Journal of Education and Practice
ISSN 2222-1735 (Paper) ISSN 2222-288X (Online)
Vol.13, No.11, 2022

The Impact of the Technicians' Skills Gap on the Nigerian Construction Industry: An Investigative Study

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The research is financed by Petroleum Technology Development Fund (PTDF) in Nigeria

Abstract
The role and importance of the construction industry in the economic growth of Nigeria as an independent nation cannot be overemphasised. However, the industry has experienced some setbacks over the years within the sector in terms of its skilled workforce shortages and gaps. This study investigated the effect of the technicians' skills gaps and their impact on the building construction industry development within the Nigerian context. The technicians' skills have been considered critical in terms of the building industry performance particularly in improving the workforce efficiency and the industry's productivity. However, there have been several exiting gaps within the current technician skills. These gaps within skills contributed to the industry poor performances in its competences and productivity, which in turn affected the nation's economy. The paper critically assessed the current technicians' skills gaps and most appropriate training requirements for better output of the industry. Hence, issues that negate the technicians' skills upgrades in the industry were identified. A mixed research methodology of enquiry was employed, comprising of quantitative and qualitative methods. These enquiries consist of empirical literature that led to the design of a constructed questionnaire survey and interviews with selected participants. The findings indicated that there were great demands for skilled workforce within the Nigerian construction industry, most specifically in the building sector of the industry. Furthermore, behavioural issues exist between the employers and employees that negate proper construction practices within the context of the building industry. This study recommends the need for an effective technicians' skills training and development framework for the industry in achieving effective output for its future growth.
Keywords: Construction, Nigeria, Skill Gaps, Training
DOI: 10.7176/JEP/13-11-12
Publication date: April 30th 2022

1. Introduction

As a developing country that is currently undergoing economic reform, Nigerian construction industry is one of the major contributors to the country's Gross Domestic Product (GDP) for its future development (Okoye & Arimonu, 2016; Abdullahi & Bala, 2018; Mu'awiya, et al., 2018). In addition, the construction industry originally contributed between 5.8% of the Nigeria GDP in the 1980s, before it declined to 1.4 in 2010 and 4% in its current state in (Oluwakiyesi, 2011; Ihua-Maduenyi, 2018). The decrease in the contribution to the nation's GDP is due to several factors, which includes inadequate training and skills development, motivation and labour relation practices, poor planning, problems of finance, corruption, recruitment, and selection practices (Oseghale, et al., 2015; Tunji-Olayeni, et al., 2017; Ameh & Daniel, 2017). More so, the rate at which buildings collapse in Nigeria today is increasing daily and sadly to say that this failure in some of the buildings occur during construction work and use, which needs immediate attention (Egunjobi & Adebayo, 2016). As cited by Okolie, et al. (2019), the collapsed buildings were due to so many problems that include, unethical behaviour and poor guidance in terms of commitment, knowledge, negligence, dishonesty, and unfair practices are prevalent in the Nigerian building industry (Osuizugbo & Ojelabi, 2020).

In Nigeria, training and skills development in its current form is inadequate which has led to skill shortages, and gaps within the industry (Kwaghbo, 2021). This has affected the performances of the industry which led to low and consistently poor productivity over the years. In addition, the quality of workers' skills is another pressing issue in the Nigerian construction industry and is already having serious implications for both the industry and the Nation's economy (Oseghale, et al., 2015; Ameh & Daniel, 2017). There are several studies addressed the impact of training and skills development on the output of the construction industry in Nigeria.

However, the importance of training and skills upgrading of workers in the construction industry should be a continuous improvement process. Unskilled workers affect the quality of products and impact on time as well as costs of projects that are undertaken in the country, thus endangering the success of projects' execution, which in turn affects the nation's economic grow (Zannah, et al., 2017). Although there are other factors affecting the productivity of the construction industry, this paper focuses on skilled workforce gaps.

