measurement, analysis and control) and a further absence of policy instruments (performance requirements, regulations, fiscal and monetary incentives). They emphasise that the situation is exacerbated by institutional incapacity, budgetary constraints and corruption.

The majority of developing countries, such as Ghana, are lagging behind technologically (Pack & Saggi, 1997; Osabutey *et al.*, 2014; Amankwah-Amoah & Sarpong 2016). Despite substantial empirical evidence from South-East Asia that investments in science and technology directly or indirectly improve national economies, most countries in SSA (such as Ghana) did not prioritise such investments in the 1980s and 1990s (Mugabe & Ambali, 2006). In addition, science and technology policies in Ghana have, historically, been fragmented and lack a sense of continuity whilst characterised by inadequate investments in infrastructure and capacity building (Amankwah-Amoah, 2016). National systems of innovation, being the interaction of production, diffusion and use of new economically useful T&K (Lundvall, 1992) are necessary to create the environment for firms to employ appropriate technologies to enhance competitiveness within a global context (Coriat & Wienstein, 2002). Although MNEs contribute to upgrading T&K, host country institutional stability and capability also influences the quantity and quality of the foreign firms they attract (Alvarez & Marin, 2010). Yet, countries in Africa have not been known to exhibit viable national systems of innovation for firms to tap into. This means that, in Africa, firms' sources of innovation must be initiated from within. Most countries across SSA champion the development of innovation and entrepreneurship (Robson, Haugh, & Obeng, 2009). Abdulai, Thomas and Murphy (2015)

studied the influence of industry-university interactions in Ghana and found that formal links of organisations with universities on their own did not influence innovation, but rather co-operative collaborations and knowledge-based networking of businesses support innovations. Robson et al., (2009), subsequently, argued that, typically, Ghanaian innovation involves introducing new products, services or processes new to a given firm, but not necessarily new to the industry, individually or collectively. This portrays low technological know-how not helped by poorly functioning innovation systems and policymaking, thereby reducing potential T&K transfer.

3.1 Deployment of Expatriates and locals in Ghana's construction industry

Soon after independence from British rule in 1957, Ghana's construction industry was dominated by foreign firms such as Taylor Woodrow and A Lang. Succeeding decades have witnessed underdevelopment of local construction capacity. Local firms have been characterised by serious resource deficiencies in, *inter alia*, managerial know-how (Assibey-Mensah, 2009; Osabutey *et al.*, 2014). Training and working conditions of the construction workforce in Ghana is poor (World Bank, 2003). Large foreign firms in Ghana, as in other developing countries, are responsible for large scale projects. Local firms are in the majority but can be categorised as small to medium sized enterprises and are often unable to compete with the foreign firms for the more lucrative large scale projects (Kheni, Gibb, and Dainty, 2006; Assibey-Mensah, 2009; Osabutey *et al.*, 2014). Although there is inadequate empirical work that gives details of the deployment of expatriates and locals in the construction industry in Ghana, existing literature suggests that in most foreign firms the majority of middle and higher level managerial positions are held foreigners with most of the local employees in low skilled positions. Cost considerations also lead most local firms to hire as few professionals as possible (Osabutey, Nyuur & Debrah, 2015; Osabutey, 2010). Such practices affect the calibre of employees in local firms, in particular, and the construction industry in general thereby reducing potential T&K transfer. Chinese firms in Ghana, for example, often hire the majority of local employees whose education is not beyond formal secondary school (Giese & Thiel, 2014). The training of construction professionals at all levels also affects the stock of construction professionals and artisans that could be employed by both foreign and local construction firms. Egmond and Erkelens (2007) observed that there was lack of investment by the government of Ghana into laboratories, workshops and information facilities in the training of construction professionals in polytechnics. Consequently, graduates from such institutions

lacked the requisite skills to meet industry requirements in a globalised world. It is, therefore, no wonder that for certain skills sets, foreign firms are likely to prefer hiring non-Ghanaians who were better skilled. That is why Osabutey, Nyuur and Debrah (2012) suggested the need for policies that would ensure that educational and training institutions are adequately resourced and equipped to train construction workers at all levels. Osabutey and Croucher (2018) suggest that, in general, exisiting weaknesses in the prevailing institutional arrangements inhibit the exploitation of T&K transfer potential.

3.3 Ghana's construction industry and Chinese construction firms in Africa

The earlier rapid economic development soon after independence in 1957 was engineered by pursuing strong socialist policies. The trend could not be sustained and led to economic decline in the 1980s. In 1983, the Ghanaian government had to adopt the World Bank and International Monetary Fund's structural adjustment policies which were designed to liberalise the economy to attract FDI (Grant, 2001). The current level of technology and innovation in Ghana is low (Osabutey and Croucher) this is further evidenced by low technology transfer from FDI, for Ghana in particular and Africa in general, in the Global Competitiveness Report of the World Economic Forum (2018). This is striking because South Korea which has consistently topped the Bloomberg Innovation index (2017) had a GDP similar to Ghana at the time of independence (Osabutey & Debrah, 2012).

