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An Assessment of Factors Affecting Productivity of Key Building Trades in Southwestern Nigeria

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Abstract
Building construction projects suffers various problems and complex factors such as cost, timing, quality, safety and other salient factors which are like incipient delay to the successful completion of building projects. The aim of this research is to identify factors affecting skilled labour performance and analyse the main factors affecting the productivity of artisans in building construction projects in southwestern Nigeria. Literature on factors as recommended by experts were considered and categorized into five groups with each group containing at least four subgroups. These factors were evaluated and analyzed using Statistical Package for Social Sciences (SPSS) based on the primary data collected via structured questionnaire. The method of analysis used are chi-square test, ANOVA test, co-efficient of determination test, hypothesis testing were all carried out to ascertain the effect of these factors on professionals and artisans in achieving the expectation of embarking on such building construction project. It was concluded that a detailed schedule of human, material and logistic must be planned and supplied in order to reduce time taken, cost, effect of weather, inadequate supervision, adverse effect of concerned authority ,alcoholism, insufficient material, unnecessary delay and waste of both human and material resources. In addition, it is recommended to develop human resources in the building construction industry through proper and continuous training programme. All these will successfully create an enabling environment and action towards completing building projects based on approved specification.
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1. INTRODUCTION

Construction labour productivity is mostly affected by the management of the labour directly involved with on-site activities. In view of this, Maloney (1983) remarked that craft workers as the major player executing construction processes and activities, have a significant influence on construction labour productivity. In the same vein, Dai *et al*. (2009) considered craft workers to be in the ideal position to know where and how much of site‘s productivity is lost or could be gained. Since labour productivity involved the management of labour, project supervisors/engineers often regarded as middle level managers are responsible for the coordination of the instructions from upper level managers for implementation by the craftsmen. These instructions equally affect construction labour productivity. In today‘s era, one of the biggest concerns for any organization is to improve their productivity, representing the effective and efficient conversion of resources into marketable products and determining business profitability (Wilcox *et al*., 2000). Consequently, considerable effort has been directed to understand skilled labour productivity concept with different approaches taken by researchers, resulting in a wide variety of productivity definitions (Lema and Samson, 1995; Oglesby *et al*., 2002; Pilcher, 1997).

Studies(Karim and Marosszeky, 1999; DETR (KPI Report), 2000; Lehtonen, 2001; Samson and Lema, 2002; Kuprenas, 2003; Cheung, 2004; Iyer and Jha, 2005; Navon, 2005; Ugwa and Haupt, 2007) related to labour productivity had been carried out in construction industry in the past. Some of them were related to calculating the effect of productivity factors. Measureable calculations about the effects of those factors are required for several purposes, it includes estimation of the construction project, its planning and scheduling. However, past study shows that it is difficult to calculate such an impact and presently there are no universally accepted standards to measure factors causing labour productivity loss in construction industry. These methods for measuring effects highlight the need to enhance measureable assessments for the factors affecting productivity in building construction.

Achieving better skilled labour productivity requires detailed studies of the actual labour cost. Various skilled labour have different variables affecting their productivity levels. For every project, productivity, cost, quality, and time have been the main concern. Better productivity can be achieved if project management includes the skills of education and training, the work method, personal health, motivational factors, the type of tools, machines, required equipment and materials, personal skills, the workload to be executed, expected work quality, work location, the type of work to be done, and supervisory personnel (Rowlinson and Proctor, 1999).

The construction industry is very important to the economy of every nation. This importance stems from a wide range of reasons associated with certain peculiar features of the industry such as its products being investment-goods (Kazaz and Ulubeyli, 2004). It covers half of the whole field of fixed capital accumulation

(Fagbenle, 2009), therefore; it constitutes the most single sector of capital formulation in any national economy (Ayandele, 1996). In Nigeria, construction investment accounts for over 60% of the Gross Fixed Capital Formation (GFCF),that is, the total national investment (Dlakwa and Culpin, 2010). The industry is also seen as the barometer for the performance of the economy in most developing countries (Kazaz and Ulubeyli, 2004; Chitkara, 2006). Adedeji (2008) observed that building industry being a subset of the construction industry is one of the most important sectors of the Nigerian economy.

Productivity is considered as one of the most important factors affecting the success and overall performance of every organization, whether large or small, in today‘s competitive market (Ersoz, 1999; Sweis et al., 2009). According to Nkado (1995) and Walker (1995), construction productivity is traditionally identified as one of the three main critical success factors together with cost and quality for a construction project. The labour force is an asset in its capability to enhance productivity and growth (Nigeria Vision, 2020). Higher savings as a proportion of national income increases investment prospects and may therefore lead to higher national output. In essence therefore, dramatic reduction in life expectancy affects the labour force and hence labour productivity in addition to the allied potential lasting adverse effects on growth particularly within the Nigerian economy.

