FIMEK

Journal of Agronomy, Technology and Engineering Management

Article

Foreign Direct Investment for Construction: The Scope Under Sino-African Relations

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Received: 14 January 2022; Accepted: 08 April 2022

Abstract: Over the years, China has taken a decisive lead in partnering with Africa, especially in the construction industry. This study explores the scope of Sino-Africa relations in the Nigerian construction industry. In line with a descriptive nature, data was obtained from building professionals within Nigeria by means of a survey and analysed quantitatively using multivariate analysis. The study found that China's involvement in the Nigerian construction industry executes project in four main categories viz land transportation; public facilities; water transportation; and building construction. It was established that China is an essential player in the Nigerian construction industry especially in infrastructure development. Hence there is a need to redefine the Sino-African partnership to focus on local capacity development while delivering optimum infrastructural development in African countries.

Keywords: Sino-African relations; China-African relations; African construction industry; foreign direct investment; African infrastructural development.

1. Introduction

The construction industry plays a vital role in every nation's economy. Although it may contribute less than other service industries such as manufacturing, it is still a significant aspect of the economy [1,2]. According to Giang [3], the first study that directly links the construction industry's performance to economic advancement was carried out by D. A. Turin between 1960 and 1970. This study appraised how the construction industry impacts the economy. Since then, many other studies, such as those of Wells [4] and Chiang [5], have been conducted further to establish the strong connection between construction and economic advancement.

The construction industry is entrusted with the responsibility of producing buildings and structures as well as developing the built environment. It is also critical in determining the extent to which labour inputs are converted into return on investment, thus making it a vital aspect of every economy [6]. The construction industry remains pivotal to national and economic progress in developing countries because of the numerous ongoing construction projects [7]. Omwoma [8], opined that Africa is mostly made up of developing countries (the majority of which are rapidly urbanising) in which cities and towns are home to a large percentage of the population.

Since developmental activities were usually supervised and performed by colonial masters, the dawn of independence in most African countries was accompanied by development problems. These problems are usually caused by the adverse effects of large populations and impromptu urbanisation, civilisation and industrialisation [9]. Faced with the demanding task of developing their economy and physical environment, most newly independent African countries dash into development and construction activities without assessing the adverse effects to the environment and economy [8,10].

At the start of the third millennium, Africa became a point of global attraction because of the economic opportunities afforded by its young and developing nations. Various economic forecasts place African countries in the top ten countries globally with the best economic development opportunities. Areas considered during these estimations include natural resources, agriculture, manufacturing, transportation, tourism, and land on which construction is based [11]. Banks [12] estimated the sum of US$ 90 billion as the annual cost of meeting Africa's infrastructural needs from 2014 to 2023. This estimation includes funds for fresh investments as well as the maintenance and operation of completed ones. This makes it necessary for the governments of African countries to consider other funding sources that are profitable to their nations' economies. Over the years, China has taken a decisive lead ahead of the rest of the world in collaborating with Africa to aid the advancement of the growing economy [11].

The infrastructure for resources initiative, which characterises most of China's dealings in Africa, has facilitated hard infrastructure construction within the continent. The hard infrastructure provided through Sino-African relations includes airports, electricity generation plants, railways, roads, seaports, as well as distribution pipelines to refineries [13]. The current study, therefore, explores the scope of Sino-Africa relations in the Nigerian construction industry. It identifies the various kinds of construction projects that have been executed under the Sino-African partnership particularly in the construction industry in Nigeria. It also assesses the degree at which various construction projects are executed through Chinese participation in the Nigerian construction industry.

2. Infrastructure in Africa

Infrastructure provision is an integral part of every country's social and economic development [14]. Ofori [15] contended that a typical community could not be sustained without setting up necessary infrastructures like roads, rail, electricity, efficient water supply, and sewage disposal systems. Infrastructure encompasses the physical networking properties of urban areas that enable communication and interrelations between cities, regions, and countries. It allows for the easy flow of goods while linking and uniting people, irrespective of their backgrounds and beliefs [16,17]. It is no longer news that Africa trails behind the rest of the developed world by a great margin in terms of infrastructural development and quality of construction.

Africa is faced with the problem of inadequate infrastructural facilities: this statement cannot be overemphasised. Numerous discussions have been ongoing for a long time concerning Africa's lack of sufficient basic infrastructures such as conducive residential living spaces for its citizen, stylish office complexes, tasteful shopping malls, suitable airports, good road networks and dependable electrical grids [18,19]. Alves [13] reported that Africa still ranks very low in infrastructure provision. The infrastructure in Africa is degraded and particularly demoralising in low-income nations. A notable challenge in Africa is that infrastructure provision does not keep the same pace as the population increases. This causes a massive deficit over the long term. Currently, most infrastructure still in existence are projects executed during the colonial era. A sizable portion of this infrastructure is neglected and therefore seriously degraded [13].

