

**IMPROVING SKILLED WORKERS' PERFORMANCE
IN CONSTRUCTION PROJECTS
IN NIGERIA**

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DEDICATION

I dedicate this work to my late father; Ashami Zannah and my mother Falmata Alhaji Goni and to my entire family members.

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ABSTRACT

Skilled workers' performance is one of the crucial aspects of labour productivity that requires proper attention for effective projects delivery in the construction industry. The level of skilled workers' low performance has been seen to be a major factor which contributes toward inefficient construction projects productivity. Therefore, the objectives of this research are to identify the causes of low skilled workers' performance in construction projects and to recommend ways to improve skilled workers' performance in construction projects in the Nigeria. The objectives were achieved through a structured quantitative method of questionnaire distributed to 150 respondents from project manager, project engineer, site engineer and site supervision that are active in the Nigerian construction and 111 of the response were collected which was 74% of the response rate. The data were collected and analysed using Statistical Package for Social Science (SPSS) version 22.0. Mean ranking and analysis of variance (ANOVA) were used as tools to analyse the data. The findings shows that; low wages of skilled, lack of sufficient skill acquisition centres and lack of incentive schemes for skilled workers were the most significant causes of low skilled workers' performance in the Nigerian construction industry. Similarly, proper supervision, supply of quality plants and equipment and good wages for skilled workers were the most significant ways to improve skilled workers' performance in the Nigerian construction industry. The homogenous analysis indicates that there are significant differences in perception of respondents on few variables whereas majority of respondents have similarities in most of the variables. The research findings confirmed that, stakeholders in the Nigerian construction industry should strategise on motivation, training and retraining, conducive working condition, supply of quality materials and equipment, and proper site management in order improve skilled workers' performance in Nigerian construction industry.

ABSTRAK

Prestasi pekerja mahir merupakan salah satu aspek penting dalam produktiviti pekerja yang memerlukan perhatian yang tinggi demi penyampaian projek yang berkesan dalam industri pembinaan. Secara dasarnya, prestasi pekerja mahir yang bertahap rendah telah dilabelkan sebagai salah satu faktor utama yang menyumbang kepada isu kecekapan produktiviti sesebuah projek pembinaan. Oleh itu, objektif-objektif kajian ini adalah untuk mengenalpasti punca-punca yang menyumbang kepada isu prestasi pekerja mahir yang rendah dalam projek pembinaan dan mencadangkan cara-cara untuk penambahbaikan dalam meningkatkan prestasi pekerja mahir dalam projek pembinaan di Nigeria. Objektif-objektif tersebut telah dicapai melalui kaedah kuantitatif itu menggunakan instrumen borang soal selidik yang telah diedarkan kepada 150 pengurus projek, jurutera projek, jurutera tapak dan penyelia tapak yang aktif dalam pembinaan di Nigeria dan sebanyak 111 borang soal selidik (74% daripada kadar tindak balas) yang telah berjaya dikumpulkan semula. Data yang dikumpulkan dianalisis dengan menggunakan *Statistical Package for Social Science (SPSS)* versi 22.0. Kedudukan min dan *analysis of variance (ANOVA)* telah digunakan sebagai alat untuk menganalisis data. Hasil kajian ini menunjukkan bahawa faktor-faktor seperti; gaji rendah, kekurangan pusat kemahiran dan latihan kepada pekerja mahir serta kekurangan insentif untuk pekerja mahir menjadi punca utama kepada isu prestasi pekerja mahir yang bertaraf rendah dalam industri pembinaan di Nigeria. Manakala, pengawasan yang baik, kelengkapan dan peralatan yang berkualiti dan tangga gaji yang baik untuk pekerja mahir adalah merupakan cara-cara yang paling berkesan dalam menambahbaik dan seterusnya meningkatkan prestasi pekerja mahir dalam industri pembinaan di Nigeria. Analisis homogen menunjukkan bahawa terdapat perbezaan signifikan dalam persepsi responden mengenai beberapa pembolehubah manakala majoriti responden mempunyai persamaan dalam kebanyakan pembolehubah. Dapatan kajian juga mengesahkan bahawa, pihak berkepentingan dalam industri pembinaan di Nigeria perlu merangka strategi iaitu memberi motivasi dan latihan semula, keadaan kerja yang kondusif, bekalan peralatan dan kelengkapan yang berkualiti dan pengurusan tapak yang baik agar dapat meningkatkan prestasi pekerja mahir dalam industri pembinaan di Nigeria.

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LIST OF ABBREVIATIONS

ANOVA	-	Analysis of Variance
BNVQ	-	British National Vocational Qualification
CACN	-	Corporate Affairs Commission of Nigeria
EBRD	-	European Branch for Reconstruction Development
GPS	-	Global Positioning System
HSA	-	Hypo Sludge Ash
IFC	-	International Finance Corporation
ITF	-	Industrial Training Fund
KPI	-	Key Performance Indicator
MMC	-	Maiduguri Metropolitan Council
NBTE	-	National Board for Technical Education
NDE	-	National Directorate of Employment
NRC	-	National Research Council
NVQF	-	National Vocational Qualification Framework
PMS	-	Performance Measurement System
ROI	-	Return of Investment
SON	-	Standard Organisation of Nigeria
SPSS	-	Statistical Package for Social Sciences
TOP	-	Theory of Performance
WBDB	-	Work Branch Department Bureau

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter discusses on the introduction, which serves as the research background. The research background forms a clear focus of the problem statement, research questions, research objectives, research significance and research scope. Finally, it describes the chapters' outline of the report.

