

## **TECHNICAL CAPABILITY OF ARTISANS IN BUILDING CONSTRUCTION INDUSTRY: EMPIRICAL EVIDENCE FROM LAGOS STATE, NIGERIA**

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### **ABSTRACT**

*The study assessed the technical capability of artisans in the building construction industry in Lagos State with a view to unraveling their technical know-how for sustainable quality building construction in the study area. Multi-stage sampling technique was used to select 210 artisans in three local government areas. A total of 179 copies of completed questionnaire were retrieved representing a 85.2% return rate. Data obtained were described with the use of frequency counts, percentage and mean, while Multinomial Logistic Regression was used to show the determinants of artisans' technical capability. It was found that about 96.4% of the artisans are male and majority of them were trained through apprenticeship. The artisans' technical capability was adjudged to be high in the area of operational and innovation capabilities but was low in investment and linkages. The results of the multinomial logistic regression showed that effective use of building materials was associated with high technical capability while aesthetic appearance of constructed buildings and ability of the artisans to determine the optimum lot size of building materials used were the significant determinants associated with both low and high technical capability of artisans.*

**Keywords:** Artisans, Technical Capability and Building Construction

### **1. Introduction**

Housing is one of the basic human needs in addition to food and shelter. It embraces all social services and utilities such as good road network, electricity, potable water supply, health services, recreational facilities, and educational services, among others, that make the neighborhood a livable environment. Housing has a profound influence on the welfare of mankind and it is used as a measure of physical, economic and historic civilization all over the world (Weesep, 2000). The United Nations (2000) describes housing as the physical environment in which the family as the society's basic unit develops. According to the United Nations Center for Human Settlements (1997), access to housing is a basic human right that should be made available to all individuals across the world. The provision of decent housing is a function of the building construction sector of a country.

The building construction industry plays an important role in the economy of any nation as activities of the sector are vital to the achievement of socio-economic growth and development of the nation (Oladinrin, Ogunsanmi and Aje, 2012). The sector is one of the five sectors used in measuring the National Gross Capital Formation (NGCF) and the Gross Domestic Product (GDP) of any country and its effect on every other sector makes it a significant front for sustainable development (Mosaku, Kehinde and Kuroshi, 2006). Successful delivery of any building project has many important components and one of the major contributors is the artisan.

Artisans occupy a sensitive position in the building construction industry (Olanipekun and Nunayon, 2017). They constitute a significant unit of human resources needed on any given building construction project delivery (Kazaz and Ulubeyi, 2017). This is because unlike in the developed economies, such as the United Kingdom, the United States of America and Germany, where operations on construction sites are highly mechanized, construction activities and operations in Nigeria are low-tech and highly labour intensive (Bilua, Ajagbe, Kigbu and Solanke, 2015). Thus, artisans are needed at various stages of the building construction process (Ajagbe and Ismail, 2014).

Historically, since the erection of the first house on earth, artisans have been the life-wire of building construction work and for the provision of infrastructure for human habitation and transportation (Chukwuji, 2012). Hickson and Ellis (2014) note that this set of stakeholders in the building construction industry is very important in building project delivery because they significantly determine the outcome of construction work. It has been pointed out that artisans play a very crucial role in the survival and growth of the building construction industry as they are mostly engaged in the practical realization of building construction projects (Medugu, Majid, Bustani, Bala, Abdullahi and Mbamali 2011; Rafeel, 2012 and Bilau, Agbaje, Kigbu and Solanke, 2015). However, their technical capability in a country like Nigeria is not well understood. This gap in the literature is important considering the low technological advancement in most developing countries unlike in advanced countries where there are improved technical know-how in building construction processes. For instance, Oluwale, Ilori and Oyebisi (2013) describe technical capability as the ability to make effective use of skills, knowledge and technical know-how in efforts to assimilate, use, adopt, and improve existing practices in the industry. These are among the areas where artisans can build their skills in order to contribute to a sustainable housing sector in Nigeria.