The failure of construction industry to address skills gaps in terms of quantity and quality has seriously caused the reduction in the Nigerian economic growth (Ekundayo, et al., 2013). Training and skills development are keys prerequisite for performances of any workforce, particularly within the construction industry (Banihashemi, et al., 2017; Kassem, et al., 2017). Hence, workforce training is important towards skills development, and it is a necessity for construction companies to understand the need for training and skills acquisition (Mpofu & Hlatywayo, 2015; Rahim, et al., 2016). Therefore, the purpose of the research presented in this paper is to critically assess the current workers skills acquisition and training within the context of the Nigerian Construction Industry, starting with the literature review.

2. Literature review

The achievement of every organisation's aim and objectives depends on the performance of its workforce, which is true for the construction industry. A well-trained workforce is generally one of the key requirements for an effective organisation. Therefore, organisations must ensure that training and skills development of their workforce are paramount to the achievement of organisational goals and objectives. Hence, training and skills must be carried out regularly to add value to human resources. Therefore, the literature review is divided into the concepts and training methods available in the wider literature, followed by the literature from the Nigerian context which was examined.

2.1 Concept of training

According to Armstrong (2017), training is defined as the formal and organized or systematic modification of behaviour through learning that occurs due to education, instruction, and development as well as planned experience. Similarly, Ericsson, et al. (2018) stress that training is a planned and a continuous process that was designed to meetup with the training needs of today and the future, enhancing organisation performance and productivity through knowledge improvement and skills development.

From the above definitions, training has to do with imparting knowledge, skills and change in behaviours for a great job with the best available information and to the best quality required. In this light, the best possible arrangement of methods, techniques, tools, and practices should be assembled in an organised form to achieve such a goal.

The vital role of the construction industry in its contribution to social and economic development through the provision of other sectors with suitable building cannot be overlooked (Marhani et al., 2021). The construction industry is labour intensive, particularly in developing countries around the world. This is where construction organisations depend on the effort of their workforce for better outcomes due to the manual activities. For this study, an effective training should create an enabling environment which trainees are able to:

- Learn the importance of knowledge, skills, and attitude.
- Practise applying the learned knowledge, skill, and attitude.
- Act on both negative and positive feedback in enhancing future performances.
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2.2 The Nigerian Construction Industry

The Nigerian construction industry has experienced failure since the discovery of crude oil in the seventies (Chen, et al., 2016; Ogunde, et al., 2017). Prior to oil and gas discovery, the construction projects have been executed on a large scale and these projects include buildings, roads, bridges, sewage plants, and dams. However, training status within Nigerian context is ineffective with low-quality coupling with challenges against the realisation of quality training (Okolocha & Baba, 2016). In addition, most of the technologies adopted by the construction industry in Nigeria are both local and imported. This suggests the needs for training and skills development plus steady supply of manpower to the indigenous population to make use of the available resources and adopt the technology available (Ayonmike, et al., 2015). These skill shortages have been experienced in most of the urban areas, where a large percentage of unemployed workers are accompanied by technicians' skills gaps in the building trades such as bricklayers, carpenters, plasterers, plumbers, and tilers. (Zannah, et al., 2017). Technicians are trained skilled workforce that can either work under the supervision of a professional or independently in a complex system.

2.3 Skills shortage within the Nigerian construction industry

Construction industry is mostly dependent on availabilities of its workforce due to its manual and labour-intensive activities predominantly in developing countries. This implies that adequate supply of skilled workforce is of a major concern to performances within the industry. However, the industry for many years

undergoes the shortages of skilled workforce and required materials (Bilau, et al., 2015). Furthermore, Oseghale, et al. (2015) stated that skilled shortages and skills gaps were often portrayed as major hindrances to the development of the industry and the nation's economy. Likewise, failure of any project due to insufficient skills could be due to inadequate training/education (Agetue & Nnamdi, 2017).

Ihua-Maduenyi (2018) lamented that the standard of competent skilled construction workforce was decreasing yearly, by 15 percent of technicians within the construction sector. According to the author, the poor performances of the Nigerian construction industry was due to inadequately skilled workforce and the need for improvement of the industry performance was paramount.

As Ihua-Maduenyi (2018) mentioned, the shortage of skilled workforce is mostly due to the weak stock of skilled construction workforce in the country. The paper further suggested a key strategy to the challenges and repositioning of the sector through enhancement of domestic construction skills. This could be carried out through educational institutions, with emphasis on providing students with better practical training to complement their theoretical knowledge.

