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Factors facilitating effective knowledge spillovers from foreign to domestic construction firms in Abuja, Nigeria

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ABSTRACT

The potential benefits of Foreign Direct Investment (FDI) on the host economy are capital inflows, job creation and most importantly, knowledge spillovers. The purpose of this study was to assess the key factors that facilitate effective knowledge spillovers from foreign construction firms to local construction firms. Data were collected through the use of a well-structured questionnaire. It was administered to construction professionals in both foreign and domestic construction firms in Abuja, Nigeria. The data were analysed using descriptive and inferential statistical tools. It was revealed in the study that ICT, access to finance, the skill of workers and employee motivation were the key factors responsible for effective knowledge spillovers. Hence, it was recommended that domestic firms should fully harness the key factors responsible for effective knowledge spillovers, as this will enable them to widen their knowledge spectrum and not become trapped in their current expertise. Also, the government should make and enforce policies that will encourage knowledge spillovers.

Keywords: Knowledge spillovers; Foreign Direct Investment (FDI); Foreign Construction Firms; Domestic Construction Firms.

1. INTRODUCTION

Construction is the backbone of development, and without an efficient and functional construction industry, no country can think dream, or experience development (Idoro, 2014). According to Alintah-Abel and Nnadi (2016), the industry is virtually widely considered as the core of every other sector of any country's economy, and this is why when the industry sneezes, the economy catches a cold. In same vein, Omole (2000) revealed that the Nigerian construction industry is the driving force behind the country's economic growth.

According to Cyrielle and Xiaolan (2015), Foreign Direct Investment (FDI) has long been seen as a significant driver of economic progress in developing countries. FDI is not only seen as a requirement for growth strategies in Sub-Saharan Africa (SSA) and other developing countries, but it is also widely accepted that FDI boosts local firms' productivity. When foreign firms invest in a host country, they often bring their unique technology. Many governments have implemented policies to encourage FDI by providing substantial financial incentives based on the notion that local firms will profit from knowledge transfer (Merlevede et al., 2014). Muyendi and Njuru (2016) stated that any firm with a high level of productivity entering the market should naturally stimulate other firms in the same sector to increase their performance and competitiveness. Increased production efficiency can be achieved by imitating innovative technologies or hiring trained workers and managers from foreign firms (Javorcik 2004). In addition, firms from other sectors may be affected by the presence of foreign firms. These include firms that supply or provide services to foreign firms. Furthermore, better standards offered by foreign firms to local firms are likely to boost the

efficiency and performance of local firms. Capital inflows, job creation, and, most significantly, knowledge spillovers are all potential benefits of FDI for the host economy.

According to Adegbembo, Awodele and Oke (2020), the construction industry is one which greatly uses the skills, experience and abilities of its employee within the organisation. As a result of the nature of the industry, which may involve professionals from within and outside an organisation, the industry is prone to knowledge spill. Knowledge spillovers, as posited by Fallah and Ibrahim (2004) are the unintentional transmission of knowledge to others beyond the intended boundary. Any knowledge that is exchanged outside the intended boundary is spillover. Once this knowledge is out there, it can be used in a variety of ways to assist other people's work and may even lead to discoveries. Moreover, knowledge spillovers occur when recipient firms make use of knowledge developed by the originating firm (Yang and Steensma 2014). These recipient firms could be alliance partners, direct competitors of the originating firm, or firms from different sectors. Whatever the case, when recipient firms take advantage of the originating firm's knowledge, they frequently merge it with other knowledge to produce their own distinctive inventions (Sorenson et al.2006).

Furthermore, Crespo et al.(2007) stated that spillovers also happen when Multinational Corporations (MNCs) are unable to fully internalise their stock of knowledge (which includes technology and management practices), allowing domestic firms to benefit from it. Osabutey et al. (2014) stated that the ability of foreign firms to transfer knowledge to local firms in the host countries is one of the key benefits of FDI. This calls for regular and intense interaction between the source and the recipient (McDermott and Corredoira, 2010). According to Cyrielle and Xiaolan (2015), knowledge spillovers boost domestic productivity, promote economic growth, and help developing countries escape poverty. When firms rely solely on their current expertise, they get caught within their limited knowledge areas and run the risk of just replicating their own expertise (Yang and Steensma 2014). Firms must seek knowledge outside of their present expertise to avoid becoming too restricted. If a firm's present expertise isn't enough to keep it afloat, it may be necessary to look for knowledge from areas outside its own (Sorenson et al. 2006).