Many studies such as Hong and Ann (2015) and Dalgodo (2018) were conducted in Portugal on the use of technology to prevent chemical attacks on buildings in order to prevent building collapse. Similarly, Gil, *et al.* (2012) examined factors that influenced the crystallization of soluble salts in the stone material used in the construction of buildings. Valencia *et al.* (2014) present a new technology and experimental study on how snow-melting heated pavement system in tunnel portal could prolong the longevity of buildings in low-temperate regions of the world. This technology, according to the researchers, was essentially peculiar to low-temperate countries where it snows. Therefore, having the capacity to negatively affect the structural stability of buildings. Also, in Nigeria, few studies conducted to address the problem of incessant building collapse such as Ayedun, Durodola and Akinjare (2012), Adegboroye (2006), Oloyede, Omoogun and Akinjare (2010) and John, Faremi and Lawal (2016) among others were essentially focused on the causes of building collapse in Lagos State. However, none of these studies focused on development of sustainable building construction industry through the lens of artisans' technical capability. To this extent, artisans' technical capability in this sector may have been grossly understudied. The unknown technical competence of artisans who are critical stakeholders in building construction delivery is worthy of investigation. Therefore, this study was conducted to analyse technical capability of artisans in the building construction industry in Lagos State, Nigeria.

## **2. Literature Review**

According to Braverman (1994), an artisan is an individual who has the ability to skillfully manipulate the tools and materials of a craft or trade. An artisan is expected to have some skills such as individual thinking capability as well as good knowledge of his craft and trade. Some of

these skills are reducible to words, but most are acquired through the physical act of production and normally manifested in the creation or production of objects (Rameezdeen *et al.*, 2000). Technical capability of artisans is usually acquired in a mixture of formal knowledge, tacit knowledge, physical and mental skills, contextual awareness, innovation and personal creative autonomy (United Nations, 2015). While assessing the importance of artisans to the Sri-Lanka's building construction industry, Rameezdeen *et al.* (2002) argue that the features of artisans in the industry include clear division of labour, high creativity and increased environmental concerns.

Technical capability has been defined in different ways by several scholars. According to Lall (1992), it means the skills and knowledge needed to effectively absorb, master and improve existing knowledge and to create new ones. Existing literature has provided several leads about various factors that can be expected to contribute to the build-up of technical capability. These factors according to Hoffman *et al.* (1998) and Wignaraja (1998) include the knowledge and skills possessed by an entrepreneur and his workforce which they obtain through prior experience, new skills acquired in the course of interaction among themselves and those obtained through introduction of new technologies.

The building construction industry, like other economic sectors, has been experiencing severe and prolonged shortage of manpower not just in terms of quantity of labour force, but also quality (COOA, 2005; Connor, 2006; and McCausland, 2006). This, according to them, is already putting the world's growing economy at risk. Magar (2007) who examined the impact of the building construction industry on the Indian economy opines that the sector was prepared to spend so much money to raise production capabilities. However, the shortage of skilled workforce would necessitate skillful project management and innovative solutions to prevent bottlenecks. The study observed the irony of how the nation of about one billion people could be challenged by shortage of trained/skilled manpower in its building construction industry. According to the study, the country's building construction industry, having been rated as the largest employer of labour and realizing the need for skilled vocational workers, had begun collaboration with academic institutions to either train their workers for plumbing and masonry type work, or to set up in-house training programmes.

Sooi (2007) reports that the construction industry in Malaysia is grappling with unfilled positions, and recommends the recruitment of critical personnel from abroad. The Chartered Institute of Building (CIOB, 2008) in its report on skilled manpower shortage in the building construction sector in the United Kingdom (UK) posits that the problem that was experienced in the industry would continue to be a major challenge in the country. The report predicts that this issue is likely going to get worse as the demand for building construction work increases. The UK building construction industry, according to the report, is suffering from a significant shortage of skilled manpower. The Academy of Social Sciences in Australia (ASSA, 2008) asserts that Australia's growing labour requirements cannot be met by the native workforce despite the high current levels of immigration. The logical conclusion from the evidence in the report is that Australia's future labour requirements, especially in the construction industry, would depend more on immigration.

Nigeria requires the services of skilled workforce in various building construction sites given the nation's growing population and the attendant housing needs (Awe, Stephen and Griffith, 2015). At present, the demand for artisans such as bricklayers, carpenters, plumbers, painters, among others, is far above supply (Akindoyeni, 2005; National Heritage Training Group (NHTG), 2005; Obiegbu, 2005). The present locally organised apprenticeship scheme which was a major

provider of craftsmen is fizzling out; the aged and experienced tradesmen would rather have their descendants become well-educated professionals than take to their trades (Dennis, 2007; McCausland, 2008; Ireland, 2007; Oluwale, Ilori and Oyebisi, 2013). Similarly, Oluwale, Jegede and Olamide (2013) observed in a study that majority (85.0%) of the sampled population of trained artisans in both building construction and automobile industries had abandoned their original occupations and drifted into commercial motorcycle transportation business which appeared more rewarding in the short term.