2.4 The Nigerian construction industry skills gaps

Limited trained/skilled workforce was of a major concern within the industry and has affected the industry performances. This has led to technicians' skills gaps and skills shortages within the industry, which required immediate attention. In addition, studies indicated that there were shortfalls within the industry in terms of quantity and quality of technicians being trained to satisfy the challenges (Afolabi, et al., 2016). Skills of the workforce are of great importance to the industry development, which was defined by Peterson, et al. (2001:464) as "Skills represent a person's level of proficiency or competency to perform a task". 'Skills gaps' defined by past studies as where members of the existing workforce lack necessary skills to do the job and 'skills shortages' as "when are not enough people available with skills needed to do the jobs which need to be done" (Green & Ashton, 1992:278). However, further training of the existing workforce to improve industry performance can fill the skills gap and the problem of skill shortages can be addressed through enrolment of incompetent employees on training programmes in the industry. Article in Vanguard by Okogba (2019) lamented the skill gap in the Nigerian construction industry and poor project delivery has become a trend within the country and is of great concern. These skill gaps include masonry, carpentry, plumbing, electrical and IT installation, painting and decoration among others.

2.5 Current behavioral patterns of construction workers in the system

Recent studies revealed that the Nigerian construction industry has the highest human rights abuses and other social problems such as lack of training on health and safety (H&S), risk assessment, ethics in construction related works, among others, compared to other countries (Adegboyega, et al., 2021). Ogundipe et al. (2018) highlighted that lack of awareness on H&S issues among Nigerian construction workers is a major concern. Similarly, organizations' reluctance to H&S management also contributed to cause of fatality injury in workplace. Consequently, H&S overall standard and corporate image of the industry have been affected. According to Zhou et al. (2015), the trend of accidents in the construction industry has reduced progressively, due to continuous effort of researchers and the implementation by some practitioners. Yet, the industry has not realized its potentials in terms of H&S for the industry development. Furthermore, Ghasemi et al. (2015) argued that construction industry compared to other industries has a high rate of fatal injuries and there should be a need for adequate attention. However, this study suggested that there should be more application on innovative approach on construction safety through effective training because the industry has been regarded among hazardous organizations. In addition, construction is risky and one of the most precarious industries that needs to be properly managed (Ganah & John, 2017). It can manifest itself through hazards of work patterns and behaviour problems at work, which may be linked to the low level of H&S culture when compared with other related industries.

2.6 Impact of skills and training gaps

In the literature review on the Nigerian construction industry, the key challenges identified due to poor performances of the industry were the inadequate skilled upgrades of workforce within the industry, which required adequate attention to attain positive output (Ogunsanmi, 2016). Inadequate investment on skilled artisan training, and construction contractors' reluctance to invest on their training (Bilau, et al., 2015).

Okoye & Arimonu (2016) enumerated inadequate funding of TVET; inadequate facilities, brain drain, staff training and retention, curriculum of technical education, policy issues as some of the industry key challenges. It has also indicated that effective communication among the stakeholders, which includes the management of the industry at the FGN, state and the local level within the industry is vital to improve performance (Ejohwomu, et al., 2017). However, there is ineffective communication among technicians, as well as among stakeholders. Hence, there will be no effective training and skills development in any successful organisation, and across

organizations without effective communication among stakeholders, which requires a holistic approach.

3. Research methodology

Quantitative method in this study utilized the questionnaire survey to collect data from participants. It was aimed at seeking the participants views on current workers skills within Nigerian construction industry. Structured questionnaires were developed on the premise of workers skills and based on the needs to fulfil the research gaps. The participants in this study were group of project managers, technicians, and trainers/educationists within the selected Nigerian construction industries. Further qualitative data collection was conducted through interviews with the selected participants on the areas that were not fully investigated during the quantitative survey. These areas include both the employers and the employees' behavioral attitudes towards technicians training in other to corroborate the quantitative survey findings. The designed interview questions after piloting were used for interview with the participants. Hence, findings of the analysed data were used in the design of a conceptual framework for training and skills development for the Nigerian construction industry. A short description of each stage is given in the paragraphs that follows.