1.2 Research background

Construction industry in many developing countries are greatly concerned with low level of skilled workers' productivity due to economic, social, physical and psychological related factors influencing the performance of the skilled workers (Naoum, 2016). Low productivity of skilled workers' is one of the most serious task facing the construction industry especially in developing countries such as Malaysia, Indonesia, Singapore, Hong Kong, and other states in South east Asia (Kaming *et al.*, 2010). In today's global economic, skilled workers' productivity is becoming more intense than ever due to the low level of quality performances of the skilled workers in the construction industries in most developing countries (Davenport, 2013). Arshad

and Ab Malik (2015) assert that, productivity improvement can be achieved when construction workers with high skills and knowledge, together with sound physical and mental health perform tasks with efficiency and effectiveness. In most countries, the cost of operatives comprises 30 % to 50 % of the overall projects' cost, and thus, it is regarded as a true reflection of the efficiency of the operation (Kazaz *et al.*, 2008). In addition, since construction is a labour intensive industry, Jarkas (2015) argued that, skilled workers are one of the most productive labour category in the industry, and therefore, construction productivity is mainly dependent upon skilled workers' effort and performance. Alinaitwe *et al.* (2007) stressed that construction industry in sub-Saharan Africa has unique characteristics. To mention few are, building is labour intensive as it is largely in-situ, therefore skilled workers are exposed to extreme of hot and wet weather conditions, poor skilled workers' incentive schemes, and hazardous working environment.

Nigeria's commitment to improving the living standard of its citizens has led to the introduction of a long-term economic programme tagged 'Nigeria vision 20:2020'. The vision consists of a set of objectives and programmes designed to launch the nation into the league of the twenty (20) most developed economies of the world by the year 2020 (Adewale *et al.*, 2014). Almutairi *et al.* (2016) stressed that, a large number of skilled workers' low performance, especially in the construction industry has been identified by several studies as critical factor for the vision 20:2020 to be achieved. Nwachukwu (2008) viewed that, Nigeria has been largely experiencing a remarkable growth in the number, size and complexity of large scale infrastructure projects with a rich heritage and traditional skilled workers. Improvement in skilled workers' performance through various means of motivational factors serve as energising forces that induce and maintain skilled workers toward quality productivity that will result in huge financial savings and more affordable housing with shorter construction periods and economic development (Dalhatu *et al.*, 2012; El-Gohary and Aziz, 2013; Heravi and Eslamdoost, 2015). Mortaheb *et al.* (2007) opined that, higher productivity leads to lower costs, shorter construction periods, better value for money and higher Return of Investment (ROI). Therefore, the issue of improving skilled workers' performance in construction projects is important as it establishes a substantial foundation for efficiency of work and higher productivity.

1.3 Problem statement

Nigeria as a developing country with rapid growing population and various housing scheme programmes such as; National Housing Policy of Nigeria, Report of the Vision 2020 National Technical Working Group on Housing, as well as publications from UN-Habitat, Musa *et al.* (2016) assert that, these programmes require the services of skilled workers on construction sites for an efficient and effective projects productivity. In the Nigerian construction industry, skilled workers such as bricklayers, carpenters, painters, electricians, welders, plumbers, plant operators among others, form a large part of the site labour force whose input determine to a great extent, the quality of the industry's products (Akinluyi and Adeleye, 2013). In Nigeria, the common problems of low skilled workers' performance in construction have been traced to unfair wages of workers, poor safety in construction sites, lack of clear-cut career paths, diminishing skilled workers training programmes and delay in schedule of works on sites (Oseghale *et al.*, 2015). On the other hand, contractors are generally not satisfied with the level of construction productivity due to apparent poor performance of skilled workers (Forcada *et al.*, 2013).

At present time, there is a decline in the performance of skilled workforce in construction project sites, whereby the old age method of locally organised apprenticeship scheme is becoming outdated (Awasthi, 2016). The aged and retiring site operatives are not wishing that their children take to their trades, rather, their goals are for their children and wards to become consultants such as project managers, architects, quantity surveyors and engineers (Ireland, 2007). McCausland (2006) observed that, young people seem to deliberately avoid the high-end construction trades in exchange for the lure of promising positions in the society, this consequently has given rise to significantly low number of skilled workers in the construction industry. The majority of nation's youth no longer shows interest in skill acquisition, a case which is not the same as in the developed countries whereas demand for skilled apprenticeship is outstripping the number of training places available in the industry (Robles *et al.*, 2014). Kim *et al.* (2016) also observed that, problems of low wages, absence of a clear-cut career path, and a lack of organised apprenticeship training schemes are evident in the industry that demotivate youths in the developing countries

to show more interest in participating in the labour force. Construction work, as at the present time in Nigeria is labour intensive, unlike in some advanced countries such as; United Kingdom (UK), United States of America (USA) and Australia where a great percentage of site operations have been mechanised thus requiring fewer numbers of operatives on the construction sites (Van Doren, 2008). The low performance of skilled labour affects schedules and costs, which in turn could critically delay projects completion and thereby jeopardise the economic benefits the project is expected to generate (Ireland, 2007). The low performance of skilled labour is one of the most pressing issues today and is already having serious implications for both business and the economy (Windapo, 2016). As self-employment continues to rise, competition is becoming more severe, contract times are shorter, profit margins are smaller and specialisation and fragmentation of various trades is increasing, which ultimately presents problem of finding key skilled workers such as; bricklayers, carpenters, plasterers and electricians (Amusan, 2016).