Ahadzie (2011) examined the performance of building contractors in the Kumasi Metropolitan Authority's projects in Ghana and discovered that the constructed buildings did not meet the expected standard because the artisans engaged in the projects performed unsatisfactorily due to their low technical competence as well as the use of inferior building materials. Also, Tengan *et al.* (2014) carried out a study on the factors responsible for low-quality housing delivery by small scale contractors in Ghana and identified some unwholesome practices such as inducements, lack of co-ordination between building plan designers and artisans, poor monitoring and feedback as being responsible for poor housing delivery. Also, Offei-Nyako *et al.* (2014) investigated the availability of artisanal skills such as carpentry, masonry, painting, plumbing, steel crafting and tile installation in the building construction industry in Kumasi, Ghana. They used a combination of questionnaire survey and interviews to gather data. Using Soofi's relative importance technique to analyse their data they found that shortage of skilled labour was one of the most consistent problems that adversely influenced poor performance in that sector of the economy. They concluded that lack of interest by the youth to take up trades such as masonry and carpentry must have been responsible for low technological advancement in the industry in Ghana.

It is clear from the above review that most of the existing research is on technological usage as relates to building construction processes in advanced countries. Very few studies focus on developing countries such as Nigeria and Ghana. In Nigeria, so far, research efforts have been concentrated on causes of building collapse and these studies have paid less attention to artisans' technical competence. This study aims to fill this gap in the literature.

### **3. Methodology**

#### **3.1. Description of the study area**

The study was conducted in Lagos State, Nigeria. Lagos State is the commercial nerve-center of Nigeria with over 21 million residents as at 2016 (National Population Commission of Nigeria, 2016).

#### **3.2. Sampling procedure and size**

A multistage sampling procedure was used to select artisans for the study. The first stage involved stratification of Lagos State into low, medium and high residential density zones. At the second stage, one Local Government Area was selected from each of the residential density zones, through balloting without replacement. This is in line with the work of Mosi (2001) that carried out a similar study in Philippines Island. The third stage, involved systematic sampling of every 10<sup>th</sup> artisan in the compendium of artisans compiled by the Lagos State Ministry of Employment and Wealth Creation. This technique was continually used until the required number of respondents was obtained. A structured questionnaire was administered on 210 artisans, of which 179 completed and analyzable copies were returned. This forms about 85.2% response rate. The questionnaire was supplemented with semi-structured interviews.

### **3.3. Validity and reliability of research instrument**

Instruments used for data collection were validated by experts in statistics and lecturers at the African Institute for Science Policy and Innovation, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria, while a pretest questionnaire was used to assess the reliability of the instrument. A Cronbach's Alpha coefficient of 0.72 was obtained. This showed that the instruments were consistent.

### **3.4. Measurement and data analysis**

Technical capabilities of artisans were measured with four variables (investment, operational, innovation and linkages) each made up of multiple questionnaire items. Each item was measured on a 3-point rating scale. For each variable, an average of all items score was obtained and those who scored above 2.0, the midpoint of the measurement scale, were rated as being above average on each variable.

To obtain an assessment of technical capability, the Equal Interval Approach (EIA) was applied to the technical capability scores (Ajayi, 2008). In total, 19 items were used to measure the technical capability with a 3-point rating scale. Therefore, the maximum obtainable score is  $3 \times 19 = 57$  points while the minimum is  $1 \times 19 = 19$ . The range was calculated as  $57 - 19 = 38$  and this value obtained was divided into 3 since three categories (high, moderate and low) were targeted. The range of values for low, moderate and high levels of technical capability was then taken from 19 at intervals of 12.7. Thus, artisans who scored between 19 and 31.7 were rated as having low technical capability, those who scored between 31.7 and 44.4 were rated moderate in their technical capability while those who scored between 44.4 and 57 were regarded as having high level of technical capability. These categories were used in a multinomial logistic regression with the moderate level as the baseline equation.

## **4. Results and Discussion**

Table 1 presents the distribution of artisans based on their demographic characteristics. Around half of the artisans were within the age bracket of 41 and 60 years. The implication of this finding is that artisans in the building construction industry in the study area are in their productive age. This means that they still have the strength and the age required to effectively carry out operations in building construction activities for efficient housing delivery to the project sponsors.