As established in earlier sections, one of the major problems of Africa is the inadequacy of physical infrastructure. Also, lack of maintenance, management, and reconstruction has escalated the degeneration of available physical infrastructure [11]. The provision of infrastructure has always been a global force behind economic growth, and Africa should not be an exception. Failure to adequately address this infrastructural deficit will only accelerate the deteriorating living standards for slum inhabitants. This will affect general economic growth and as well increase poverty [20]. Various factors act as a catalyst for infrastructure deterioration in Africa, namely insufficient funding, lack of technical ability and unavailable infrastructure inputs. These infrastructure deficits have a ripple effect on almost every area of national development [11]. The poor road network in Africa, for instance, can be directly linked to substandard and incomplete infrastructure and construction. Over the years, numerous African governments have prioritised modernisation and rebuilding towns into standard interlinked cities, which has greatly influenced Africa [11]. Infrastructure development

significantly influences the fact that Africa is the fastest urbanising block of countries on the planet [21].

3. Africa as an Ideal Construction Investment Destination

Deloitte [22] highlighted various factors that promote Africa as a suitable investment destination: rapid urbanisation and the need to meet housing needs; consistent growth and resultant deficiency of office space; a rising standard of living; and intracontinental integration and infrastructure projects. These factors have greatly increased the infrastructural needs of the continent and therefore necessitated a more sophisticated construction industry. Since the demand for infrastructure is excessively greater than the supply, foreign investors took advantage of this shortfall as it is a profitable investment method. As a result, Africa has rapidly blossomed into a vast construction site with numerous buildings and structures being built within a short period of time. Consequently, as of 2012, seven of the world's top-ten progressive economies were African [11,23].

The majority of construction firms in countries with emerging economies are controlled by construction firms from 'developed' or more 'developed developing' countries. These foreign firms, in most instances, only undertake major projects. It has become the norm for developing countries to accumulate a huge amount of foreign debt, which severely decreases the rate at which the economy grows, and infrastructure programmes are implemented [24]. Adams [24] also noted that numerous international organisations had taken a significant interest in the growth and progress of local construction firms in developing economies, especially those in Africa. Organisations including the World Bank, the United Nations and the International Labour Office have been abundantly generous towards this cause. Africa has become a desirable investment destination for numerous countries seeking economic cooperation. This desire emanates from the inherent deficits in Africa's infrastructure, inadequacy of capital, as well as a wide range of untapped resources [13].

With most developing African countries still struggling to bridge the massive gaps between urban and rural lifestyles, many opportunities are still available to China and other rapidly developing countries [25]. More opportunities arise, with over 75% of urban residents living in slums [20]. Sustaining urban centres requires endless development, construction, and maintenance activities due to rapid population growth and urbanisation. This continual development is necessary to ease the impact on the environment and the population [26]. Effective management of a functioning city depends largely on the availability of adequate and standard housing and infrastructure. Making these houses and facilities available can prove difficult due to funding and managerial problems in developing countries [26]. However, various developed and rapidly developing countries as well as financing groups have led the charge to develop the infrastructure in Africa.

Table 1 reveals the amount of finance that has been channelled as investments into addressing the infrastructure deficit in Africa. It can be deduced from the table that African infrastructure consumes over US$ 60 billion annually, with an all-time high in 2013 reaching up to US$ 99 billion.

Despite recent progress, Africa's infrastructure is still very inadequate, which is drastically affecting the investment and developmental potential for the region [13]. Banks [12] estimated the sum of US$ 90 billion as the annual cost of meeting Africa's infrastructural needs from 2014 to 2023. This estimation includes funds for fresh investments as well as the maintenance and operation of completed ones. This makes it necessary for the governments of African countries to consider other funding sources that are profitable to their nations' economies since most countries in Africa lack the financial capability to undertake substantial developmental projects. However, several African countries are blessed with mineral resources which are being leveraged for infrastructural development [13].

Table 1. Financing flow into African infrastructure from 2012 – 2017 ('million US$) [27–32].