The construction industry has been Ghana's fastest growing industrial sector in the last decade (Anaman & Osei-Amponsah, 2007; Sutton & Kpentey, 2012); the third sector behind manufacturing and services for employment generated by foreign firms (Osabutey & Debrah, 2012). Local small and medium-sized construction firms exist, but largely lack capabilities required to win and execute major contracts (Assibey-Mensah, 2009). There are generally resource (human, finance, equipment, government support etc.) differences between the three players (local, Chinese, other foreign – mostly Western) in the construction industry. Such resource differences introduce an added dimension to the competitive landscape.

Construction accounted for 18 per cent of FDI flows to Africa and it is in the construction and infrastructure sector where Chinese FDI is most ubiquitously evident, with much of the physical infrastructure investment in centre-piece construction outputs such as government buildings and sports stadiums (Kaplinsky & Morris, 2013). Since most of SSA has huge deficits in construction infrastructure, aid and loans for these are welcomed by the African political elite to meet short-term and long-term infrastructure needs, without significant

reference to the benefits of T&K transfer and local capacity building. In addition, the construction industry in Ghana (and Africa) is characterised by contractors of various sizes. The fragmented nature and the ease of entry to, and exit from, the industry has resulted in too many incompetent local competitors (Eyiah, 2004; Ren *et al*., 2012).

4. Research design and method

Given the paucity of previous empirical research that evaluates T&K transfer from Chinese to African firms, a qualitative, semi-structured interview-based method was considered appropriate for gathering and analysing data. This approach is suitable for the investigation of subject areas considered complex (Suddaby, 2006) and has the potential to unearth previously neglected but essential phenomena (Doz, 2011). In addition, semi-structured interviews allow comparability between responses, while permitting significant but unanticipated issues to emerge (Myers, 2008). Interviews help us learn about perceptions, experiences and reactions from individuals who are direct or indirect stakeholders (Weiss, 1994). In order to diminish bias in the analyses of our data we sought to evaluate responses from three stakeholder groups (local, Chinese and other foreign) of industry experts and practitioners bearing in mind their varying interests and relationships with the issue under research. All interviews were conducted in the English language. According to Morgan and Smircich (1980) the researchers' familiarities and capability to understand the phenomenon under study can be an important advantage in making sense of the data. One of the authors had previously worked in a multinational in Ghana and had also conducted recent studies involving the construction industry in Ghana. These allowed the selection of participants with the highest theoretical relevance for our research questions (Miles & Huberman 1994). We therefore sought the most information-rich (Patton, 2002) respondents by using an experience-based purposive sampling framework supported by an industry membership lists. Our theoretically directed interviewee choices ensured that data saturation (Locke, 2001) was reached after about two-thirds of our interviews within groups.

4.1 Data and participants

We used our knowledge of the need to build trust with Chinese respondents to rely on our existing networks of local people who had built good working relationships (*guanxi*) with the Chinese respondents. Indeed, in two of the interviews, these trusted locals were present and participated in the interviews. This allowed cordial sharing of opposing views wich resulted in data enrichment. Each interview lasted between 30 and 90 minutes. Questions covering T&K

transfer, positive and negative influences and related policy deficiencies and implications were discussed. Emerging themes that were explored further covered ownership types, bidding, collaboration and HRM practices of Chinese construction firms and issues related to the potential for South-South T&K transfer. Notes were taken for all interviews and nearly two-thirds of respondents agreed to audio recording. Interviews were conducted until significant consistencies in responses, at least within the three groups emerged. Analysis sought to aggregate responses within and across groups by employing widely used processes of data reduction, data display, and drawing and verifying conclusions (Miles & Huberman, 1994).

For the study we interviewed a total of 32 respondents. This comprised of seven senior managers of Chinese origin working for Chinese construction firms, five local senior managers working for local construction firms, and three senior managers of other (non-Chinese) foreign construction firms. These firms were selected from the top classification of foreign and domestic construction contractor firms using lists from the ministries responsible for awarding construction contracts in Ghana. In addition, we included other professionals and stakeholders to widen and buttress viewpoints: Three local professional body executives (for engineers, quantity surveyors and planners), three different local industry association executives, seven local construction industry professionals who were consultants (3 engineers, 2 Quantity surveyors, 1 architect and 1 urban planner). We also interviewed four senior local public sector officers working in the ministries involved in classification of contractors, tender reviews and the monitoring and evaluation of government construction projects.