The economically active age of 60 years and below has been documented in many scholarly articles across several academic disciplines. For example, the study of Adeyemo and Olatunji (2004) observed that at the age of 60 years and above, the strength to engage in productive ventures may have been drastically reduced and entrepreneurial spirit may not be strong enough to carry out strenuous activities that are associated with the tasks of artisans in most African countries. Similarly, Alinaitwe, Mwakali, and Hansson (2007) noted that age is a major factor that determines artisans' productivity at building sites in Uganda, while Chan (2002) also opined that artisans' productivity tends to decrease with increase in age. In the same vein, Oluwale, Ilori and Oyebisi (2013) found that no mechanic was above 60 years of age in their study conducted in Southwestern Nigeria. The fact that building construction activities could be strenuous explains its relationship with age.

Majority (96,4%) of the respondents are male. This finding is consistent with the work of Jimoh, Oyewobi, Adamu and Badeje (2016) which observed that the building construction industry is male-dominated worldwide. This is due to many challenges faced by women in the industry.

**Table 1: Distribution of Artisans Based on the Demographic Characteristics**

<b>Variable</b>	<b>Frequency</b>	<b>Percentage (%)</b>
<b>Age (years)</b>		
20-24	9	5
25-30	12	6.7
31-35	33	18.4
36-40	23	12.8
41-50	47	26.3
51-60	41	22.9
Above 60	14	7.8
<b>Gender</b>		
Male	168	94.0
Female	11	6.0
<b>Form of training</b>		
Apprenticeship	111	62
Technical institutes	31	17.3
Vocational centres	23	12.8
Polytechnics	14	7.8
<b>Highest academic qualification obtained</b>		
Primary school leaving certificate	69	38.5
Junior secondary school certificate	17	9.5
WAEC/GCE	58	32.4
ND/NCE/HSC	12	10.6
HND/B.Sc/B .Tech/B.Eng	19	6.7
Others specify	4	2.2
<b>How many years did it take you to be trained?</b>		
1-2 years	22	12.3
3-4 years	122	68.2
5-6 years	23	12.8
above 6 years	12	6.7

This ranges from lack of self-confidence to compete with their male counterparts to insecurity in the midst of men to execute their assigned tasks. The domestic and reproductive roles of women, especially in Africa, may also prevent them from engaging in physically demanding activities such as building construction. In addition, gender perception towards construction activities could be a factor that inhibits women from participating in building construction as reported by Agapiou (2002). In a study of the perceptions of gender roles and attitudes toward work among

male and female operatives in the Scottish construction industry, it was found that women viewed construction work as strenuous and exclusively for men. Similarly, Bagilhole, Dainty and Neale (2000) submitted that women only play service roles in building construction activities and that their proportion relative to that of men is usually insignificant.

On the form of training acquired by the artisans, majority (62.0%) of the respondents were trained through apprenticeship scheme while 17.3%, 12.8% and 7.8% were trained at technical institutes, vocational centres and polytechnics, respectively. On-the-job training, also known as apprenticeship scheme, has been widely accepted as the best form of skill acquisition in the building construction industry, both in developed and developing countries. Ogbeifun (2011) stressed that this form of artisans' training scheme is usually introduced and implemented through the adoption of progressive implementation of construction processes, by commencing work from areas requiring low skill to areas of high skill demand. The study posits that this principle hinges on the collaborative efforts of the key project stakeholders and facilitates on-site training and that the consultants actively guide the contractor on the construction processes to achieve the training objectives. The study added that this principle is widely used in construction sites in the United Kingdom and in the development of infrastructure in the tourism industry in South Africa.

On the level of educational attainment of the respondents, 38.5% held primary school leaving certificates, 32.4% were Secondary School Certificate holders, 10.6% held National Diploma/National Certificate of Education/Higher School Certificates, while a lower proportion (6.7%) had acquired Higher National Diploma/bachelor's degrees. The finding implies that a significant proportion of the artisans had secondary school education, at most. This educational attainment of the artisans may be useful in skills acquisition for complex building construction projects as education has been identified as a correlate of skill acquisition (Lingard and Lin, 2004; Howells, James and Malik, 2004). The findings also conform to the study of Unduyaundeye and Otu (2015) who worked on the entrepreneurship skills acquisition and the benefits among undergraduate students in Nigeria. It was reported that academic performance had a strong relationship with the entrepreneurial spirit among students in tertiary institutions in Nigeria. This may be applicable to artisans as those with higher educational qualifications are likely to perform better than those with lower qualifications in the construction of building projects. Hence, technical capability of artisans may therefore be enhanced by their level of educational attainment.