3.1 Data collection

In this study, the sampling population is from Abuja in central Nigeria, due to its expansion as the new capital city of the country. The population was estimated to be 4,000,000 by the National population commission (NPC) (CTGN Africa Published on July 20, 2016). A random sample technique was used for the population of construction workforce opinions (Harrison, et al., 2020). This was accomplished using the construction industries drives from the Civil Construction Directory Gallery (CCDG) database within Abuja metropolis.

Against the backdrop, 350 questionnaires were distributed and 289 were retrieved and used for the analysis. The experts used for the survey within the field of construction includes group of Project/Site Managers, Technicians and Trainers/Educationists. Designed questionnaires were administered to the participants to identify the training analysis, actual skills and knowledge needed for the Nigerian construction industries. To corroborate the quantitative survey findings and to obtain a comprehensive, precise, and specific views on the research problem, selected participants were chosen from the sample for further data collection and analyses through the interview stage.

3.2 Questionnaire survey

Questionnaire survey was designed to collect and gather participants' views on the current technicians' skills and the training methods in other to assess workers' skills based on the research problem of the study (Brace, 2018; Nardi, 2018). The questionnaire covers the important criteria of technicians' skill development identified from the literatures to fill in the missing knowledge gaps. In the questionnaire, the factors that negate the development of workers (technicians) skills and the growth of the industry performances were examined. This approach facilitated the gathering of opinions and allowed comparison and statistical aggregation of strategic data collection from the respondents (Donovan, et al., 2019).

3.3 Interview survey

Interview questions were designed in line with the areas that were not fully covered during the quantitative survey analysis, which include behavioral attitudes of the employers and the employees towards technicians adequate training. This section of the data collection enabled the researchers to gain an in-depth finding of the interview through the selected participants' opinions to develop the research framework. The interview questions also were undergone a pilot testing and necessary amendments were made before the interviews were conducted with the selected participants. For the essence of this paper, five participants were used for the face-to-face interviews with the researchers within a period of two weeks.

3.4 Data analysis

Descriptive statistical techniques were used to assess the data collected from the developed questionnaires. The approach used describe the phenomenon and the attitude of those affected by it. Tests for reliability and validity, which gave an empirical reliance on the data collected (Nardi, 2018). In addition to that, data analysis was carried out for the qualitative data collected from the participants through the transcription of the recorded interviews. The transcribed data were inputted into the NVivo software and the application of manual method to determine the key themes relating to the research study.

4. Results and discussions

This section of the paper precedes on the discussion of the collected data from participants in the questionnaire survey and the interviews.

4.1 Respondents profile

A total number of 350 questionnaires from different construction industry professionals participated in this research and the research demography showed that all the participants were with different qualifications (Table 1 and Table 2). For this research study, 289 questionnaires from technicians, project managers and trainers were returned constituting a total of 82.5% and were analysed. Table 1 and Table 2 indicate the participants occupation, level of education, working experience and company size. Across the three groups, 18.2% were supervisory technicians, with higher qualifications, (11–15) years of working experience within the industries of various sizes (Micro enterprise, small, medium, and large enterprise). In addition, Table 1 indicates that 20.3% of the participants were others (trainers/educationists) with higher qualifications and a working experience in the industry for 16 years and above.

Table 1. Respondents profile for quantitative survey

Current Job	%	Education Level	%	Experience	%	Company Size	%
Electrical technician	5.8	Primary School	14.3	0 – 5 years	26.6	Micro Enterprise	3.2
Mechanical technician	28.8	Secondary school	19.0	6 – 10 years	28.6	Small Enterprise	28.6
Project Manager	26.9	Higher Institution	26.5	0 – 5 years	16.4	Micro Enterprise	6.1
Supervisory technician	18.2	Higher Institution	18.0	11 – 15 years	19.5	Medium Enterprise	14.0
Others (Trainers)	20.3	Higher Institution	22.2	16 and above years	8.9	Large Enterprise	17.5

Table 2. Participants profile for the interview survey

Interviewee ID No.	Training Background	Professional Practice	Years of Experience	Educational Qualification
PID1	Building Engineering	Construction & Architectural design management	26 years	PhD
PID2	Civil Engineering	Construction Management	15 years	PhD
PID3	Civil Engineering	Construction/Project Management	18 years	PhD
PID4	Civil Engineering	Civil Engineering and Construction Management	16 years	PhD
PID5	Building Engineering	Building Engineering	15 years	PhD