5. Analysis of the data

Analyses involved categorizing responses related to our research questions as well as identifying emerging themes. From the analysis of the data the following themes emerged:

Theme 1: Competitiveness of Chinese construction firms

Theme 2: Human resource management and development, and T&K transfer

Theme 3: Potential South-South T&K transfer via closer knowledge base and development stage and history

Theme 4: Host country T&K policy framework.

We now look at each of these areas in connection with our discussions in the theory sections above.

5.1 Competitiveness of Chinese construction firms

It was generally agreed among respondents that T&K transfer would build the capacities and capabilities of the local firms. The majority of respondents across the three groups (locals, Chinese, and foreign non-Chinese) agreed that over the last decade Chinese construction firms have been undertaking the majority of construction projects in Ghana and Africa. FDI figures concur (GIPC, 2009; 2010) with the views from a number of local respondents that some Indian construction firms are also operating in the industry. These Indian construction firms were often deemed as being, comparatively, more willing to collaborate with local practitioners at the consultancy level. Most local professionals affirm that Chinese construction firms were executing most small-simple to large-complex projects. One of the many views indicated that:

> *"The Chinese are doing the majority of the major projects and do not leave the small projects for Ghanaian contractors…they virtually do not give any subcontracts. It is through subcontracts that people may get quite close to learn"* (Local Consulting Engineer)

Local content (equity/finance, human capital, equipment, material etc.) is often extremely low and there is no evident T&K transfer. The majority of local practitioners agreed that:

> *"For road works and high-rise building the FDIs and MNEs coming in are mostly Chinese…Coming in their numbers…, but they are performing... Being supported by their government and most of them are state institutions"* (Local Professional Body Executive).

Chinese construction firms operating in Ghana (and SSA) are either government owned (national or provincial) or privately owned firms. Some firms labelled private are somehow spinoffs from provincial or governmental organizations. The Chinese respondents agree that there is general encouragement and support for private and public firms to move out into foreign markets. However, some argued that the level of government support assumed by Westerners, the media and host country nationals was exaggerated. They argued that it was practically impossible for the Chinese government to support the many Chinese firms operating overseas. Hence, to a very large extent, some of them operate as independent and private entities. But a great number of non-Chinese (local and foreign) firm respondents disagreed and argued that:

> *"It is a state sponsored strategy, part of a national agenda, particularly for Africa, to use their direct influence through aid to export excess labour, create employment for their firms and people to stimulate their local industries and grow their economy*" (Senior Manager of Non-Chinese Foreign Construction Firm).

Our non-Chinese respondents argued that this strategy was aimed at reducing competition in China and increasing global competitiveness. They were also in agreement with existing literature that, through aid, construction is being used as a resource-seeking tool (Gelb, 2005; Kaplinsky & Morris, 2013). Respondents agreed that African governments find larger and more generous Chinese loans and aid less cumbersome in comparison with bilateral or multilateral sources such as the IMF and the World Bank who require sovereign guarantees for which they could not qualify. Such loans often have provisos for Chinese construction firms to undertake the projects. Some Chinese and local respondents agreed that recent developments involve Chinese construction firms identifying a project in Africa and then sourcing for the funds from Chinese banks for the host governments. In a sense, funding is beginning to chase projects and the situation is creating a new competitive landscape detrimental to the non-Chinese firms. Chinese construction firms are therefore not constrained by financial resources. Africa needs the infrastructure and the Chinese construction firms can deliver quicker funding and cheaper outputs. Interview responses, therefore, suggest that in the short-term Africa gains construction outputs, but China's interests appears strategic, integrative and long-term.

Although we could not have oversight of specific bids indicating prices quoted by Chinese and non-Chinese firms, almost all respondents agreed that the Chinese companies often bid lower. Indeed, some respondents wondered how Chinese firms were able to deliver project outputs at such prices. For instance, local respondents suggested that in international competitive bidding the Chinese firms generally bid below others. While non-Chinese foreign firm respondents believed construction outputs from Chinese firms were of relative questionable quality, the majority of the local respondents disagreed and felt that such rhetoric could be part of a Western propaganda. A senior local public officer observed that:

"I don't know if the issue of poor quality construction work is coming from the Europeans. The way I see it, the Europeans are a little bit worried about the Chinese penetration into Africa… but I think the evidence is not really there."