As regards the length of training of the artisans, the study reveals that 68.2% of the artisans spent between 3-4 years in apprenticeship, while 12.8%, 12.3% and 6.7% spent 5-6 years, 1-2 years and above 6 years respectively. The findings show that craftsmanship training in building construction could be achieved within three years. This means that with between 3 and 4 years of training, an artisan in the building construction sector should possess technical expertise in some aspects of building construction. This finding agrees with earlier studies such as Oluwale, Ilori and Oyebisi, 2013 and Uchendu, Osim and Odigwe (2015). The former found that the modal age range for apprenticeship in the auto-mechanic industry in Southwestern Nigeria was between 3 and 4 years. The latter argued that polytechnics across Nigeria should adopt the system of training of craftsmanship in a fashion similar to apprenticeship scheme by providing 2-3 years of practical skills exposure and knowledge acquisition programmes in workshops/laboratories for trainees to achieve sustainable job creation for economic growth and development, especially in a developing country like Nigeria.

**Source: Computed from field survey (2018)**

#### **4.1. Technical capability of artisans**

The technical capability of artisans was measured in terms of investment, operational, innovation and linkage capabilities. Table 2 presents investment capability of artisans in the study area. Technical capability of artisans was captured with a 3-point rating scale with a grand mean score of 2.0 as benchmark using 4 indicators of investment capability. Results show that about 108 (60.3%) of the artisans indicated that they had the ability to recognize and purchase modern tools, while about 42 (23.5%) did not have that ability. About 112 (62.6%) of the artisans indicated that they could give accurate estimate of building materials needed, while only 17 (9.5%) could not give accurate estimates. On the determination of estimated cost of building projects, analysis revealed that most of the artisans 115 (64.3%) indicated that they could just give estimated cost of building projects. Also, about 72 (40.2%) of the artisans could not raise funds for training and workshops while 66 (36.9%) indicated that they could raise funds for training and workshops. The grand mean score of 1.95 is an indication that investment capability among the artisans surveyed in this study was low.

For the operational capability, results reveal that about 116 (64.8%) of the artisans had ability to work and learn from colleagues with improved and up-to-date skills, while very few (6.7%) did not have such skills. Also, about 91 (50.0%) of the artisans had ability to effectively use building materials, while about 135 (75.5%) of the artisans could translate building plans to built-up structures. Furthermore, about 69 (38.5%) of the respondents could complete building projects on time, in line with the expectation of the building project sponsors, while about 111 (62.0%) and 68 (38.0%) revealed that they were able and just able, respectively to determine the optimum lot size of building materials required for building projects. The grand mean of 2.39 indicated that artisans in the study area had high operational technical capability.

Under innovation capability, the analysis shows that 95 (53.0%) of the artisans had ability to repair broken down tools and equipment while 15 (8.5%) indicated that they did not know how to carry out such repairs on broken down tools and equipment. It was also revealed that about 93 (52.0%) of the artisans had the ability to detect and fix constructional defects, while 51 (28.5%) had no such ability.

The high technical capability of the artisans in the areas of operational and innovation capabilities in the study may be supported by the earlier findings of Bokinni (2005) who reported that artisans in the building construction industry possessed some skills that made them perform efficiently in their profession. This makes them to be technically competent, hence, their high level of technical capability that was established in this study, especially in areas of operational and innovation capabilities. Similarly, Singh and Bhanushali (2012) who conducted a study in Ahmedabad City in India reported that artisans in the study area had high operational capability in construction sector of the economy. This high operational capability was attributed to their regular involvement in building construction activities as well as exposure to new techniques and therefore knowledgeable about challenges faced in complex building construction activities. As such, Afolabi, Ojelabi and Oyeyipo (2017) recommend that the National Vocational Qualification Framework (NVQF) policies currently being used for training and retraining indigenous artisans in the Nigerian building construction industry be extended to tertiary institutions to assess and license students in the building construction-related fields in order to enhance their self-employment potentials, increase their business opportunities and ensure their employability.