Despite the efforts by the government in providing housing schemes for its citizens, Adegoke (2012) noted that, there are still cases of low skilled workers' performances which mostly occurs as a result of rework in construction, use of low quality materials, lack of proper supervision, non involvement of ethical standards and benchmarks. Fagbenle *et al.* (2012) added that, poor management, omissions in design specification, inadequate information from clients, and lack of technical measures to transform these specified requirements into objectives and targets lead to low skilled workers' performance in the anaigerian construction industry. Certainly, these weakness result in cost overrun, late delivery in project completion time, and low quality structures with low life span (Olabosipo and Adedamola, 2010). It has also been observed that, most project managers and site supervisors do not understand how to identify the skilled workers' goals and link them with organisational reward in order to improve their performances, as a result, skilled workers getting frustrated and thereby productivity subsequently suffers (Nwachukwu, 2008). According to Ahiakwo (2015), the factors affecting skilled workers' performance in Nigerian construction industry are mainly varied from; shortage of materials and equipment, poor construction due to design errors, inclement weather condition during construction works, late commencement of work on site due to lack of free transportation, and lack supply of modern plants and equipment. Funso *et al.* (2016a) opined that, an unsatisfactory working environment, lack of proper motivation, ineffective training

schemes and poor site management lead to an adverse effect on skilled workers' productivity in the Nigerian industry. In the construction industry, skilled workers are directly responsible for setting out construction work on site, therefore, suitable motivations are necessary in order to maximise their performance toward effective productivity (Ho, 2016). Perhaps, programmes combining elements of both financial and non-financial incentives schemes are those that produce the most consistently satisfactory results, where the result of either component serves as motivational factor toward skilled workers' performance in construction projects (Fagbenle, 2009).

The performance of skilled workers in the construction industry in the past received little attention as a subject of research, whereby most researches focus on general labour productivity. Therefore, the genesis of this research focuses on skilled workers' performance which was driven by observations in the disparity of the skilled workers' low performance as a result of non-implementation of factors militating to the construction productivity. Similarly, there is need to strive towards achieving optimal productivity in the Nigerian construction industry, however, this cannot be attainable unless problems such as; inadequate tools and equipment, lack of training and retraining of skilled workers, poor working condition, lack of motivation and incompetent site management are addressed. Hence, this research will seek to recommend ways to improve skilled workers' performance towards ensuring the overall development of the Nigerian construction industry.

1.4 Research questions

This research is proposed to answer two questions, which invariably would assist in achieving its objectives. The questions are:

- i. What are the causes of low skilled workers' performance in construction projects in Nigeria?
- ii. How to improve skilled workers' performance in construction projects in Nigeria?

1.5 Research objectives

This research is aimed at investigating into improving skilled workers' performance of construction projects in Nigeria. This aim can be achieved through the following objectives:

- i. To identify the causes of low skilled workers' performance in construction projects in Nigeria.
- ii. To recommend ways for improving skilled workers' performance in construction projects in Nigeria.

1.6 Research significance

Improving constraints associated with regard to skilled workers' performance in construction project delivery is important to construction industry in the following aspects:

- i. **To Policy**

By identifying the causes and ways of improving associated with skilled workers' performance in construction projects, the government can come up with a good policy and laid down criteria that can ensure skilled workers' performance in projects delivery follows a stated guideline to ensure that quality, cost and time are maintained toward successful projects productivity.

- i. **To economy**

The economy of any nation tends to be more realistic when there is cost, time certainty and quality control. However, the quality and productivity of any completed project determines that, the economic benefit is liable to be achievable. The economy can save

the money that would have been otherwise channelled for maintenance work of projects.

ii. **To contractors**

The research is expected to contribute immensely to the contractors such as the project manager, project engineer, site engineer and site supervisor, toward improving skilled workers' performance in construction projects, which apparently can lead contractors into successful completion of any given project within cost, stated time and quality and that add to contractors' reputation in various ways.

iii. **To skilled workers**

Identifying areas that affects quality in construction would ensure good workmanship and high productivity of any completed project. This would go a long way in preventing building from collapse and safeguard peoples live. It would also ensure that the tax payers, who are the people themselves, get value for their money.

iv. **To academic environment**

The findings and recommendations of this research will open a window, thereby contributing to the academic knowledge and for future research regarding the causes of low skilled workers' performance in construction projects, and the ways to improve it.

1.7 Research scope

This research focuses on improving skilled workers' performance in construction projects in Borno State, which is located in the north-eastern region of Nigeria. Borno State is one of the fastest growing State in Nigeria which experiences rapid development in terms of construction of public and private projects and it is evident that, the construction projects in the state suffer from many problems and complex

issues especially in terms of skilled workers' performance (Jalam, 2016). In this research, Maiduguri Metropolitan Council (MMC), which is the Capital of Borno State was selected due to significant number of public construction activities that is on-going in various sites within the state capital (Egidario *et al.*, 2016). The geographical location of Maiduguri lies within 11° 50' latitude and 13° 09' longitude and it is situated at altitude of 325 meters above sea level and occupies a land mass of an area of 50,778 square metres (Jimmie *et al.*, 2016). According to Waziri (2016), despite the present rapid increase in population density of about 1.1 million, Maiduguri remains as centre of trade, learning, culture, tourism and history but public constructions projects in the public sector suffer from low quality due to skilled workers' ineffective performance. In this regards, co-operation from project manager, project engineer, site engineer and site supervisor as respondents will be sought to investigate the causes of the skilled workers' low performance in public construction projects within the study area in order to suggest ways of improving it.