2. LITERATURE REVIEW

2.1 Theoretical framework on knowledge spillovers

Theory of Learning by Doing - Sorensson (2010) stated that knowledge must be gained. It is self-evident that knowledge increases over time. Learning is the term used to describe the process of acquiring knowledge. Arrow (1962) exploits the learning-by-doing theory. This simply means that one producer's activities may/can lead to the productivity of another simply by learning and doing what the first producer has done. This refers to the spillover of knowledge between producers. The level of technology can now be influenced by individual producers themselves by R and D activities.

Marshall-Arrow-Romer (MAR) Theory - According to Sorensson (2010), the corresponding knowledge spillover in a localisation setting is commonly referred to as Marshall-Arrow-Romer (MAR) externalities (in reference to Marshall (1890), Arrow (1962), and Romer (1990)). This focuses on knowledge spillovers within the same industry, where concentration in a specific region fosters knowledge spillovers between firms and, as a result, economic growth. The MAR theory was developed in 1980 by an English economist named Alfred Marshall, and it was later extended by these economists, Kenneth Arrow in 1962 and Paul Romer in 1986. The MAR views on knowledge spillovers were gathered and called the MAR spillovers by Glaeser et al. (1992). According to the MAR spillover theory, the proximity of firms within a similar industry significantly impacts how well information travels among firms to support innovation and growth. This means that as firms move closer to one another, the MAR spillover increases. The exchange of ideas is mostly from employee to employee,

that is, employees from different firms in an industry share ideas on products, innovations, and new ways to produce items. New goods and improved production methods are the focus of the opportunity to exchange ideas that lead to advancements. Carlino (2001) cited several semiconductor companies that purposefully situated their R&D centers in Silicon Valley, California, USA, an industrial location, to take advantage of MAR spillovers. Furthermore, the film industry in Los Angeles, California, and other places rely on a geographic concentration of specialists such as directors, producers, scriptwriters, set designers, and other professionals to bring diverse components of filmmaking together into a finished product.

Jacob Spillover Theory - Jacobs (1969) emphasised that the importance of diversity in the urban industry mix is directly linked to urbanisation economies, particularly in terms of the growth impacts caused by information spillovers. A broad industry mix in a given location increases the chance of exchanging, imitating, modifying, and recombining products, processes, or ideas, implying that diversity could be a source of knowledge spillover that spurs growth. Under Jacob's spillover view, the proximity of firms from different industries impacts how successfully knowledge flows among firms to facilitate innovation and growth. This is in disparity with MAR spillovers which focus on firms in a common industry (Carlino 2001). The Jacob's spillover's diversified proximity brings together ideas from individuals with diverse views to enable an interchange of ideas and create innovation in a diverse industrial setting.

Porter Spillover Theory - Porter (1990) proposes a concept that is similar to MAR in that it stresses concentration within the same industry as the major channel for firm spillover. Knowledge spillovers in specialised geographically concentrated industries enhance growth. However, he emphasises that local competition, rather than local monopoly, encourages the pursuit and quick acceptance of innovation as well as the transmission of local information. In the same line, he emphasises the importance of local competition of ideas in promoting growth through increasing adoption of innovation, using the ceramics and gold jewelry industries in Italy as examples of industries where hundreds of enterprises are clustered and aggressively compete to innovate. In cities with geographically specialised, competitive industries, Porter spillovers are maximised.

2.2 Factors facilitating effective knowledge spillovers

Learning/Training - Osabutey and Jin (2016) stated that knowledge spillovers could be influenced by learning, which is a result of educational systems. As a result, knowledge transfer should include a purposeful effort on the part of local firms to acquire, store, generate, transmit, and build upon or add to knowledge, which is related to the Knowledge Management (KM) concept. The recipient's ability to absorb information is crucial to learning.

Skill of Workers - According to Crespo et al. (2007), foreign firms do business with local firms that make high-quality goods because expertise is linked to high-quality goods. Skilled workers in local firms can learn new production processes and technology from workers in foreign firms, which indicates that they have a better absorption capacity. Koen and Bartoldus (2002) also stated that Local high-skilled workers can obtain training from foreign firms' workers, which improves their productivity and quality of output. Therefore, it was concluded in the study of Muyendi and Njuru (2016) that the skills of domestic firms' employees are a crucial factor of their ability to attract both vertical and horizontal spillovers.