**Table 2: Technical capabilities of artisans**

Capability	Unable	Just Able	Able	Mean	Chi-square
<b>Investment Capability</b>					
Ability to recognize and purchase modern tools	42(23.5)	29 (16.2)	108 (60.3)	2.41	
Ability to estimate building materials needed	17 (9.5)	50 (27.9)	112 (62.6)	2.48*	
Ability to determine cost of building projects	28 (15.6)	115 (64.3)	36 (20.1)	1.43	12.84*
Ability to raise funds for training and workshops	72 (40.2)	138 (77.1)	66 (36.9)	1.49	
<b>Grand mean</b>				<b>1.95</b>	
<b>Operational capability</b>					
Ability to work and learn from colleagues with improved and up till date skills	12 (6.7)	51 (28.5)	116 (64.8)	2.52*	
Ability to use building materials effectively	11 (6.1)	77 (43.1)	91 (50.8)	2.42*	
Ability to translate building plans to built-up structures	19 (10.6)	25 (13.9)	135 (75.5)	2.53*	51.71**
Ability to execute aesthetics building	21 (11.7)	27 (15.1)	131 (73.2)	2.50*	
Ability to timely complete building projects	15 (8.4)	95 (53.1)	69 (38.5)	1.64	
Ability to determine optimum lot size of building materials required		68 (38.0)	111 (62.0)	2.71	
<b>Grand mean</b>				<b>2.39</b>	
<b>Innovation capability</b>					
	<b>Never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Mean</b>	
Ability to repair broken down tools and equipment	15(8.5)	69 (38.5)	95 (53.0)	2.94*	
Ability to detect and fix constructional defects	51(28.5)	35 (19.5)	93 (52.0)	2.87*	
Ability to seek for and make use of improved construction techniques from the internet	12 (6.7)	72 (40.2)	95 (53.1)	2.62*	2.19
Ability to imitate improved construction process as demonstrated on video platforms	35(19.6)	56 (31.3)	88 (49.1)	2.09	
Ability to carry out modifications on existing buildings, where necessary		49 (27.4)	130 (72.6)	2.65*	
<b>Grand mean</b>				<b>2.63</b>	
<b>Linkage Capability</b>					
	<b>No linkage</b>	<b>Weak linkage</b>	<b>Strong linkage</b>	<b>Mean</b>	
Linkages with registered/well-established building construction companies	92 (51.4)	45 (25.1)	42 (23.5)	1.19	
Linkages with research institutes	33 (18.4)	81 (45.3)	65 (36.3)	1.74	
Linkages with fellow artisans that had worked with well-established construction firms	52 (29.1)	97 (54.2)	30 (16.7)	1.51	44.71**
Linkages with immigrant artisans	64 (35.8)	43 (24.1)	72 (40.1)	2.17	
<b>Grand mean</b>				<b>1.65</b>	

Source: Computed from field survey (2018)

\*Grand Mean  $\geq$  2.0 = High technical capability

#### **4.2. Determinants of technical capabilities of artisans**

Table 3 presents the results of multinomial logistic regression showing the determinants of technical capability of the artisans. The dependent variable in this study was technical capability which in this case was categorized into three low, high and very high. In the output, 'moderate' category was used as the baseline. The results show that effective use of building materials ( $\beta = 3.17$ ); aesthetic appearance of constructed buildings ( $\beta = 5.11$ ) and ability of the artisans to determine the optimum lot size of building materials used ( $\beta = 4.26$ ) were the attributes that significantly influenced high technical capability of the artisans with reference to the very high category that was used as the baseline. Similarly, determining the optimum lot size ( $\beta = -2.58$ ) and aesthetic appearance ( $\beta = 1.39$ ) were the response variables that determined low technical capability of artisans in building construction industry. The odd ratio of 3.18 and 2.35, respectively indicates that a unit change in the optimum lot size and aesthetic appearance were responsible for about 18% and 35% variations that may be recorded in technical capabilities of artisans.

These findings suggest that the ability of artisans to skillfully master the use of basic building construction tools has positively influenced high level of technical capability of the artisans in the study area. This may have contributed to the artisans having very high technical competence in building construction activities, due to the fact that very high category was obtained as the baseline equation. It could be deduced from the findings that technical capability of an artisan is influenced by his ability to skillfully make use of his basic tools. Based on these findings, an individual who is noted to have had the capability to skillfully make use of his tools is likely to have higher level of technical capability than his counterpart who is noted not to have such tacit knowledge required in handling his working tools. This implies that artisans found in the study area were dominated by highly skillful individuals who have high level of operational capability. In addition, being able to deliver aesthetic/appealing building projects was found to significantly determine their level of operational technical capability. This implies that artisans with ability to construct buildings that are attractive to the general public in view of their high quality of decorative attributes may be adjudged to be technically competent. In the same vein, effective use of building materials was also significant in determining the level of technical capability of the artisans.