1.2 Background of the Study

Although researches (Karim and Marosszeky, 1999; DETR (KPI Report), 2000; Lehtonen, 2001; Samson and Lema, 2002; Kuprenas, 2003; Cheung, 2004; Iyer and Jha, 2005; Navon, 2005; Ugwa and Haupt, 2007) have been carried out on factors influencing productivity, there is still a lot to be done even in developing countries. To improve productivity, the impact of each factor can be assessed by statistical methods and attention given to those particular parameters that adversely affect productivity. Previous studies looked at the construction industry as a whole, yet the majority of the workers are employed on building sites. Most civil engineering projects are ―mechanized‖. Various factors have been identified by different researchers from the time aspect in different construction sites. Olomolaiye *et a*l. (1989) found that the five most significant factors in Nigeria were lack of materials, rework, inadequate equipment, supervision delays, absenteeism, and interference and also he went further to say that lack of materials, weather and physical site conditions, lack of proper tools and equipment, design, drawing and change orders, inspection delays, absenteeism, safety, improper plan of work, repeating work, changing crew size and labour turnover were found out to be the most critical factors.

Lim and Alum (2005) found that the major problems with labour productivity in Singapore were recruitment of supervisors, recruitment of workers, high rate of labour turnover, absenteeism at the workplace, communication with foreign workers, and inclement weather. Yet, Lema,,(2004) through a survey of contractors in Tanzania found out that the major factors that influenced productivity are leadership, level of skill, wages, level of mechanization, and monetary incentives

A study from (Adrian 1990) stated the following general misconceptions about labour productivity: Key factor for low productivity in construction industry is labour; because the construction industry is controlled by the weather, productivity cannot be improved; the construction industry always has an unfavorable relationship process .Facts about the construction productivity studied by Adrian (1990) also stated that Tuesday is studied as most productive day of the week;10 a.m. is studied as most productive time of the day ;the least productive time frame for labor is right before the finishing time; A labourer is capable of lifting approximately 94 pounds on his own. It is clear from the foregoing that there is still dearth of information on the factors affecting craftmen construction productivity in Southwest Nigeria and which this study set to address. This research aim at examining factors influencing skilled labour productivity on building construction sites in South Western Nigeria so as to achieve the following objectives;identify various factors affecting skilled labour productivity in building construction projects ,determine the premiums placed on the identified factors by stakeholders in the construction industry, examine the effects of the identified factors on construction productivity in the study area and develop a template for an improved skilled labour productivity.

2.0 LITERATURE REVIEW

The construction industry is often not perceived as offering an environment that nurtures creativity. According to Dale (2007), Construction is a unique environment and by definition is a creative industry. He supported this notion by stating that no single project is the same as another and that diversity breeds innovation and innovative problem solving at the practical level. The industry is evolving changing and seeking more integration, innovation and simply better schemes for providing public services and products. Pakkala (2000) maintained that many countries around the world are attempting to answer the key challenges to the construction and maintenance of the infrastructure networks that are essential to the economic stability within their respective countries. He further stressed that society is rapidly changing and public clients are trying to meet the critical needs of this fast-paced society. He listed ageing infrastructures, productivity, acute regional development, environmental issues and sprawling growth as causing concern to the management and administration of infrastructure networks. These factors are strong incentives for seeking alternative and innovative means to procure the main foundations of society and maintain economic stability.

Pale (2007), stated that research conducted by the office of national statistics shows that construction spends comparatively small amount on innovation and it is evident that the issue of sustainability is clearly at the top of the agenda for innovation in construction. Increase of productivity was calculated prior to mid-1906‘s, in the construction industry (Stall, 1983). A study by Polat and Arditi (2005) stated that policies to high productivity are not always similar in each country. Their study identified different factors affecting labour productivity and grouped them according to their characteristics such as, design, execution plan, material, equipment, labour, health and safety, supervision, working time, project factor, quality, leadership and coordination, organization, owner/consultant, and external factors. Adrian (1987) classified the productivity factors causing low productivity as industry-related factors, labour-related factors, and management-related factors. Industry-related factors, essentially, are the characteristics of the construction industry, such as the uniqueness of construction projects, varied locations, adverse and unpredictable weather, and seasonality. Labour-related factors include the union‘s influence, little potential for learning and lack of motivation. Management-related factors usually refer to lack of management for tools or techniques.

2.1. Different Factors Affecting Labour Productivity

Studies into the performance of the construction products have engaged the attention of many researchers (for example, Sidwell, 1983; Sink, 1985; Campbell, 1995;Fagbenle 1997 and Chimwaso 2000). Clients of the construction industry have measures for assessing contractors‘ performance depending on the type of client, projects and other related factors. According to Seeley (1996) and Fagbenle (2000), the traditional project performance measures of cost, time and quality are frequently used to measure contractors‘ performance by clients. Skitmore (1997) grouped the factors affecting the environment of construction project under cultural, economic, political, social, physical, aesthetic, financial, legal, institutional, technology and policy. It was further argued that a project might be delayed because of a seemingly endless list of variables and that all delays usually cost money. Moreover, the neglect of quality has a detrimental effect upon time and cost performances.