1.8 Research methodology

Research methodology explains the method used in conducting the research. The steps involve are; formation of problem statement, developing research objectives, literature review, data survey using questionnaire, data analysis, then conclusion and recommendations. This research uses quantitative approach and would be conducted in three stages, as shown in Figure 1.1. The first stage is the process to identify research issues, topic selection, problem statement and research objectives. Second stage is the literature review to find out the previous study related to improving skilled workers' performance in construction projects. The third stage shows the types of data collection to be used in this research, which are literature review and questionnaire survey. The final stage discussed on data analysis process, results and findings based on the survey using questionnaire form, conclusion and recommendations for the research.

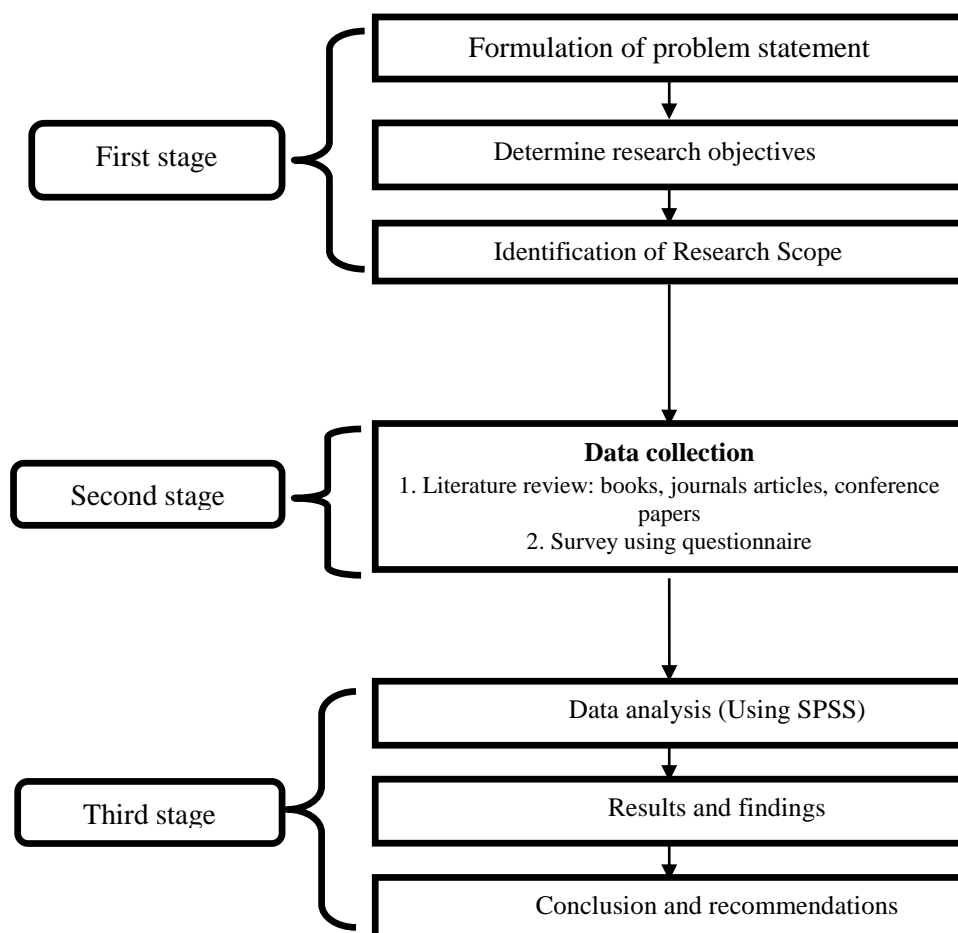


Figure 1.1: Research methodology process

1.9 Chapters outline

The research comprises of five (5) main chapters, namely; Introduction, literature review, research methodology, data analysis and discussion, then conclusion and recommendations. Details and explanation to every chapter will be discussed below:

Chapter 1: Introduction

This section introduces the research topic. It consists of the research background, research problem, research questions, research objectives, research scope, and research significance. Finally, the chapters' outline and summary.

Chapter 2: Literature review

This chapter reviews factors causing low skilled workers performance in construction projects and recommends appropriate ways of improving it. The chapter also focuses on identification of the research gaps that have not been discussed by previous researchers or need to be discussed more. The chapter also focuses on general suggestions to minimise interface problems.

Chapter 3: Research methodology

This chapter discusses the research approach and strategies, and the procedures to be adopted in conducting the research. This includes, research process and design, population and sampling techniques to be used. It also discusses the instrument of data collection and data analysis technique.

Chapter 4: Data analysis and discussion

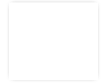
This chapter presents the data obtain from questionnaires and make analysis of the data. It also discusses the result from the survey conducted. The chapter also discusses on the findings obtained from the analysis which forms the basis of recommendations for future research.

Chapter 5: Conclusion and recommendations

The last chapter in the research summarises the entire research work to be conducted where conclusion would be made. The recommendation is given based on the research subject matter for possible action to be taken. This chapter ends with highlighting the limitations in the research and conclusion.