Geographical Proximity of Local Firms to Foreign Firms - According to Binyam and Syed (2018), it was stated that when local firms are physically close to foreign firms, they tend to

gain. The major reason for this is that spillover transmission channels are reinforced first by neighbouring firms and then expand to firms that are geographically further away. As a result, the potential of spillover transmission decreases as distance increases.

Availability of Deeper and Stronger Financial Markets - According to TeVelde (2019), deeper and stronger financial markets encourage spillover. Suppliers, imitators, learners, and competitors can invest in technology and human capital to improve spillovers when capital markets are better and functioning. Local firms become less reliant on and trapped in captive supply/value chain linkages as the financial sector develops. Although linkages are beneficial in and of themselves, the ability to diversify and develop new linkages and enhance value chains through access to finance may optimise learning. Thus, Local firms are motivated to act by foreign firms, and they can respond to opportunities if they have the resources to do so. Access to finance helps them in this situation. Local firms will be able to adapt to rising foreign competition with the help of a more established financial market.

Employees' Motivation - According to Zafar, et al. (2014), employee's motivation is essential for achieving efficiency. Motivation is a collection of factors influencing an employee's behaviour to achieve a specific objective. Motivation is necessary to encourage individuals to perform effectively in the long run and to assist an organisation in achieving excellence. Even though motivating people is a difficult task, if employees are motivated, they will be satisfied with their jobs, and if they are satisfied with their jobs, they will work hard to reach organisational goals, which will result in profit for the organisation. An organisation must have a reward management system in place to evaluate the performance of employees since this system has a motivating effect on retaining employees and achieving high levels of performance.

Digital Infrastructure - According to TeVelde (2019), a lack of digital infrastructure is one reason why spillovers through subcontractor linkages frequently fail to materialise. A better digital infrastructure (e.g., access to the internet and digital platforms) will entice more digital foreign firms (Banga and TeVelde, 2018). Such firms have a lot of knowledge and hence greater potential for spillovers to local firms. Digital infrastructure can also help form clusters, which fosters knowledge spillovers TeVelde (2019). Based on a survey of Hong Kong garment firms in China, the study by Thompson (2002) showed that clustered FDI is substantially better than scattered FDI at transferring technology, implying that industry clustering should be considered.

3. METHODOLOGY

The research adopted the survey design approach. The research involved the population of construction professionals in some construction firms. The target respondents included quantity surveyors, architects, engineers, builders and other professionals. The location of the study was Abuja, Nigeria; this was based on the fact that Abuja is prominent for construction activities and the headquarters for most foreign and local construction firms. In this study, questionnaires were used in collating data from the respondents. The preliminary section of the questionnaire centred on the respondents' demographic information, while the second section centred on the key factors that facilitate effective knowledge spillovers. The questions were asked on a 5-point scale, with five being the highest rating. Statistical method was used to analyse the collected data using the Statistical Package for the Social Sciences (SPSS) software package. The statistical methods used were percentile to analyse the background information of respondents, while the Mean Item Score (MIS) and standard deviation were used to rank the key factors responsible for effective knowledge spillovers.

4. DATA ANALYSIS AND RESULT

A total number of one hundred and fifteen (115) copies of the questionnaire were distributed within the survey area, out of which eighty-four (84) were retrieved and considered good enough for analysis, amounting to seventy-three (73) per cent response rate. The collected data were analysed and represented in tables. It is shown in table1that 31percent of the respondents are Quantity Surveyors, 15.5 per cent are Architects, 10.7 per cent are builders, 40.7 per cent are Engineers, and 2.4 percent belong to other professionals. This depicts that the respondents cut across every profession in the construction industry and are competent enough to provide suitable and reliable data needed to achieve the purpose of the study. In addition, it can be noticed that 60.7 per cent of the respondents have more than ten years of working experience. Also, 88.1 per cent of the respondents work with an indigenous construction firm, while 11.9 per cent work with a foreign construction firm. Also, 32.1 per cent of the 88.1 per cent of the respondents who work with various domestic firms claimed to have previously worked with one foreign construction firm or the other. Meanwhile, 96.4 per cent of the respondents are Nigerian, while 3.6 per cent are foreigners.