Donors into African infrastructure	2012	2013	2014	2015	2016	2017
African governments	42197	46674	34500	28402	26255	34345
Private sector	7911	8764	5124	7442	2555	2324
Europe	4936	6269	4543	4622	5978	3584
The Americas	1321	7155	693	1002	140	311
China	13360	13443	3091	20868	6413	19403
Other Asian countries	3713	2451	2693	2380	3570	3075
African Development Bank	2928	3565	3551	4166	3956	3364
World Bank	4370	4533	6480	6039	3642	6993
European Investment Bank	1813	1077	1015	1414	1250	1889
Regional development groups	1551	2183	1562	4412	2135	1038
Arab Coordinated Groups	5149	3296	3460	1348	5528	2986
Others	-	-	876	1278	1078	2235
Total	89249	99410	67588	83373	62500	81547

4. China and Africa

As of 2006, China's fraction of Africa's total trade was 6%, which made China the continent's third-largest commercial partner [33]. However, at the end of 2017, China had approximately 18% of the total trade in Africa and has risen to be the largest commercial partner of Africa [32]. IMF [32] noted that the value of China's total export trade to sub-Saharan Africa reached approximately US$83 billion in 2016 and rose to around US$85 billion in 2017. Also, the Information Office of the State Council [34] submitted that Africa is the main point of origin of all China's imports, making China Africa's largest trade partner. By 2012 Africa was the fourth largest investment destination and the second largest foreign construction market for China.

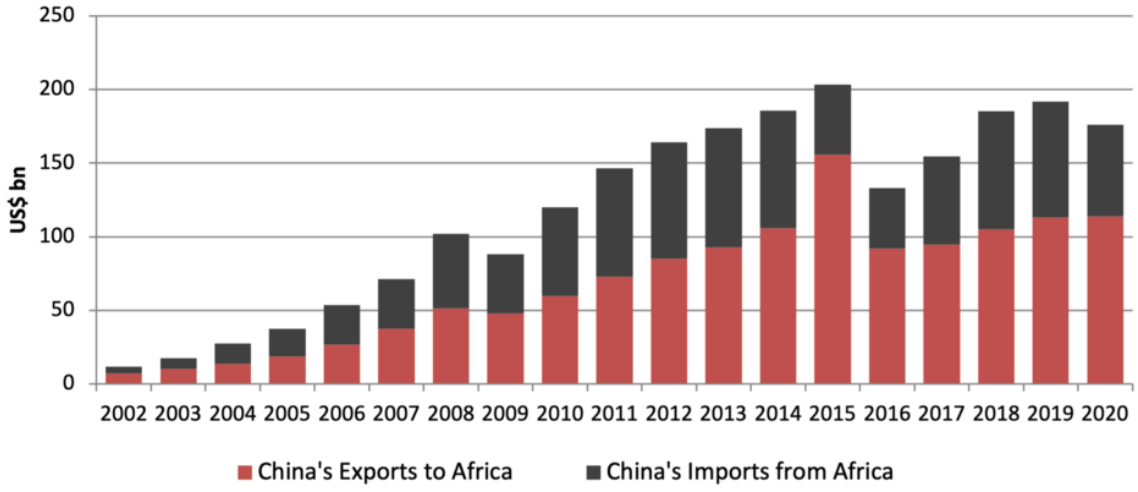

Figure 1. China-Africa bilateral trade volume from 2002 to 2018 [35].

Figure 1 revealed that, as the total volume of trade between both countries increases, there has also been continuous growth in China's international trade with Africa, both imports and exports. However, in most years, the balance of trade has been in favour of China and continues to rise [34,35].

5. China Financing Construction Projects in Africa

In 2009, four African countries were the major beneficiaries of China's investment in infrastructure construction on the continent. The four countries, namely Nigeria, Sudan, Angola, and Ethiopia, received about 70% of investments allocated to Africa [11]. The bulk of these investments were made into the power and transport sectors, mainly for road construction and maintenance [14]. In the recent past, China has funded mega infrastructural projects around Africa [11], such as the construction of the African Union Building in Ethiopia and the Tanzam railways connecting Zambia and Tanzania to ports on the Indian Ocean [33]. China has greatly contributed to the development of Africa's infrastructure by injecting numerous commercial and concessional loans through the Chinese Exim Bank. These funds are distinctly earmarked for infrastructural developments, including roads, seaports, power grids, hydropower stations, and hospitals [11].

Figure 2 reveals that China is the second-largest financier of developmental and infrastructural projects in Africa. The ICA [32] reported that China caters for 18.9% of the finance needed to construct infrastructures in Africa, coming second only to 24.5% from African governments.