1.10 Summary

This chapter had discussed on the research questions and background on issues related to causes of low skilled workers' performance in construction projects and ways to improve skilled workers' performance in construction projects in Nigeria that provides context in formulating the research approach taken to accomplish the objectives of the study. The contractors are in a strong position as they have the guidance to define the causes and ways to improve the skilled workers' performance in construction projects. This aimed at enhancing skilled workers' performance towards successful project productivity. In addition, the research also outlined the research scope and the methodology to be used in the research process. Therefore, further relevant information that relates to the research will be discussed in literature review in the subsequent chapter.



CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter discusses previous researches on skilled workers' construction projects performance in the construction industry. The overview of the previous researches on the subject matter justifies the way research questions are to be answered. Through the chapter, the elaborations of the topic will be clearly described. This research reviews its literature relevant to the subject matter from books, journal articles, and other available documents related to this research. To achieve the success of the research, an intensive literature review is needed, which will be collected from previous scholars' write up on the particular subject matter.

2.2 Overview of the Nigerian construction industry

Construction activities affect nearly every aspect of the economy and that the industry is vital to the continued growth of the economy (Olawore, 2013). The influence of the construction industry to national economic growth requires improvement of productivity by means of cost, time, quality effectiveness that is expected to contribute immensely to the economics of the nation (Aibinu and Jagboro, 2007). Construction industry in Nigeria is like any other construction industry in the world in terms of the

economic growth and also in problems facing. Danso and Menu (2013), justify that, Nigeria is like most developing countries where construction industry plays a dominant role in the economic activities of the country. In spite of the Government's apparent concern over the quality of skilled workers' performance outputs in Nigeria, little effort has been made to ensure compliance to efficient productivity in the Nigerian construction industry and this is reflected in the publication of only two codes of practice for use in the construction industry in 1973 by the Standard Organisation of Nigeria (SON) since its inception (Ahaotu and Pathirage, 2015). These codes are outdated in relation to the present development in construction materials, design and site techniques (Adenuga, 2013).

Looking at the importance of the Nigerian construction industry in the economic development of nations, it becomes necessary to study the activities of the industry and also to be very much vigilant upon all the impediments that will affect the output and quality of productivity (Bilau *et al.*, 2015). In addition, Wogu *et al.* (2015) reviewed that, Nigeria is pursuing a project tagged 'vision 2020' as one of its strategies to become one of the top leading twenty (20) economies in the world by 2020. In Nigeria, there has been a large scale construction of low-cost housing estates is on-going to provide houses at reduced cost for citizens, but nevertheless, there are still cases of skilled workers' inadequate productivity due to their low performances (Hardoy and Satterthwaite, 2014). Therefore, embarking on improving skilled workers in construction will go a long way in curtailing their low performances in the Nigerian construction industry.

2.3 Skilled workers in the construction industry

According to Griggs *et al.* (2016), the structure of labour force in the construction industry are categorised into skilled and unskilled workers. The labour force under the skilled workers are of varying abilities ranging from apprentices to trades foremen or supervisors (Liepmann, 2013). The apprentice can be described a beginner who is willing and interested in learning a certain trade in the construction industry. The three possible avenues for training skilled workers are; schools, vocational training centres, workshops and on sites (Husseini, 2008). According to Bheemaiah and Smith (2015),

skilled worker is a segment of the work force with a high skill level that creates significant economic value through the work performed. Skilled worker is generally characterised by high experience and expertise level and involves complicated tasks that require specific skill sets, education, training and experience, and may involve abstract thinking. Sweet and Meiksins (2016) assert that, a skilled worker requires some form of professionalism and training which does not require a college degree or the like. Common skilled workers include electrician, plumber, painter, carpenter and mason, bar bender, tiler, plant operator, welder, mechanics, and steel fixer (Uchitelle, 2009).

Skilled workers not only work with their hands to build, fix, or install something, there is also a significant amount of brainpower required to do most jobs. Griffith and Macartney (2014) viewed that, with the present trend of technology, skilled workers must be computer literate as many machines use computer programs to operate in projects, and they must also have good math and reading skills in order to calculate, measure and read blueprints accurately. In addition, innovations and advances in technology have enabled skilled workers to engage in the use of robotics and lasers based on their respective trades (Scarborough and Corbett, 2013). The unskilled workers on the other hand are a category of workers that require special skills and it is defined as any way of making a living with little or no degree of security of income and employment and they require little or no training to make them perform (Wahab, 2011). Unskilled workers are able-bodied men and women that perform manual duties, and their major asset therefore lies in their strength and healthy body which requires no special training (Goswami *et al.*, 2016). Therefore, skilled workers are persons that have served an apprenticeship, practice the trade learned activity, and by reason of their knowledge and vocational capacity are given tasks which are particularly difficult and need a lot of experience that involves different trades of specialisation (Vollenhoven, 2016).

2.3.1 Categories of skilled workers in the Nigerian construction industry

According to Ogochukwu (2014), the Industrial Training Fund (ITF) in Nigeria enumerated the followings as recognised skilled workers in the construction industry,

namely; masons, steel fixers, electricians, carpenters, plumbers and welders. Uchitelle (2009) asserts that, common skilled workers include electricians, plumbers, painters, carpenters and bricklayers, bar benders, tile fixers, plant operators, welders, mechanics, and steel fixers. Offei-Nyako *et al.* (2014) stressed that, skilled workers vary from mason, carpenter, tile worker, steel worker, painter, electrician and plumber. The study of Ameh and Shokumbi (2013) viewed that, skilled workers in the construction industry include; iron bender, carpenter, bricklayer, painter, electrician, welding worker, plumber and tiler. However, Adewale *et al.* (2014) listed categories of skilled workers which include; carpenter, bricklayer, painter, iron bender and plumber. Oseghale *et al.*, (2015) assets that, frequent used skilled workers in the construction industry include; carpenters, bricklayers, bar bender, plumbers and painters where their services are required most in construction projects. Sherekar and Tatikonda (2016) identified the major categories of skilled workers in the construction industry as; mason, painter, steel fitter and plasterer. Therefore, from the various categories of skilled workers mentioned by various researchers, there are significant similarities among the researchers on the different trade specialisations of skilled workers in the construction industry. The various categories of skilled workers in the construction industry consist of the following:

2.3.1.1 Tile fixers

Tile fixer is responsible for laying hard tile and marble to floors, decks, and walls when specified in any construction projects. There are also roof tiler who able to lay roof tiles on the roof frame. According to Lam *et al.* (2007), tiler fixer must have training to set their tiles properly, also qualified tile fixer must able to be fast and efficient to ensure less risk of project run behind schedule. However, tile fixers are susceptible to a number of injuries, whereby, constant straining and bending over a surface can lead to repetitive stress and injuries, for this, trained tile fixer is needed to minimise such vulnerability involve in the work (Ene, 2010).

2.3.1.2 Bricklayers

Bricklayers build walls, partitions, and other structures made of brick, and they also work with concrete and blocks, bricks, tiles, marbles, and terra cotta, also bricklayers can do both construction and maintenance work as directed in the study of Ward-Harvey, (2009). Normally bricklayers will stretch string from one corner of the wall to the other to use as a guide so that they can build the wall straight. According to Wahab (2011), many tools used by bricklayers include; trowels, brick hammers, chisels, levels, plumbs and measuring squares, whereby unskilled worker will assist the bricklayer to do the heavy work such as; carrying materials and mixing mortars.

2.3.1.3 Plasterers

According to O'Kelly and Dean (2007), plastering is one of the oldest and required construction trade which is responsible for applying stucco and plaster to building components for insulation, support, aesthetic and smooth background on walls both internally and externally. To achieve this, an efficient services of skilled masonry work is required for the plastering and rendering finishes. Kadu and Gajghate (2016) viewed that, waste produced from paper mill industries as Hypo Sludge Ash (HSA) can be used as replacement to cement in varying proportions which yields smooth background in plastering.

2.3.1.4 Pavers

According to Uwaifo (2009), segmental pavers are responsible for cutting, placing, and arranging a variety of finished masonry such as brick and concrete in order to create paths or walkways, driveways, and steps. They work in conjunction with other concrete professionals such as masons, finishers, and terrazzo workers to create the

modern society that we so often take for granted. Rajkumar *et al.* (2016) assert that, the usage of bagasse ash in manufacturing of paver block leads to lesser environmental hazards than conventional concrete, which reduces the pollution and global warming. In addition, it shows the economic benefit in terms of construction and maintenance cost by replacing cement with bagasse ash in concrete paver blocks.

2.3.1.5 Plumbers

According to Gupta and Thawari (2016), plumbers design, install, repair and maintain piping systems such as soil, waste water treatment, portable water connections, and gas systems in residential, commercial, industrial buildings and at utility sites. Plumbing tasks require the ability to assemble, install, maintain and repair pipes, fittings, fixtures, appurtenances, appliances of heating, water, storm and sanitary drainage systems according to specifications and plumbing codes. Ogochukwu (2014) viewed that, plumbers install sanitary fixtures such as, lavatories, toilets, bathtubs, bathroom accessories, showers, kitchen sinks and appliances, fountains and laundry equipment.

2.3.1.6 Carpenters

In construction industry, the job scope for carpenters is construct, erect, install or repair structures, fittings or furniture made of wood; building frameworks including partitions, joists, struts and rafters, wood staircase, window and door frames and hardwood floors using their skills and tools (Usman *et al.*, 2012). They build wood framing for houses, roofs, stairs, and decks, and construct formwork to support concrete work such as footings, columns and stairs. Besides that, they also involve carpentry work to install cabinets siding, drywall rails, building cabinets and counter tops and may include; work on drywall, wood flooring, metal jambs and ceilings. Normally carpenters are skilled in exterior and interior finish work. Different type of carpenters have different skills according to their specialisations such as; roof members

constructors, cabinet makers, stairways constructors, floor coverers and interior decorators (Adeyemi, 2010).

2.3.1.7 Metal workers

According to Ogbeifun (2011), the duty of metal workers in the construction is to maintain and install for variety of metal products including vinyl siding repairs, signs and ventilation equipment. This profession requires many years of training and experience, not only because metal work must be very precise, but also the level of danger associated with working environment which use the powerful cutting and lifting equipment is higher than most other occupations. The transformation of metals through the application of the available manufacturing process date back to stone ages when bulk of the valuable work contents are manual with the accompanying by repetitive risks. Common manufacturing processes in practice among the local fabricators includes cutting, grinding, welding, shaping, bending, painting and forging (Onawumi *et al.*, 2016).

2.3.1.8 Plant operators

Construction equipment operators use machinery to shift construction materials, earth, and other heavy materials at construction sites, and operate equipment that clears and grades land to prepare it for construction of roads, buildings, and bridges (Okuntade, 2014). They use machines such as bulldozers to excavate trenches to place or repair sewer and other utilities, and use tower crane to hoist heavy construction materials. Besides that, construction plant operators also help make adjustments, set up and inspect the equipment, perform some maintenance and minor repairs. According to Uwaifo (2009), construction equipment is more technologically advanced than it was in the past. In technology advanced country such as Japan and United Kingdom, skilled workers use Global Positioning System (GPS) technology in for accurate grading and levelling activities.