Table 1. Demographic information of respondents

Variables	Classification	Frequency	Percent
Profession of Respondent	Quantity Surveyor	26	31.0
	Architect	13	15.5
	Builder	9	10.7
	Engineer	34	40.5
	Others	2	2.4
	Total	**84**	**100.0**
Years of Experience	1-5	16	19.0
	6-10	17	20.2
	11-15	17	20.2
	16-20	14	16.7
	Above 20	20	23.8
	Total	**84**	**100.0**
Employer	Domestic	74	88.1
	Foreign	10	11.9
	Total	**84**	**100.0**
For the domestic employees, ever worked with a foreign firm before?	Yes	27	32.1
	No	47	56.0
	Total	**74**	**88.1**
Nationality	Nigerian	81	96.4
	Foreigner	3	3.6
	Total	**84**	**100.0**

4.1 Mean ranking for factors that facilitate effective spillover

Table 2 shows the mean ranking of the factors that facilitate effective knowledge spillovers. ICT, with a mean value of 3.76 and a SD value of 1.209 is the highest factor that facilitates knowledge spillovers. It is followed by access to finance with a mean score of 3.74 and a SD value of 1.077 while skill of local workers followed with a mean value of 3.73 and a SD value of 0.923. The least ranked of the factors is age of local firm with a mean value of 3.07 and SD value of 1.138.

Table 2: Mean ranking for factors that facilitate effective spillover

Factors	Mean	SD	Rank
ICT	3.76	1.209	1
Access to finance	3.74	1.077	2
Skill of local workers	3.73	.923	3
Employee's motivation (Incentives)	3.71	1.048	4
Training of local workers by foreign corporations	3.70	1.095	5
Adoption of local content policy in the construction industry	3.69	1.053	6
Attracting more FDI into the country	3.63	1.062	7
Strong technological capacity of a local firm	3.58	1.204	8
Frequent and intensive interaction between foreign and local contractors	3.52	1.114	9
R&D emphasis on both local and foreign firms	3.52	1.124	10
Consistent jobs for local contractors from the government	3.46	1.246	11
Size of local firm	3.43	1.021	12
Competition policy	3.43	1.056	13
Strong innovative capacity of local firms	3.42	1.184	14
Availability of deeper and stronger financial market for local firms	3.42	1.224	15
Geographical proximity/nearness of local firms to foreign firms	3.31	1.251	16
Strong legal system	3.29	1.059	17
Age of local firm	3.07	1.138	18

4.2 Factor analysis for factors that facilitate effective spillover

Each Factor was named by using a name that reflects all the variables. And where there was difficulty in picking a suitable name, the variable(s) that has the highest factor loadings among all the variables that loaded onto a factor was used in naming that factor. The three factor groupings are reported as follows.

- Nine (9) variables loaded onto factor 1, as shown in table 3, which indicates that these variables are identified as the topmost factors that facilitate effective knowledge spillovers. This factor loads 'frequent and intensive interaction between foreign and local contractors', 'strong technological capacity of a local firm', 'size of local firm', 'Skill of local workers', 'geographical proximity/nearness of local firms to foreign firms', 'age of local firm', 'availability of deeper and stronger financial market for local firms', 'strong innovative capacity of local firms' and 'R&D emphasis on both local and foreign firms'. Therefore, they are collectively called the 'Capacity factor'.
- A total of four (4) variables were loaded under Factor 2, as shown in table 3. This factor loads 'Attracting more FDI into the country', 'Training of local workers by foreign corporations', 'Competition policy' and 'Digital infrastructure (ICT)'. They were collectively named 'Attraction factor'.
- Five (5) variables are loaded in Factor 3, as shown in Table 3. This factor loads 'adoption of local content policy in the construction industry', 'consistent jobs for local contractors from the government', 'access to finance', 'employee's motivation (Incentives)', 'strong legal system'. Therefore, they were collectively called 'Motivation factor'.

Table 3: Reduced component for the factors that facilitates knowledge spillovers

Components	Variables	Factor loadings
Capacity factor	Frequent and intensive interaction between foreign and local contractors	0.757
	Strong technological capacity of a local firm	0.754
	Size of local firm	0.709
	Skill of local workers	0.676

	Geographical proximity/nearness of local firms to foreign firms	0.654
	Age of local firm	0.653
	Availability of deeper and stronger financial market for local firms	0.605
	Strong innovative capacity of local firms	0.593
	R&D emphasis on both local and foreign firms	0.515
Attraction factor	Attracting more FDI into the country	0.706
	Training of local workers by foreign corporations	0.702
	Competition policy	0.551
	ICT	0.550
Motivation factor	Adoption of local content policy in the construction industry	0.725
	Consistent jobs for local contractors from the government	0.621
	Access to finance	0.590
	Employee's motivation (Incentives)	0.570
	Strong legal system	0.562