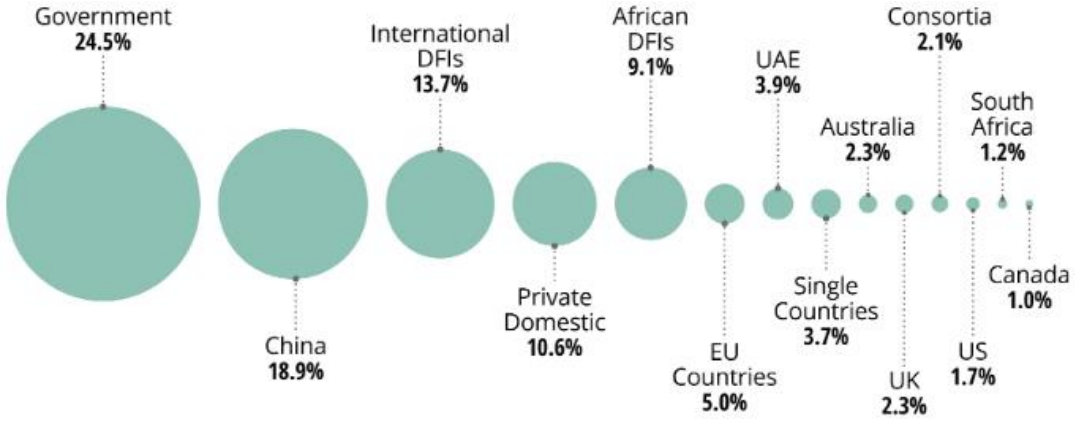

Figure 2. Investment in Africa's infrastructure [32].

According to the IOSC [36], construction projects executed in Africa by Chinese-owned firms in 2012 was valued at over $40.8 billion, compared to only $22.5 billion as of 2009. In retrospect, China's investment in the African construction industry saw a 45% increase in just three years, and in 2012, Africa was the destination of over 35% of Chinese foreign projects [11]. Similarly, in 2015, the official news agency of China Xinhua forwarded that China has successfully executed a total of 1046 projects in Africa, built approximately 2,233 km of railways and 3350 km of roads [37]. Mail and Guardian Africa [37] also revealed that there were over 3000 ongoing projects in Africa as of September 2015.

Following the April 2016 FOCAC conference convened in Johannesburg, China offered a $6 billion loan to Nigeria for infrastructure construction. A total of $46 billion was injected into the African economy for the same purpose. Land transportation in Nigeria has been transformed through projects executed by Chinese construction firms. In addition, the first modern tramway in sub-Saharan Africa, commissioned in Addis Ababa in September 2015, was also constructed by Chinese firms [22]. Also, China is executing major construction activities in the electricity sector, having signed a nuclear power deal in Kenya [11].

6. Matherials and Methods

This research aims to contribute immensely to the Sino-African relations field of study, focusing directly on its scope in the Nigerian construction industry. This study was designed to follow a descriptive nature since it seeks to establish the scope of projects executed in the Nigerian construction industry through Sino-Africa relations. The methodology adopted for this study followed a quantitative model, and the survey method was adopted as the research strategy. Since the study is quantitative, A close-ended structured questionnaire was designed to collect data with

the sole purpose of establishing the scope of construction projects executed within Nigeria through the Sino-African relations.

The current study was limited to covering only Nigeria, and primary data was sourced from core construction professionals that engage in the day-to-day activities related to construction projects. These include architects, builders/construction managers, engineers, and quantity surveyors who are living and working in Nigeria. Although 150 participants were targeted for this study, only 139 responses were extracted from the online survey used as the medium of data collection. All retrieved questionnaires were checked for completion and validity and thereby formed the basis of this research. The data collected were analysed using factor analysis in conjunction with mean item score and presented through tables and figures in the following section. The data collected was subjected to Cronbach's alpha test to check its reliability. The Cronbach's alpha test returned a value of 0.901 for the dataset measured by this study. A Cronbach value as strong as 0.901 suggests a strong internal consistency in the dataset collected. This suggests that the data is highly reliable.

7. Results

Background data about respondents collected by this study covers profession, years of work experience, academic qualification and experience with Chinese firms. Data collected on respondents' occupations shows that 16.5% are architects, 24.5% are contractors and construction managers, 28.8% are engineers, and 30.2% are quantity surveyors. Data collected on respondents' years of work experience in the construction industry shows that 30.9% of the respondents have five (5) years or less work experience in the construction industry, 38.8% have worked for six (6) to 10 years in the construction industry, 18.7% have worked in the construction industry for 11 to 15 years, while 11.5% have above 15 years of work experience in the construction industry.