More than half of the local respondents argued that it depended on the level of supervision and others felt that: *"because they are so many in Africa, they are trying to throw everything at you; so it comes with the good, the bad and the ugly"*. They argued that it is a mixed bag across Africa. A local consultant argued that:

"I am working in other African countries and when I mention Chinese contractors they say no, we don't want them, we've had enough of them; Cameroon and Gabon, for example, and I think in Equatorial Guinea they sacked one of their Chinese contractors"

Majority of technocrats interviewed objectively agreed that construction outputs from Chinese firms operating in Ghana are often value for money and completed on schedule. A local consulting engineer argued that for the stadia construction projects for the African nation's football tournament in 2008:

"The Ghana government did not have enough money. They had consultations and realised that the Chinese company could do it at a much lower cost. It was Ghana government's own money but they wanted value for money"

Chinese respondents rebuffed arguments from non-Chinese respondents that government subsidies, given with long-term strategic intents, allowed Chinese construction firms to bid lower. They explained that Chinese firms sometimes made losses or broke even for majority of their first projects with the hope of making profits on future projects. The majority of interviewees (Chinese, local and other foreign) agreed that reasons for lower bids by Chinese firms include:

- Subsidies and financial support from the Chinese government
- Cheaper inputs (labour, material, equipment, etc.) mostly from China with ability to find cheaper sources (e.g. mine stones for construction locally)
- Lower operating and staff costs (housing, transportation, local and expatriate staff remuneration). More temporary local employees with minimized overheads, over-time, medical and social security payments.
- Multi-skilled relatively cheaper Chinese workforce.

Even the procurement law provisions aimed at giving a margin of preference to local contractors do not inhibit Chinese construction firms from bidding lower. One of the many views is expressed as follows:

"The margin of preference in the procurement law suggests that local firms would be favoured if their bids were higher (within a margin of fifteen percent). But Chinese firms often bid far below… We need to identify the underlying factor, that we don't have, that is making them quote so low and yet deliver" (Local Industry Association Executive).

Some local practitioners suggested a modification of the procurement law to encourage Chinese construction firms to collaborate for the purposes of knowledge sharing.

Work ethics of the Chinese, *inter alia*, also was suggested to contribute to low operating costs with consequent lower bids. Objective views from a good number (over 70 per cent) of local professionals are confirmed by a local public sector senior manager who said:

"What we see is that without a doubt their work ethics is good compared to ours... They are prepared to pack themselves on site"

A consulting engineer [supervising a project by a Chinese firm] observed that:

> *"In terms of time [schedule] they may delay a bit but they can work long hours. They work from morning till 12:00; 12:00 to 2:00pm is break time. Now [1:33pm]…, the place is very quiet, they are all sleeping. They come out at 2:00pm and work till about 5:30pm when they take supper, rest and then work until about 9:00pm."*

This buttresses their work ethic. In relation to their frugal operations and competitiveness the consulting engineer added that:

> *"This camp houses all of them; the highest to the lowest all eat from the same kitchen. The European project manager would be staying in a 5-star hotel or a house at 'Airport Residential Area' [preferred expatriate residential area]. Their [Chinese] costs are low and they are able to beat them on price."*

There was no evidence of a collaboration (joint ventures, subcontracting) between Chinese and local firms. According to most local practitioners some Chinese firms *'have been able to register as local firms, with the help of locals, and this allows them to participate in national competitive bidding as well'*. This appears to be a symptom of weak governance and institutions. Willingness to collaborate with Chinese construction firms on the part of local firms is mixed; unwilling ones are sceptical that: *'subcontracts would not be profitable because of the value of the entire bid'* (Local Consultant Engineer). The prevalent view, however, indicated that local firms interested in collaborating are only interested in financial gains and not T&K transfer. Most Chinese respondents cite work ethics, language and cultural barriers as reasons for non-collaboration. A Chinese respondent indicated that:

> *When we started working in this country language and cultural barriers and different technical and work standards discouraged us from collaborating with local firms".*

They also noted that Ghanaian firms were small and had resource constraints (human, finance, equipment) and lacked adequate experience on similar projects. Chinese construction firms feared *'such arrangements would slow projects down and escalate costs which we work hard to keep to a minimum'* (Chinese Senior Manager). This acknowledges that there is a potential to learn from Chinese construction firms but learning opportunities are scarce because of the absence of Chinese-local firm collaboration. This brings us to the second major theme to emerge from our interviews.

5.2 Human resource management and development, and technology and knowledge transfer

Responses from both Chinese and locals suggest that Chinese firms generally reserve most management and supervisory roles for Chinese nationals. The majority of the locals are hired at lower operational levels; most locals being labourers. A few of the Chinese firms, particularly the ones of a private nature, employ a small percentage of locals (less than five percent) in some technical, supervisory and lower-middle level roles. The human resource role in such firms, for example, appears often to be held by a local. The Chinese respondents indicated that they sometimes hired some Ghanaians into such roles to help deal with regulatory and institutional issues. They cite communication problems resulting from language and cultural barriers as contributing factors, but argued that on first entry into a host country they hired more people from China. They maintain that it made more economic sense to identify and hire good local workers at all levels on subsequent projects. Most non-Chinese respondents believed that the majority of local labourers hired were temporary workers who were not entitled to holiday, medical and social security payments. Most labourers leave before the end of their contracts or were rehired after contracts ended to get round local labour laws mandating permanent employment for long-serving temporary workers. Chinese respondents dispute these assertions, but a public sector engineer supervising a road construction by a Chinese firm noted:

> *"If I restrict myself to this project, apart from the artisan (the carpenters, steel benders, labourers, concrete foremen etc.)... 19-20 are expatriate Chinese. In every working location you will see a Chinese supervisor… and the difficulty is that most of them cannot speak adequate English. So it is more of sign language and short commands like come, bring, etc… And yes, they don't employ Ghanaian engineers here.*

Language difficulty is one impediment to T&K transfer in the case of Chinese construction firms. Not hiring local middle to higher level human resources limits potential T&K transfer. Another supervising engineer indicated that:

> *"On this project they do not expose locals to so much. Apart from using some local artisans and drivers, some of the heavy equipment and cranes are operated by the Chinese. So in terms of transfer of technology it is not very beneficial"*

Poor workmanship by local artisans and craftsmen was a common complaint from respondents across our three groups; a huge disincentive for hiring locals. Arguably, this gives Chinese construction firms a good business case for not hiring locals for particular roles. The Chinese respondents argued that the locals lacked the requisite engineering and technical skills and are rarely multi-skilled.

Most non-Chinese respondents noted that local employees were not adequately remunerated and as a result the labour turnover was high as opined by a consulting engineer below:

"They are not paying well compared to other contractors [local and foreign] *so they are not able to hold onto their local staff... Every month they drop, re-employ and drop and that affects technology transfer"*

Chinese respondents argued that Chinese labourers were on the same rate, but worked longer hours. It was argued that Chinese firms' pay rates were low but equivalent to the local minimum wage. Chinese construction firms do not encourage the formation of unions. The Chinese respondents explained that this was due to cultural and institutional differences and argued that:

"In China unions are not trouble makers. They help management to manage workers but here the union is not on management's side but on workers' side. It is like a culture shock to Chinese managers. They do not understand how unions work and perhaps the first step would be for the trade unions to educate the Chinese firms" (Chinese Senior Manager)

On training and development, some of the Chinese respondents argued that they provided on-the-job training but time and resource constraints did not allow off-the-job training. One Chinese respondent indicated that their firm (operating in Ghana for over 10 years) sent some Ghanaian employees (in 2012) to China to work and learn from parent firm employees; thereby acquiring new T&K.

5.3 Development stage, knowledge base and potential South-South technology and knowledge transfer

The general view expressed most strongly by the Ghanaian respondents, was that developing countries could be guided and inspired by the Chinese from whom they stood a better chance of learning compared to the advanced West. Chinese construction firms operating in Africa employ low-to-medium technologies which are more labour-intensive than the capital-intensive unlike Western MNEs. This would be more appropriate for countries such as Ghana where labour is abundant and technological know-how is low. A supervising public sector civil engineer observed that:

"…They are not that sophisticated. Most of the equipment, tools or methods they use are very simple. But they have mastered the art because they have used it over and over again

and it works... unlike firms from the advanced countries who would use sophisticated machinery'

He provided the following supporting evidence: "*I am supervising a government project and they* [Chinese firms] *are using very basic and simple technologies but they get the work done. We may not benefit in terms of high-tech, but because we are in Africa, we can start by learning low-tech labour-intensive methods."*

The potential to learn from the Chinese firms was affirmed by another civil engineer who said:

"A section of my colleagues believe that because we are not that advanced ourselves we should look at simple ways of doing things instead of going the Western way – heavy machinery etc. We don't have the capital so most of our contractors should try to be labour-intensive. If you look at it that way then we can learn from them because their methods can be easier to imitate and less costly"

Asking yet another supervising engineer if the labour-intensive methods of the Chinese construction firms relative to Western firms gave comparable quality outputs, he responded thus:

"Yes, they are efficient and that is what gives them competitive advantage in terms of price. They would use a much simpler method and be able to achieve the same results. When you are supervising them you might think that their methods are basic and sometimes primitive but, with a bit of patience, the end results are good"

It also emerged that Chinese construction firms adopt simple low-tech to medium-tech methods as noted by a building technologist who said:

"Unlike the Ghanaian artisans, the Chinese use a lot of power tools, they cut, they don't saw. They drill, they don't chisel and some of these things ensure structural soundness"

Their multi-skilled artisans appear to produce higher quality outputs which add to their competitive advantage. A local procurement specialist who supervised a government project had this to say:

"I was amazed at how craftsmen can exercise that level of patience to fix a WC bowl…You see some of them laying tiles and realise how they exercise a lot of discretion. They have the craftsmanship within them and they are disciplined and carry out their assignment to the best of their ability. Our artisans lack comparable discipline. Acquiring skills and practicing them properly could be through school and training..."