The implication of this is that artisans with the ability to effectively make use of building materials are bound to deliver building projects at the most reasonable cost possible. Therefore, this is an indication of high level of operational technical capability. Lastly, ability to determine the optimum lot size of building materials required at any point in time was found to be significantly related to high level of operational technical capability. This means that artisans who are knowledgeable to determine the lot size of building materials required are likely to determine the average cost of building projects. Such artisans must have been involved in regular engagements in building construction activities and are bound to be exposed to contemporary developments in their various areas of specialization. The -2 Log likelihood value of 167.530 and Nagelkerke value of 0.776 imply that the variables chosen for the models were appropriate as they were found to have generated value that was large enough which was in line with the opinion of Kolibáčová (2014) who states that the causal relationship between employee's competency and employee's performance is a linear relationship.

Also, the findings are consistent with the work of Kashiwagi and Massner (2000) who posit that artisans' skill acquisitions in building construction industry is influenced by their regular

engagement in building construction activities. Similarly, Saha (2003) reports that engagement in other occupations and regular training programmes are major factors influencing operational technical capability among artisans in building construction projects. This high level of competence, according to him, implies regular involvement in training programmes, as this is bound to increase skills and knowledge stocks of individuals. In the same vein, Fagbenle and Oluwunmi (2010) as well as Adebayo (2000) also emphasised the importance of operational technical capability in the building construction industry. Though these scholars reported low level of technical competence among artisans in the Nigerian building construction industry they however, noted that the incessant building collapse in Nigeria may be as a result of direct impact of low level of technical competence of the major stakeholders in the industry. Therefore, the above identified determinants of technical capability are very crucial in ensuring that artisans' competence is enhanced.

**Table 3: Results of Multinomial Logistic Regression Showing the Determinants of Technical Capability of the Artisans**

Variable	Low					High				
	B	Std. Dev	Wald	Sig	Exp (B)	B	Std. Dev	Wald	Sig.	Exp (B)
Effective use of materials	3.88**	1.98	1.96	0.01	1.9	3.17**	1.15	2.76	0.01	2.91
Translation of plans to structures	2.26	1.72	1.32	0.17	0.85	1.40	1.9	0.74	0.31	0.4
Aesthetic appearance	1.39*	0.88	1.57	0.05	2.35	5.11**	1.58	3.23	0.01	2.24
Timely completion	-2.33	2.27	1.03	0.17	0.72	1.32	1.01	1.31	0.71	0.47
Determine the optimum lot size	-2.58**	0.69	2.58	0.01	3.18	4.26**	1.85	2.30	0.01	1.69
Technical capability	3.61**	1.54	5.48	0.01	10.38	2.89*	0.91	10.04	0.01	17.11

**Source: Computed from field survey (2018)**

-2 Log Likelihood = 167.530; Nagelkerke = 0.776

\*Significant at 5%

\*\*Significant at 1%

### 5. Conclusion

Good housing is part of the basic necessities of life and this is one of the criteria used to measure poverty all over the world. One of the key determinants of good housing is the technical capability of the artisans that are engaged at the various stages of building construction projects. The findings showed that artisans in the building construction industry in Lagos State were still in their economically active age and that the profession is male-dominated. Most of them acquired training via apprenticeship which spanned between 3 and 4 years on the average. Most of the artisans had primary and secondary school education. Artisans' technical capability was adjudged to be high in the areas of operational and innovation capabilities but had low

investment and linkage capabilities. Effective use of building materials, ability to deliver aesthetics in building constructed and ability to determine the optimum lot size of building materials were the determinants associated with high technical capability of artisans. It is therefore recommended that higher institutions offering building construction-based courses should affiliate with similar schools abroad for the purpose of cross-fertilization of ideas thereby enhancing technological transfer among artisans. This will have a significant impact on the artisans working in the building construction industry in Lagos State. By doing this, the technical institutions will have access to new developments, embark on exchange programmes and other numerous benefits that may be available at those institutions.

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