Furthermore, data collected on respondents' academic qualifications shows that 8.6% of the respondents have higher national diplomas, 51.8% have bachelor's degrees, 14.4% have postgraduate diplomas, 23% have master's degrees, and 2.2% have doctoral degrees. Data collected on respondents' work experience with Chinese professionals and firms shows that 62.6% of the respondents have worked on projects that involved Chinese participation while 37.4% have not. Overall, the biographical information of the survey respondents as discussed in this section emphasises the reliability of the information, opinions, and perceptions of the participants of this research with specific respect to the aim and objectives of this research.

Since the study is quantitative in nature, the analysis also follows a quantitative method which was carried out using exploratory factor analysis and descriptive statistics. In addition, the data collected were subjected to normality tests and non-parametric tests.

7.1. Results from the Exploratory Factor Analysis

Exploratory factor analysis is an analytical method used for the reduction of data. It is often utilised in the early stages of research into a specific field of study to collect information and explore the inter-linkages among a given set of variables [38]. Before performing the Principal axis factoring, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity were conducted on the data to ascertain its suitability for factor analysis. All 16 variables measured in the study were subjected to principal axis factoring with an oblimin rotation. The KMO test returned a value of 0.842 which is above the prescribed value of 0.6, while Bartlett's test returned a significant value of 0.000 which is below 0.5 as prescribed. From these tests, it was established that EFA can be conducted on the data.

Table 2 shows the communalities for the variables. All extraction values should be above 0.300, and an inspection of the output from the communalities revealed the presence of values all above 0.3 which was suitable for EFA. Table 2 also assigned unique codes to individual variables.

Table 2. Communalities.

	Variables	Initial	Extraction
Sc.1	Residential housing	0.430	0.562
Sc.2	Commercial buildings	0.519	0.577
Sc.3	Industrial buildings	0.613	0.644
Sc.4	Sports and recreational construction	0.536	0.490
Sc.5	Road construction	0.505	0.473
Sc.6	Railway construction	0.551	0.781
Sc.7	Seaport construction	0.743	0.755
Sc.8	Airport construction	0.714	0.676
Sc.9	Hydro-electric power construction	0.706	0.660
Sc.10	Construction of power plants	0.642	0.649
Sc.11	Irrigation projects	0.602	0.614
Sc.12	Dredging of waterways	0.800	0.820
Sc.13	Construction of river basin	0.812	0.812
Sc.14	Construction of dams	0.626	0.632
Sc.15	Construction of telecommunication facilities	0.298	0.301
Sc.16	Construction of environmental facilities	0.610	0.623

Extraction Method: Principal Axis Factoring.

Table 3. Total variance explained.

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	Variance	Cumulative	Total	Variance	Cumulative	Total
1	6.687	41.791	41.791	6.348	39.676	39.676	4.871
2	2.232	13.950	55.741	1.865	11.659	51.335	2.700
3	1.309	8.183	63.923	0.913	5.707	57.043	2.654
4	1.192	7.453	71.376	0.843	5.267	62.309	4.457
5	0.826	5.160	76.536				
6	0.636	3.974	80.510				
7	0.557	3.482	83.992				
8	0.415	2.591	86.583				
9	0.411	2.569	89.153				
10	0.375	2.346	91.499				
11	0.361	2.257	93.755				
12	0.297	1.856	95.612				
13	0.234	1.464	97.076				
14	0.202	1.263	98.339				
15	0.169	1.057	99.396				
16	0.097	0.604	100.000				

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Table 3 shows the eigenvalues of the variables in the data set. The Kaiser's standard which entails retaining factors with eigenvalues that are above 1.0 was employed. Hence, four factors with eigenvalues greater than 1 were retained. The eigenvalues of the retained factors are 6.687, 2.232, 1.309, and 1.192 which explain 41.791%, 13.950%, 8.183%, and 7.453% of the variance respectively. These four clusters of factors represent 71.376% of the total variance, highlighting the importance of all 16 variables measured.

Similarly, Figure 3 shows the scree plot for the data set, highlighting the eigenvalues for all the 16 variables analysed. The scree plot shows that only four factors are above 1 on the eigenvalue axis. Also, further inspection of the scree plot reveals the last significant break on the plot was on the fourth factor, which confirms the extraction of four factors. The steeper portion of the slope displays the factors with eigenvalues above 1, while the gentle slope displays the smaller factors.