2.3.1.9 Painters

According to Authority (2016), painters and decorators are often the last line of construction workers to finish a project before the tenants occupy the structure. The main duty of painter is to provide not only aesthetic considerations for a bare structure, but also enhance the natural shape of a building and provide additional protection from weather, wear and tear, and natural aging process. Lo *et al.* (2016) opined that, there are many purposes for using paint in building construction, these includes increase the visual appeal of building surface, protect surface against weathering impact, make the surface water proof, protect surface from termite attack and increase the surface durability. In addition, the study of Ozic *et al.* (2016) indicate that, painting is usually use in four elements of a building such as; interior wall, exterior wall, ceiling surface, wooden surface and metal surface.

2.3.1.10 Welders

In the Nigerian construction industry, welding is a method of permanently joining two or more metal parts which involves applying heat to metal pieces which melts and fuses them, creating a strong bond upon cooling (Musa, 2016). Welders use many different welding methods for specific purposes including maintenance and repair. Monday (2015) asserts that, the importance of welding as an industrial process, it is not surprising that welders are employed across a broad range of industries including; construction, car racing, oil and gas, mining, and manufacturing. According to Ajufoh and Ogwuche (2016), welding is an essential part of the process in many construction projects, especially commercial construction projects or large, civil engineering-style projects such as building bridges, dams or utility plants. Construction welders as viewed by Nworu (2016), help create large structural metal parts such as girders on site, and often have to work in difficult conditions, including outdoors and on construction platforms high above the ground. Welders in the commercial and industrial machinery and equipment repair and maintenance industry also sometimes

have to work in difficult conditions as it maintain and repair all types of industrial machinery, including outdoor facilities such as oil rigs (Ekong and Ekong, 2016). Therefore, a welder is among skilled workers that involves in construction, manufacturing and civil engineering works which the Nigerian construction industry recognises it as one of the categories of skill trades in the construction projects.

2.4 Definition of Performance

To perform is to take a complex series of actions that integrate skills and knowledge to produce a valuable result (Romero *et al.*, 2014). Project performance has been defined as the degree of achievement of certain effort or undertaking which relates to the prescribed goals or objectives that form the project parameters (Al-Dhaafri *et al.*, 2013). The key requirements of suitable performance measures and measurement frameworks are identified as including, having a few but relevant measures, being linked with critical project objectives, providing accurate information, and comprising financial and nonfinancial measures (Idiako *et al.*, 2015). There are many potential measures of performance for evaluating the success of a construction project. All address performance in three key areas; scope, schedule and budget (Kaliani *et al.*, 2016). Alsulamy (2015) discovered seven (7) project performance indicators, namely; construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service. project performance indicators are measured based on three components which include; safety, profitability and productivity.

According to Grodal *et al.* (2015), the ability to execute work on time, cost and quality is what is known as performance, and there are several aspects to performance but to get the most from the system is to keep each of the components in balance not allowing any to become a blockage. In another definition, Katsikeas *et al.* (2016) mentioned that, performance is the accomplishment of a given task measured against present known standards of accuracy, completeness, and cost in a contract. Performance is deemed to be the fulfilment of an obligation, in a manner that releases the performance from all liabilities under the contract. Almes *et al.* (2016) state that, performance of a project depends on the coordination between the parties involved,

system of communication, culture of the project, staff members and the structure of the communication used. In construction industry, according to Balfaqih *et al.* (2016), there are several performances such as; safety performance and environmental performance, which are measured using Performance Measurement System (PMS) in order to improve the performances of construction industry. Maya (2016) indicates that, clients, investors and other stakeholders are demanding continuous improvement in the construction industry. Performance measurement is defined as the process of quantifying the efficiency and effectiveness of an action (Spano, 2016).

2.4.1 Theory of Performance

The Theory of Performance (TOP) develops and relates six foundational concepts to form a framework that can be used to explain performance as well as performance improvements (Auma, 2014). To perform is to produce a result with either a positive or negative outcome, a performer can be an individual or a group of people engaging in a collaborative effort to achieve certain goal (Aje *et al.*, 2009). Developing performance according to Golini *et al.* (2014) is a journey, whereby level of performance describes location in the journey. According to Romero *et al.* (2014), current level of performance depends holistically on six (6) components which include; context, level of knowledge, levels of skills, level of identity, personal factors, and fixed factors. These levels of performance are proposed for effective performance improvements through a performer's mindset, immersion in an enriching environment, and engagement in reflective practice.

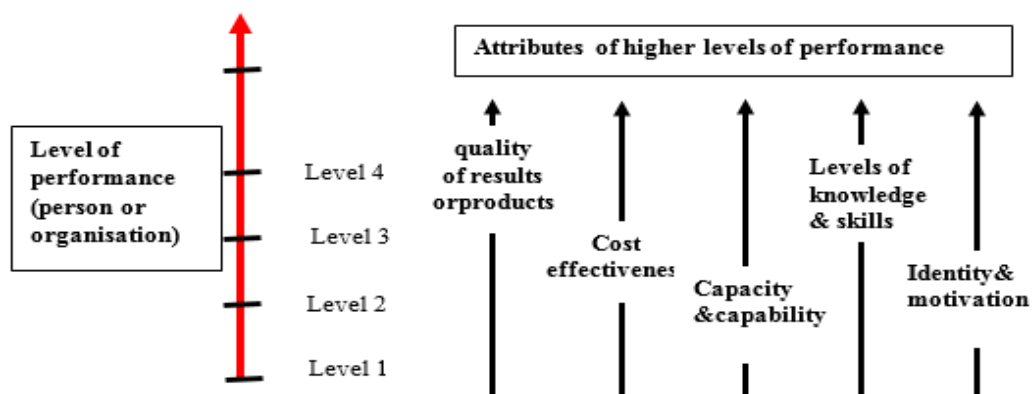


Figure 2.1: performance advancing through levels (Romero *et al.*, 2014)