4.2 Training methods

The most effective method of training is the Polytechnic/Colleges of Technology in Table 3 and this view is in line with study of Yusuf & Soyemi (2012), who argued that the polytechnic was the most appropriate training method for effective skilled development of construction workforce. Yet other studies rejected this assertion, saying that they were discriminated by many professional bodies (Ogbunaya & Udoudo, 2015). For instance, a Higher National Diploma (HND) graduates could not gain admission for a postgraduate degree without an additional qualification and equal opportunities might not be given during employment.

However, Olibie, et al. (2013) argued that the standard of all tertiary institutions should be raised to the same level, staff development and training intensified. In line with the above, adequate educational resources (human and material resources) should be provided and existing ones should be maintained. This research study is in support of the participants' views that the polytechnic/colleges of technology education can be the most appropriate training method. This is due to the manual activities are carried out within the construction industry, mostly in the developing countries like Nigeria. The construction activities are mostly manual, and the polytechnic/collages of technology mostly do practical construction activities while the universities are more of theoretical learning.

Table 3. Appropriate methods of training for apprenticeship in Nigeria

	Response scores in percentage %						Mean Value	Std D	Cronbach's Alpha
	No. of respondent	VS	S	N	DS	VD			
Polytechnic/ Colleges of Technology	289	4.73	18.4	4.1	0.0	0.0	4.73	.53	
University Education	289	4.71	24.5	2.0	0.0	0.0	4.71	.50	
Science and technology colleges	289	4.49	42.9	4.1	0.0	0.0	4.49	.58	0.80

4.3 Factors hindering the growth of TVET in enhancing skills upgrade

The various factors indicated in Table 4, hindering the growth of Technical Vocational Education and Training (TVET) in enhancing the skilled upgrade in construction industry with regards to Quality standard and Quantity of skilled labor trained. These findings are in line with the findings of Okoye & Arimonu (2016) among others whose views are in line with the factors impeding the growth of Nigerian construction industry. However, there is a clear indication of challenges of TVET funding, training facilities, ineffective training methods, and shortages of qualified TVET trainers with a mean value of 4.60, 4.19, 4.05, and 4.03 respectively. In addition, the findings showed the effect of the quantity of skilled labor trained as a stern challenged within the organisation compared to the quality standard of skilled labor.

Table 4. Factors hindering the growth of TVET in enhancing the skilled upgrade

	Response scores in percentage %						Mean Value	Std D	Cronbach's Alpha
	No. of respondent	SA	A	N	DA	SD			
Poor funding of TVET in Nigeria	289	68.3	27.0	1.6	3.2	0.0	4.60	.685	0.87
Insufficient facilities for training	289	25.4	68.3	6.3	0.0	0.0	4.19	.535	
Ineffectiveness of training models	289	14.3	76.2	9.5	0.0	0.0	4.05	.490	
Government lack of commitment to TVET	289	25.4	57.1	12.7	4.8	0.0	4.03	.761	
Shortages of qualified TVET teachers	289	25.4	54.0	12.7	4.8	3.2	3.94	.931	

4.4 Behavioral factors and their impact on technicians' training

There are several factors that came out from the interviews with the selected participants in this research investigation, which are important in the technicians' skills upgrade. The identified factors include management commitments towards technicians training; lack of organizational structure concerning; inadequate funding on TVET programs; inadequate projects managers' support on the technicians' training; absence of incentives measures; poor leadership/management commitment; inadequate communication network within the workforce and inadequate enforcement of mandatory standards on technicians' training within the industry.

4.5 Project managers' commitment towards technicians training

It was observed by the researchers during the recorded interview data transcription inadequate project/site managers' commitment towards the technicians training. This has been revealed by the participants that project managers' commitment on technicians training has been inadequate. The interviewees emphasized that the management of the industry was always reluctant when it came to the technicians' training and claimed to be too busy. "*...the management team is too busy to organize training but encourages the technicians to go on training once in three years*" (PID1).