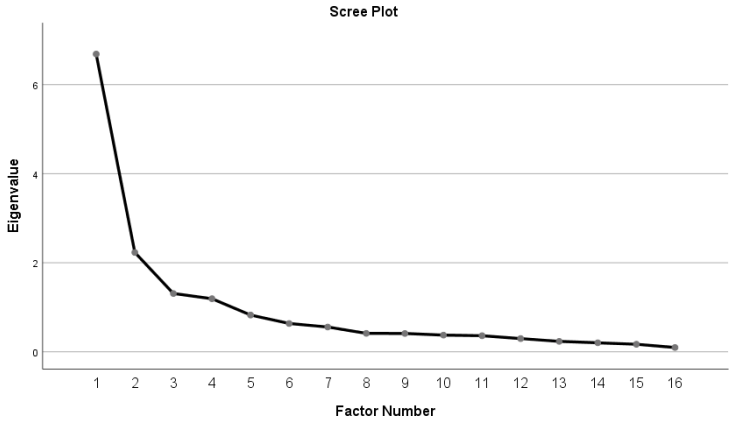

Figure 3. Scree plot for factor analysis.

Table 4. Pattern matrix.

Codes	Variables	Factor			
		1	2	3	4
Sc.16	Construction of environmental facilities	0.740			
Sc.7	Seaport construction	0.721			
Sc.9	Hydro-electric power construction	0.640			
Sc.10	Construction of power plants	0.621			
Sc.8	Airport construction	0.566			
Sc.11	Irrigation projects	0.549			
Sc.15	Construction of telecommunication facilities	0.460			
Sc.4	Sports and recreational construction	0.399			
Sc.1	Residential housing		0.746		
Sc.3	Industrial buildings		0.638		
Sc.2	Commercial buildings		0.631		
Sc.6	Railway construction			0.878	
Sc.5	Road construction			0.654	
Sc.12	Dredging of waterways				0.859
Sc.13	Construction of river basin				0.845
Sc.14	Construction of dams				0.746

Extraction Method: Principal Axis Factoring.

Rotation Method: Oblimin with Kaiser Normalisation.[a]

a. Rotation converged in 13 iterations.

Table 4 presents the pattern matrix, highlighting how the factors have been clustered together. The table shows that the EFA returned four factors and revealed all the variables' arrangement under each returned factor according to their significance.

7.2. Results from descriptive analysis

Results of the descriptive analysis present the mean item score (MIS) of the measured factors and their skewness in Table 6 according to their rank. Ascertaining the normality of data is important when carrying out a parametric or non-parametric test. The cut off for the p-value is 0.5, which means that when the test returns a p-value of 0.05 or above, the data distribution is normal. The non-parametric test carried out for this study is the Kruskal-Wallis H test. This test highlights the difference in the response of the study participants who have had previous construction industry experience with Chinese firms and those who have not had any experience with Chinese firms. The cut off for the p-value is 0.5, which means that when the test returns a p-value of 0.05 or above, there is no statistically significant difference in the responses of the two classes of study participants measured in this study.

Table 5. Descriptive analysis.

	All respondents				**CE**		**NCE**			
Code	Mean	SD	R	*p-value*	Mean	R	Mean	R	Diff	*p-value*
Sc.6	4.55	0.801	1	0.000[a]	4.56	1	4.52	1	0.04	0.653[b]
Sc.5	4.35	0.709	2	0.000[a]	4.39	2	4.27	2	0.12	0.233[b]
Sc.15	3.74	0.973	3	0.000[a]	3.79	3	3.65	3	0.14	0.266[b]
Sc.9	3.43	0.901	4	0.000[a]	3.46	5	3.38	4	0.08	0.390[b]
Sc.10	3.40	0.865	5	0.000[a]	3.47	4	3.27	5	0.20	0.097[b]
Sc.8	3.32	0.993	6	0.000[a]	3.37	6	3.23	6	0.14	0.234[b]
Sc.7	3.23	1.163	7	0.001[a]	3.36	7	3.02	7	0.34	0.088[b]
Sc.16	3.08	0.971	8	0.000[a]	3.16	8	2.94	10	0.22	0.089[b]
Sc.14	3.04	0.880	9	0.000[a]	3.07	9	2.98	9	0.09	0.550[b]
Sc.3	2.86	0.934	10	0.000[a]	2.78	11	3.00	8	-0.22	0.138[b]
Sc.11	2.83	0.947	11	0.000[a]	2.92	10	2.67	12	0.25	0.730[b]
Sc.4	2.65	1.042	12	0.001[a]	2.62	12	2.69	11	-0.07	0.693[b]
Sc.13	2.62	0.951	13	0.000[a]	2.59	13	2.67	12	-0.09	0.591[b]
Sc.12	2.55	0.964	14	0.000[a]	2.52	14	2.62	14	-0.10	0.421[b]
Sc.2	2.40	0.866	15	0.000[a]	2.37	15	2.46	15	-0.09	0.583[b]
Sc.1	1.76	0.776	16	0.000[a]	1.69	16	1.88	16	-0.19	0.054[b]

Note: SD = Standard deviation; R = Rank

CE = Respondents with experience with Chinese firms;

NCE = Respondents without experience with Chinese firms;

Diff. = Difference in mean scores from respondents with and without experience with Chinese firms;

[a] The Shapiro-Wilk test result is significant at the significance level of 0.05 (hence, non-normal distribution at p-value < .05);

[b] The Kruskal-Wallis H test result is significant at the significance level of 0.05 (hence, no statistical differences at p-value < .05).