The majority of the local engineering consultants interviewed argued that different condition of contract used by Chinese firms also adversely affects T&K transfers. A local consultant who had supervised a project by a Chinese firm observed that:

"The Chinese don't like to work with what we know here which is the FIDIC (International Federation of Consulting Engineers) conditions of contract. They don't like to see that at all. They want to do it according to Chinese standards. We use the British standards, but they [Chinese] claim their standards are far higher.

The use of Chinese standards and the non-involvement of local consultants meant that T&K transfer potential is limited. This becomes evident when local practitioners are required to repair and maintain projects as lamented by a consultant building technologist:

"With the National Theatre, they brought the Chinese back to do the maintenance, but if there had been technology transfer we should have been able to maintain it. They are not helping us to build national capacity. The dependency situation is becoming critical because they come to complete the projects and if they go away with all the information and do not transfer it how can we stop depending on them."

It appears therefore that despite Chinese T&K being more appropriate to the local context, opportunities for transfers are limited. Poor T&K transfer policy framework also contribute to long-term maintenance and repair costs. Therefore, despite related knowledge base, low skilled local artisans, unfamiliar Chinese conditions of contract and non-involvement of local professionals lead to lost opportunities for T&K transfer.

5.4 Host country technology and knowledge policy framework

Ghana and other countries in SSA focus on financial aid and affordable construction outputs from China. Current government policies are not geared towards developing the local industry. Respondents argued that without interventionist policies, the local contractors subsector was heading towards annihilation. On the role of government there was a general suggestion that clear and enforceable local content laws were needed to reduce the labour and material inputs from China by the Chinese construction firms. A public sector officer suggested that:

"They should be encouraged to form partnerships with local firms in terms of working together and using local suppliers…. If we don't do that they [Chinese firms] *will stay here for decades and we will not learn anything"*

Weak regulatory infrastructure has allowed some Chinese construction firms to register as local firms. The need to build verification into the certification and registration of firms was emphasised. A building technologist with tender review experience observed that:

"I have seen some Chinese firms working in Ghana who have registered as local companies because they have a Registrar General's certificate and they pay their way through the Ministries and get their categorization to operate because they have realised that the laws are weak and the sanctions are non-existent."

A quantity surveyor who is actively involved in tender review and local contract awards also confirmed that:

"A Chinese comes into Ghana to establish a construction company and operates… in order to qualify for national competitive bidding a Chinese company has been able to get a Ghanaian to own fifty one percent of the shares [on paper] because he may have given him some 'small money' to sign for him… You would have to go into their accounts to find out who the signatories are to confirm ownership"

Institutional and regulatory weaknesses appear to contribute to corruption in the sector. Most local respondents felt there was the need to take advantage of foreign firms' presence as suggested by a researcher/consultant as follows:

"It should be imbedded in our foreign policy that all bilateral discussions should have this focus that in terms of services there should always be a JV [joint venture]. *The Chinese are doing it in a peculiar way…through aid… We have at least nine large Chinese construction companies who are prepared to outbid anybody…what stops the government from coming out with a deliberate policy to encourage forming a Ghanaian-Chinese consultant collaboration on specific projects. On incentive award systems…with even twenty percent Ghanaian equity, eventually our people can build up capacity… I have been telling our ministers that we should learn from the Chinese"*

While government policy can help build capacity through collaboration, opportunities such as scholarships for locals to study in relevant Chinese tertiary institutions could increase the human capital. A local mechanical engineering consultant observed that:

"I don't see why if government is giving out a contract probably worth five to ten million dollars it cannot incorporate scholarships for ten Ghanaians in the construction industry."

Emerging views from local respondents suggest that bilateral relationships should seek to encourage learning through long-term collaborations.

6. Discussion

Our study sought to identify what key factors influence potential T&K transfer from Chinese construction firms, why transfer appears to be low and how local policy might address these. In Table 1 we summarize key findings by evaluating the opportunities and challenges and the related policy implications. Our findings suggest that Chinese construction firms have competitive advantage over both local and other foreign firms in both national and international competitive bidding. Their competitiveness is not only due to predominant home government support as alluded to by previous studies (e.g. Tull, 2006), but also astute access to and efficient management of cheaper resources from home and host countries. They do not collaborate with local and other foreign firms and therefore present limited opportunities for T&K transfer. Their human resource practices with respect to recruitment of less local middle to higher level employees, poor working conditions and remuneration resulting in higher turnover, and low commitment to human resource development adversely influence T&K transfer.