The issue of inadequate commitment of project managers towards the technicians' skills training is critical and there is no doubt that this has affected industry development. There will be no technician's skills enhancement through training without the commitment of the management of the industry. Technicians training within an organisation is always key to the organisation performance because the technicians form the vital aspect of the industry that requires competent and effective workforce skills, which can be accomplished through suitable training to improve their skills.

4.6 Use of recent technologies

A lack of proper integration of knowledge on recent technology was considered as most critical within the construction sector and this has impacted negatively on workforce training within the industry. In addition, some of the organizations borrowed the required tools for commissioning to be fully registered and then return it back after the registration.

As such, considering the analysis of literature review, the results of the questionnaire survey and the interviews with industry practitioners it is proposed at this stage to develop an outline for conceptual framework which will be the bedrock for future development the skills of construction technicians in Nigeria.

5. Outline of conceptual framework for training

The proposed outline for the conceptual framework gives a holistic top-level understanding of how training and skills that should be integrated and implemented for the construction industry. The framework is in three stages and is based on the INPUT- PROCESS – OUTPUT (IPO) model (Ren, et al., 2022; Decius, et al., 2021). The P

(i.e. Process) is what the researchers want to enhance, or effect change for the Nigerian construction industry. The new processes will include new behavioral patterns that will be embedded within the old processes, in an integrated format. Such injection will involve, for example, remodeling universities curriculum development and remodeling at the college and vocational level curricula.

From both primary and secondary data, it can clearly be seen that there is a serious challenge within the construction industry in Nigeria regarding training. This has led to the shortfall in growth rate contribution to national growth and survival of the industry. This research investigates source of the problems to find a solution for training and skills development for workers of the Nigerian construction industry to improve workers' skills quality. The framework shown in Figure 1 is an outline for the detailed conceptual framework, which serve as a guide for the researchers to develop a detail framework as the research progress. A more detailed conceptual framework will be presented and discussed in another publication.

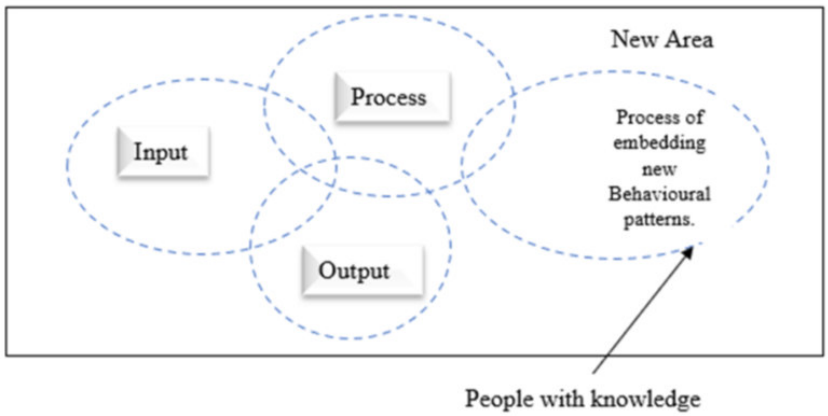

Figure 1. Outline for the conceptual framework for training and skills development.

6. Conclusion and future research

This paper critically assessed the technicians' skills gaps and training on the output of the construction industry performances. Hence, the factors that negate growth in technicians' skills within the industry are identified. From the study carried out, the analysis of the questionnaire survey findings showed the polytechnics/colleges of technology were the most appropriate training method for construction related works. Surprisingly, polytechnic training methods were given less attention compared to the universities training. Furthermore, qualitative analysis findings revealed that management commitment towards technicians training is inadequate. From the study, there was lack of interest shown by youths in acquiring construction related skills, poor funding of TVET, insufficient training facilities lack of government commitment were major concerns for poor performances. In addition, the study revealed that training and skills upgrades are fundamentals/prerequisites for the construction industry's development. Despite the different innovations in producing the needed skills apprentices for the industry, the anticipated effectiveness in the training of apprentices in the industry is still limited. Overall demand for skilled workforce has not been properly addressed within the Nigerian construction industry. Hence, further study into the management section of the industry is needed for future development of the construction industry in Nigeria. The development of the framework incorporates behavioral factors that are missing from what has come out of the initial findings of the research. This framework is ongoing as the next research phase.

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