Performance advancing through levels is shown in figure 2.0 where Label 1, Label 2, Label 3, Label 4 etc., are used to characterise effectiveness of performance of a person or organisation. The figure indicates that, a person or organisation at Level 3 is performing better than a person or organisation at Level 2.

As shown on the right side, performing at a higher level produces results that can be classified into categories:

- i. **Quality increases:** Results or products are more effective in meeting or exceeding the expectations of stakeholders production a result, amount of waste goes down.
- ii. **Capability increases:** Ability to tackle more challenging performances or projects increase.
- iii. **Capacity increases:** Ability to generate more through performance input increase.
- iv. **Knowledge increases:** Depth and breadth of knowledge increases.
- v. **Skills increase:** Abilities to set goals persist, maintain a positive outlook, increase in breadth of application and in effectiveness.
- vi. **Identity and motivation increases:** Individuals develop more sense of whom they are as professionals or organisations to develop their productivity.

2.4.2 Construction projects performance

Chinny *et al.*, (2010) stated that, the level of the satisfaction experienced decides the degree of the project success. Khan (2015) mentioned that, ineptitude management is generally recognised as a major factor of poor construction productivity especially as a result of insufficient supervision on site. In fact, poor supervision on site contributes to the poor workmanship on construction site and it can be seen at many occasions on the jobsite as inadequate management on the construction site to be the primary cause that affects labours' daily productivity (Kasun and Janaka, 2006). Jha and Chockalingam (2009) stated that, unqualified project manager is one of the causes of substandard project delivery, as a result, poor project management is one of the factors contribute to poor workmanship in construction sites. Khalid *et al.* (2006) agreed that, the role of subcontractor is one of the factors contribute to construction poor workmanship that need to be addressed for effective project productivity due to the fact that, most of the site works are completed by subcontractors whereby the main contractors only depend on the subcontractors. Jarkas (2013) asserts that, approximately 90% of the site work is executed by variety of subcontractors whereas main contractor is focused on management and coordination of the projects. Besides, Chan *et al.*, (2006) also mentioned that, labour sub-contracting also leads to severe problems in the co-ordination of work and attainment of quality standards. Therefore, complicated role of subcontractor in construction projects can contribute to poor workmanship.

On lack of experience and competency of labours, (Jorge *et al.*, 2005) mentioned that, productivity cannot be achieved by speed and harder work only without adopting better work practices, whereby insufficient skilled workers are the most important factor industry stakeholders are concern about. According to Kazaz and Birgonul (2005), some construction companies in Turkey usually prefer to employ short-term unskilled workers and consequently cause faults in the process of attaining the stability of quality associated issues. Hence, lack of experience and competency of unskilled workers must be taken into account as a factor contributes to poor workmanship. According to Cooper *et al.* (2015), language barrier and communication difference between the foreign labours and local supervisors causes the

communication failure on the jobsite, whereby, language barrier indirectly causes the lack of communication between the supervisors and labours. This consequently causes misunderstanding by the labours during work scope and then lead to poor workmanship. Faisal *et al.*, (2006) stated that, unsuitable construction equipment and insufficient latest information about procurements of equipment can influence the project quality. Danso (2014) added that, poor quality of mass low-cost housing projects in Turkey is mostly because lack of information about current construction materials and equipment. Therefore, unsuitable construction equipment can cause low quality of workmanship in construction. Dai *et al.*, (2009) stated that, extreme climate condition is one of the factors that affecting construction labour productivity and workmanship. Abu-Hamdeh & Alnefaie (2016) found that, the climate of Saudi-Arabia being extremely hot and severe during summer which makes most of the construction work very hard to deliver effectively, and as a result, the quality of workmanship is affected.

Ghaffar *et al.*, (2010) noted that quality enhancement by strict supervision in construction site is one of the criteria for improving recent practices in the construction industry. This indicates that, supervision should be carried out by the contractors so that workmanship problem can be identified and the remedy work can be executed immediately. Osama and Khan (2010), agreed that, appropriate training and internship experience are necessary in transferring the quality of project. Van der Merwe (2013) stated that, the capability of construction managers to manage, arrange and co-ordinate the work would lead to the successfully productivity of any construction project, and construction project that has a well-arranged manpower will produce a high quality of project. Besides, Abdulaziz (2010) mentioned that, manpower is the sole productive resource, thereby construction productivity is essentially relying on human endeavour and good performance. In terms of proper design, Kiong and Pheng (2006) found that, better design can get rid of workmanship defects and helps to avoid excessive errors during construction work. Othman *et al.* (2015) assert that, inadequately worded specifications and undetailed designs always cause poor skilled workers' performance and thereby result in poor quality and inefficient project productivity. Loosemore (2014) states that, international construction projects performance is affected by more complex and dynamic factors than domestic projects which is frequently being exposed to serious external uncertainties such as; political, economic, social and cultural related factors as well as internal factors within the project. Due to their unique

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