Our findings agree with existing studies that technologies from the emerging Southern economies, with advancing skills and technologies, can potentially transfer more appropriate technologies to the rest of the South (Dahi & Demir, 2016; 2017). Indeed, the sizes, institutions, production systems, availability of capital, technological know-how, quality and quantity of labour and the general gamut of endowment mix (Demir & Duan, 2018; Dahi & Demir, 2017; Demir and Hu, 2016; Atta-Akomah, 2014; Aleksynska and Harvrylchyk, 2013; and Pack and Saggi, 1997) do not suit Northern firms as they would Southern ones. Therefore, South-South technology transfer may be more appropriate than North-South transfers. However, lack of local policies aimed at both short-term (rapid value for money infrastructure development) as well as long-term (T&K transfer and capacity building) benefits were absent despite similar values and synergies for sharing knowledge (Jackson, 2012) and comparable endowment mix (Fu *et al.,* 2011). Our findings, unlike previous studies, suggest and confirm that in an attempt to significantly reduce costs, the activities of Chinese construction firms decrease the potential for T&K transfers. Chinese firms rationalize employment practices on the grounds of cost, productivity and language and cultural difficulties (Tull, 2006; Chen *et al.* 2009). Although Chinese construction firms create some employment, there is insignificant associated human resource development and therefore little T&K transfer. As Western firms are being squeezed out of the construction market in Africa, Chinese construction firms are likely to become the dominant players. Policy should be directed at how T&K transfer can be achieved to reduce longer-term overdependence on such firms, for example, for maintenance and repair.

Table 1 here

Dependence has matured into 'perpetual dependency', which overlooks potential learning opportunities. Our study agrees with Leys (1996) that dependency thrives where governments are weak. Since growth in most of SSA is dependent on foreign capital, dependency was bound to increase as argued by Amsden (2003). If the dependency theory suggests that peripheral nations are dependent and exploited by the developed, then 'perpetual dependency' will inevitably result in perpetual exploitation whether by developed or emerging economy firms. How then can countries in SSA extricate themselves from their perceived peripheral existence?

Weak governments and institutions (Costantini & Liberati, 2014; Osabutey & Croucher, 2018), and other political factors such as endemic corruption (Koria *et al.,* 2012), have led to short-term agendas which do not pursue long-term goals such as innovation and T&K transfer (Coriat & Weinstein, 2002). Kaplinksy and Morris (2013) suggest that whilst China has a strategy for Africa, Africa has no strategy for China. Africa has no policy that seeks to extract benefits such as T&K transfer. So, the issue is more to do with an existing policy vacuum (Osabutey & Debrah, 2012) and the absence of adept policymaking.

In general, Chinese presence in SSA must be viewed as having the potential to transfer T&K as expected from the FDI and technology transfer theories (Hoekman et al., 2005; Ma & Delios, 2010; Osabutey et al., 2014). African governments must develop platforms to learn from the Chinese government to support their firms to build local capacity as suggested by Bozeman (2000). Countries in Africa need not have a targeted China policy *per se*, but an urgent, more general, FDI/Aid/Trade policy linked to T&K transfer and technology development that takes advantage of the increasing Chinese presence. The competition between China and the West for the 'African Space' can leverage bargaining power for negotiating with both to increase South-South knowledge sharing opportunities (Fu *et al*, 2011; Jackson, 2012). To avoid long-term unfavourable outcomes, SSA should incorporate into bilateral Sino-African relations a stint of foresightedness that builds into all negotiations with the new development partner, China Incorporated, the idea re-echoed by our local respondents; *'we want to learn and develop like you'.*

7. Conclusion

The study notes that the increased presence of Chinese construction firms in SSA support infrastructure development but can also enhance T&K transfer and capacity building. Our contribution to the literature highlights that this cannot be realised within the current policy framework. There are enough synergies in terms of levels of technology and shared history and values to enhance South-South transfers. A policy shift that incorporates T&K transfer and capacity building into construction projects awarded to Chinese firms is required.

Our contribution to the literature also expands on the factors that enhance competitiveness of Chinese construction firms by highlighting multi-skilling, work ethic and astute cost and resource management as well as lower overheads. Unlike other studies on the subject that focus on the negatives, we highlight the unexplored and unexploited opportunities to emphasize that without adept African policymaking, perpetual dependence on foreign firms will persist. One unique element of our contribution is that we sub-divide our respondents into three stakeholder groups (local, Chinese, and non-Chinese foreign) and in a novel way, seek to bring the international business literature into a better alignment with the development (host country) literature in order to convey a new dimension to policy thinking. Our contribution can help policymakers in Africa and those working with multilateral and international organizations to integrate T&K transfer requirements into all construction contracts. This study has also laid the foundation for further exploration of the theories related to modernisation, dependency, FDI and T&K transfer. Our study has also contributed to our understanding of the key issues that would influence T&K transfer from China to Africa. Further studies could incorporate policy issues from both the SSA and Chinese policymakers' perspectives. Although our study captured views that covered most of SSA and China a multi-country study can build on our novel use of a balanced combination of views from local, Chinese and other foreign professionals and stakeholders to improve our understanding of how Chinese presence in Africa can facilitate T&K transfer.