4.3 Discussion of Result

ICT ranked high as one of the key factors that facilitate effective knowledge spillovers from foreign firm to local firms. This loads under the 'Attraction factor' component in the factor analysis. This is in agreement with the study of Hamad (2018) which stated that ICT has been critical in facilitating knowledge spillovers from one location to another around the world. ICT is a useful instrument for transferring or exchanging knowledge because it allows geographically dispersed people and teams to communicate successfully regardless of distance. Arreymbi et al. (2008) also mentioned that it accelerates fast information access by firms. Ha et al. (2016) supported this idea that ICT is a useful tool for faster response time and gaining access to information. With ICT, firms' information can be assessed and obtained for an organisation's usage. Nasimi et al. (2013) stated that ICT allows for the acquisition of information through the use of networks and databases. One of the transmission channels through which technology can be distributed between firms, regions, and countries is through the media and the internet (Fu et al. 2010).

In the study, access to finance was also a top key factor that facilitates knowledge spillovers. This factor was seen to load under the 'Motivation factor' component in the factor analysis. According to Ozturk and Mrkaic (2014), access to finance can be referred to as the availability of finance in the form of bank loans, trade credit, equity, debt securities, and other external sources. Having access to finance is an important determinant for enterprises' development. This agrees with Thanh et al. (2011) that financial assistance, such as loans from financial institutions, has aided small and medium enterprises in their operations. With access to finance, domestic firms will be able to easily improve their technological and management abilities to remain competitive. This goes in line with the findings of Rupeika-Apoga and Solovjova (2017), which confirmed that firms that have access to loans develop more quickly than those that do not.

Skill of local workers has also been seen as one of the factors that can be responsible for knowledge spillovers. This loads under the 'Capacity factor' component of factor analysis. The technical and managerial skills of workers will make knowledge spill over rapidly. This supports the study of Mason (2018) that building and acquiring skills is a critical component of a firm's ability to absorb and exploit ideas and technology from other sources. The study further explained that for a firm to imitate the results of innovation carried out by other firms, they need a workforce with the relevant skills and knowledge for research, development and innovation, as well as the ability to turn innovations acquired from outside sources into increased productivity. The study by Keller (1996) stated that economic

historians stress that technological catch-up necessitates better labour force skills which was also supported by UNCTAD (2006) that technology and managerial skills are one of the factors that enable small and medium enterprises (SMEs) to compete in the global market place. Also, from the study of Jude (2015) carried out on Romania workforce, it was discovered that workers' high skill level might boost domestic firms' ability to profit from knowledge spillovers.

It can also be seen that employee motivation is one of the factors that help facilitate effective knowledge spillovers. When local employees are motivated, it propels them to want to go all the way out in search of knowledge and do anything possible to make their organisation grow. This assertion was supported by Zafar et al. (2014) that increasing competition forces firms to have highly skilled, motivated and loyal employees who work for the success of the firm. Employee's motivation is compulsory for achieving efficiency and also important to help an organisation grow for excellence. The study further stated that motivation comes in two different rewards; extrinsic and intrinsic rewards. Extrinsic rewards can be in the form of salary/pay, incentives and bonuses, while intrinsic rewards are intangible like appreciation, caring attitudes from employers and job rotation.

5. CONCLUSION AND RECOMMENDATION

The study assessed the factors that facilitate effective knowledge spillovers in the Nigerian construction industry. From the study, it was discovered that Information Communication Technology (ICT), access to finance, skill of local workers and employee's motivation are the key factors that can facilitate effective knowledge spillovers. Furthermore, all the factors were clustered into three major components. If these important components are well addressed by both the government and domestic contractors, the qualities of the foreign firms will be possessed by the domestic firms and in the long run, the Nigerian government may not be needing the services of the foreign firms because by then, the Nigerian construction industry will be fully internalised. It is also recommended that domestic contractors should use ICT facilities to their own advantage in other to source for latest technologies and knowledge used in the industry. Also, the government should make funds easily accessible to local contractors so that they can be able to acquire advanced technologies for their tasks. The domestic firms should make possible effort to upgrade the skills of its workers as this will further boost the absorptive capacity of the firm. Motivation of workers should also be the top priority for domestic firms as this in turn increases the efficiency of workers. Also, the government should also enforce interaction between the foreign and domestic contractors in the form of linkages.

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