Table 5 reveals the respondents' ranking on the scope of Sino-African relations in the Nigerian construction industry. The results show that the most executed kind of projects in Nigeria through the Sino-African partnership are construction of railway, roads and telecommunication facilities which returned mean scores of 4.55; 4.35 and 3.74, respectively. In comparison, the least executed

projects are construction of commercial and residential buildings which returned mean scores of 2.40 and 1.76.

7.3. Summary of Results

After a critical study of Table 4, a common name for each clustered factor was decided. Factor 1 is termed 'Public facilities projects'; factor 2 'Building projects'; factor 3 'Land transportation projects'; and factor 4 'Water transportation projects'.

Table 6. Grouping of variables into factors for Section B.

Codes	Factors	Eigen-value	% of variance	Factor loadings	Mean
Factor 1	**Public facilities projects**	**6.687**	**41.791**		**3.21**
Sc.16	Construction of environmental facilities			0.740	3.08
Sc.7	Seaport construction			0.721	3.23
Sc.9	Hydroelectric power construction			0.640	3.43
Sc.10	Construction of power plants			0.621	3.40
Sc.8	Airport construction			0.566	3.32
Sc.11	Irrigation projects			0.549	2.83
Sc.15	Construction of telecommunication facilities			0.460	3.74
Sc.4	Sports and recreational construction			0.399	2.65
Factor 2	**Building projects**	**2.232**	**13.950**		**2.34**
Sc.1	Residential housing			0.746	1.76
Sc.3	Industrial buildings			0.638	2.86
Sc.2	Commercial buildings			0.631	2.40
Factor 3	**Land transportation projects**	**1.309**	**8.183**		**4.45**
Sc.6	Railway construction			0.878	4.55
Sc.5	Road construction			0.654	4.35
Factor 4	**Water-related projects**	**1.192**	**7.453**		**2.74**
Sc.12	Dredging of waterways			0.859	2.55
Sc.13	Construction of river basin			0.845	2.62
Sc.14	Construction of dams			0.746	3.04

Table 6 shows how the extracted factors from the principal axis factoring were given a group name and highlighted the variables under each group.

8. Discussion

The study was addressed using 16 variables. A descriptive analysis was performed on the data received based on the 16 variables using a mean item score. Furthermore, a normality test was conducted on the data set. Since the Shapiro-Wilk test for normality returned significant p-values for all variables, it is safe to say that the distribution of data is non-normal. Therefore, the data set was subjected to a non-parametric test. Results from the Kruskal Wallis H test revealed that no variable has a statistically significant difference according to the opinions of the two groups of participants in this study. Further analysis was carried out on the data using EFA. The result of the analysis grouped the variables under factors that were subsequently identified as public facilities projects, building projects, land transportation projects, and water-related projects.

From previous literature, Arewa [11] highlighted different kinds of construction projects that have been executed in Africa by Chinese firms. These relate to building construction, including

housing units, commercial buildings, industrial buildings, and sporting facilities; transportation infrastructure in the form of roads, railways, airports, and seaports; power projects such as construction of dams, hydroelectric power, and other power plants and lastly, telecommunication and environmental facilities. In the same light, Kiala [39] noted that Chinese construction firms have executed various kinds of construction projects in Angola. These projects cover both road and railway constructions. Chinese firms have also constructed various residential housing projects in Angola, including Dundo City, which entailed constructing all kinds of housing and infrastructural facilities that make up a city. Lastly, Chen [40] noted that China's presence in the continent has helped build numerous infrastructures needed for the development of Africa.

8.1. Factor 1: Public facilities projects

As shown in Table 6, eight variables are loaded into factor 1 and given the common name 'public facilities projects'. The variables loaded into public facilities projects are construction of environmental facilities (74.0%); seaports construction (72.1%); hydro-electric power construction (64.0%); construction of power plants (62.1%); airports construction (56.6%); irrigation projects (54.9%); construction of telecommunication facilities (46.0%); and sports and recreational construction (39.9%). The public facilities projects cluster accounted for 41.79% of the total variance.