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Table 1. Implications for Chinese presence

Findings (themes)	Opportunities/ Advantages	Challenges	Policy Implications
Chinese interests strategic, integrative and long-term. Chinese construction firms' competitive over local and other foreign firms. Use more advanced and efficient T&K than African firms. Competitiveness goes beyond government support (astute cost management).	Long-term partnership (aid, trade and for value-for-money infrastructure). Bargaining power and potential T&K transfer: Opportunity for collaborating local firms to learn product, process and managerial T&K.	Sustaining local firms' existence and capability. Negotiation skills. Encouraging CCF-local firm collaboration. Language, culture, engineering standards and specification differences	Optimizing short- and long-term goals. Balancing value-for-money outputs with T&K transfer and capacity building initiatives. Incentives for collaborating flagship CCF-local firms: preferential bidding.
Human resource management and development practices of Chinese construction firms does not enhance T&K transfer	Enforcing existing labour and immigration regulations could encourage foreign firms to hire and train more locals at various levels within organizations	Getting locals hired for middle-higher supervisory or management roles (learning potential high). Reducing labour turnover. Enforcing immigration and labour rules when local skills gaps exist.	Project completions should be accompanied by T&K transfer and capacity building reports detailing: T&K transferred, employees trained or upskilled etc.
Development stage, knowledge base and potential South-south T&K transfer	Comparably similar development background and history. Low capital with abundant labour. Low-medium technologies more cost effective for local firms	Right balance between capital intensive vs labour intensive vis-à-vis high-tech vs low-medium tech.	More co-operative arrangements with the Chinese government and their firms for specific projects aimed at transferring specified T&K
Poor T&K policy framework in host country and weak institutions means no incentive for foreign-local collaboration	Foreign firms already operating in the country may respond to policy changes against leaving the country because of plant and machinery already invested.	Enforcing policies when institutions are weak and corruptible. Policies should not discriminate in favour of Chinese construction firms against other foreign firms blatantly.	Stakeholder involvement in bidding process and implementation and enforcement of T&K transfer and capacity building policies

Appendix

Question Outline for Chinese Construction firms in Africa and T&K Transfer

What is the role of the Chinese government towards the increased participation of Chinese construction firms (CCFs) in Africa in general and Ghana in particular?

- What is contributing to the increased participation of CCFs in the construction industry in Ghana
- Are there adequate foreign-local collaboration between Ghanaian firms and CCFs?
- Is the level of T&K base and development of CCFs likely to enhance better T&K transfer to local firms as compared to western firms?
- What HRM/D practices within CCFs are likely to enhance T&K transfer to local firms
- What role can the government of Ghana play to enhance T&K transfer from CCFs?

Extension of Question Outline
Home Government Involvement

- There is anecdotal evidence that most Chinese firms in Africa in general and Ghana in particular are either state owned or firms substantially supported by the Chinese government. Can you suggest the rationale behind that?
- What are the motivations behind the increasing participation of CCFs in Ghana

Bidding Practices

- There is evidence to suggest that CCFs are able to bid extremely low and yet often deliver outputs of adequate quality. What are their sources of competitive advantage? Are they from:
    - Appropriate technology and knowledge (high tech, medium tech, low tech?)
    - Quality of human resource (Chinese engineers and artisans?)
    - Sources of inputs (labour, material, equipment - relatively cheaper?)
    - Cheaper sources of finance (from home country?)
    - Others

Attitude towards collaboration with local firms

- My interest is in technology and knowledge transfer that could result from the presence of foreign firms in developing countries. Increasingly experts and practitioners believe that the level of development of countries such as Ghana (and the technological distance between developing countries in emerging economies) means that a lot could be learned from CCFs by local firms. Do you support this view?
    - Do you think Ghanaian firms, professionals and artisans have the technology and knowledge base that would enable them to learn more from emerging economies such as China as compared to firms from more advanced economies?

- What are the reasons why CCFs are reluctant to collaborate with local firm? Are the reasons related to:
    - Cultural or language differences
    - Technology and knowledge gaps
    - Differences in standards and operating systems
    - Quality of local firms
    - Quality of local professionals
    - Quality of local artisans
    - Others

Human Resource Management (HRM)/ Human Resource Development (HRD)

- What HRM/D practices in CCFs are likely to influence positively or negatively T&K transfer?

Role of Host Government

- What role can the government of Ghana play to encourage T&K transfer from CCFs?