Public facilities projects returned an average mean score of 3.21, ranking second among the four factors extracted. It can be deduced that the scope of Sino-African relations significantly covers public facilities projects as the results show that they are second on the list. With a mean score above 3.0, it is clear that public facilities projects are a huge part of Chinese involvement in Africa as the results further reveal that construction of telecommunication facilities, power plants, airports, seaports, and environmental facilities are public facilities projects that are most frequently carried out within the scope of the Sino-African relations.

8.2. Factor 2: Building projects

Table 6 shows that the three variables loaded into factor 2 are given the common name 'building projects'. The variables loaded into building projects are residential housing (74.6%), industrial buildings (63.8%), and commercial buildings (63.1%). These projects are all building construction projects and they accounted for 13.95% of the total variance.

Building projects returned an average mean score of 2.34, the lowest score among all four extracted factors. The results indicate that Sino-African relations are rarely involved in building projects. These building projects include the construction of residential housing, industrial buildings, and commercial buildings and are the least executed projects within the scope of the Sino-African relations. With an average mean score of less than 2.5, Chinese involvement in building projects in Nigeria can be very uncommon.

8.3. Factor 3: Land transportation projects

Table 6 shows that the two variables loaded into factor 3 are given the common name 'land transportation projects'. The variables loaded into land transportation projects are railway construction (87.8%) and road construction (65.4%). Both projects are directly involved with land transportation construction, and they accounted for 8.18% of the total variance.

Land transportation projects returned an average mean score of 4.45, the highest mean score among all four extracted factors. These results point to the fact that land transportation projects are the main focus of Sino-African relations in Nigeria. Railway and road construction are the priority of the Nigerian construction industry and, in turn, have also become a priority for Chinese involvement in Nigeria.

8.4. Factor 4: Water-related projects

Table 6 shows that the three variables loaded into factor 4 are given the common name 'water-related projects'. The variables loaded into water-related projects are the dredging of waterways (85.9%), construction of river basins (84.5%), and construction of dams (74.6%). All projects classified under this factor are construction projects executed on water, and the cluster accounted for 7.45% of the total variance.

Water-related projects returned an average mean score of 2.74, ranking third among the four factors extracted by the factor analysis. The results show that water-related projects are a part of the scope of Nigeria's relations with China. With an average mean score that is slightly below 3.0, it could be deduced that although the scope of Chinese projects in Africa covers water-related projects, they are not executed as frequently compared to land transportation projects or public facilities projects. Dredging of waterways and the construction of dams and river basins are water-related projects that have been executed within the scope of the Sino-African relations in Nigeria.

9. Conclusion

This study aims to determine the scope of Sino-Africa relations in the Nigerian construction industry. The empirical and theoretical findings of this study revealed that the scope of the Sino-African relations has covered all kinds of buildings, transportation, as well as electrical, telecommunication and environmental facilities. From this study, it could be deduced that Chinese involvement in Africa through the Sino-African relations has mainly focused on developing the land transportation facilities in Africa. In most parts of Africa, road and rail facilities are inadequate. Since the demand for land transportation systems is high and ever-growing in Africa, it has become a priority within the framework of the Sino-African partnership.

China has also been significantly involved with developing public facilities projects around Africa. Facilities such as telecommunication facilities, power plants, airports, seaports, and environmental facilities are public facilities projects that are most frequently carried out within the scope of the Sino-African relations. Lastly, building and water-related constructions are also areas of development that Sino-African relations have aided. The partnership between China and Africa has widely covered major areas of the construction industry. As such, it can be established that China is an integral part of the Nigerian construction industry, especially in infrastructure development. However, the study recommends and encourages more Chinese participation in the building construction and water transportation development to facilitate the all-round growth of infrastructure within the country.

Over one-quarter of the Chinese population has been emancipated from poverty. But over the same period, the economies of numerous African countries have regressed. China's challenges and strategies during the difficult era could also be a learning model for Africa. China has played a significant role in the development of Africa over the years. However, the drive and motive behind this partnership have caused much deliberation. Most recently, a great deal of criticism has been associated with China's assistance to Africa: experts claim it will result in accumulated debts that might be unmaintainable. In all, China has maintained that the partnership is of mutual benefit to both China and Africa as infrastructural development and human capacity building in Africa is a fair trade for energy sources. Redefining the Sino-African partnership to focus on attaining optimum infrastructural development through the growth of the local construction industry should be the priority for Nigeria and the African continent at large.

Conflicts of Interest: The authors declare no conflict of interest.

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