Olomolaiye *et al*. (1998) classified the productivity factors into two categories: external factors which are the ones outside the control of the organization management and internal factors which is related to the productivity factors originating within the organization. From their viewpoint, the nature of the industry, usually the separation of design and construction functions, has affected construction productivity through delay in drawings, design changes, and following rework. Moreover, being an outdoor industry, construction performance is extremely affected by weather conditions. In addition to the factors discussed, health and safety regulations, and codes of practices are other external factors influencing task operations and productivity. In the internal category, management inadequacies could result in a waste of resources with consequent losses in productivity; adoption of modern technology and training for the labourer would increase productivity.

Fagbenle (2000) defined labour as a task that requires the exertion of body and mind or both. Labour is also regarded as an important resource in construction because it is the one that combines all the other resources namely materials, plant equipment and finance in order to produce the various construction products. As expressed by Wachira (2000), consultants via specification, control of materials, plant costs, profit and overheads are generally controlled by the competition. This then leaves labour as the major resource opened to improvement.

Labour management can be expressed as the application of management skills to labour. That is, planning, control and monitoring of labour management is also the process of channeling human energy and skill into achieving business objectives. According to Olateju (1992), the primary responsibility of management in a construction firm, as in any other firm, is to ensure that all resources namely, manpower, machinery, materials and money are employed optimally to produce maximum profit for the investors in the enterprise. In general, productivity signifies the measurement of how well an individual entity uses its resources to produce outputs from inputs. In Nigeria, low productivity in construction was identified as one of the major problem of the construction industry, because of its labour-intensive nature, reasons for this situation include the separation of design and construction phases; a transient pool of largely low-cost, unskilled foreign labour; and the still economical, traditional labour-intensive construction systems. While that may have overcome labour shortages in the industry, the problem of low productivity associated with the readily available pool of foreign labour abounds. As a result of this cheap and low class labour, there is little incentive for contractors to improve construction methods by introducing technological advancements. At the same time, the attempts to identify the factors for low productivity never ceased, especially to distinguish the critical causes. If the effort to enhance productivity performance can be devoted in the right direction, then measures for improvement will be taken efficiently. Although several studies have been done on factors affecting productivity, and most of the factors are identified, further research on the relationship between different factors is seldom carried out. In this research, a study is conducted to recognize the significant factors for the low skilled productivity in Nigeria construction industry. The focus is on the relationship among different factors through quality and quantity analysis, so as to identify the most direct factors and their root causes

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2.2 Productivity in the Construction Industry

It is important to understand and improve the construction productivity as the construction industry represents more than 13 % of the U.S economy (U.S. Bureau of statistics, 2000). Over 10 million people work in the construction field and many studies showed a recognizable increase in construction productivity (P. M. Goodrum, Haas, & Glover, 2002); but more improvements are required. The construction industry is believed to be a main generator of jobs and it is an important component of the gross domestic product. The concept of construction productivity can be difficult to define, measure, and communicate. This is because there is a lack of comparable inputs and outputs, and projects variation in the construction industry. Besides, the difficulty in analyzing productivity statistically arises from the fact that it has different units of measurement for each construction activity (P. M. Goodrum & Haas, 2004). It was also stated by (H. Thomas & Yiakoumis, 1987)that there has been no standard definition of productivity in construction industry because each company defined productivity depending on their own internal system which is not the same in each company. And none of them succeeded in forming standard definitions or survey tools that can be used to collect standard productivity data (Park *et al*., 2005). Also, each construction project is unique and non-repetitive. However construction productivity can be defined in many ways. First, it is how well, how quickly, and at what cost construction projects can be constructed. Second, it was defined by The American Association of Cost Engineers as a relative measure of labor efficiency, which is defined as the output per hour worked, either good or bad depending based on the reality that productivity changes over time. Third, a common measurement of construction productivity is factor productivity.

Partial factor productivity is the relationship between output and one input, usually, but not necessarily, labour or capital while multifactor productivity (MFP) or total factor production (TFP) relates output with all of the inputs that can be measured and labour productivity can be measured in terms of output per hour worked or output per worker (Harrison, 2007). Labour Productivity equals physical outputs per work hours. Goodrum & Haas, 2004). Another definition for Engineering Productivity is the ratio of direct engineering work hours to the engineering outputs. Also, it is mentioned that productivity presents how efficiently the major resources are used to produce the outputs. (Liao, Thomas, O'Brien, Mulva, & Dai, 2009). Using relative instead of absolute values is a way to solve the difficulty of measuring productivity.

Total factor productivity is used to monitor the state of the economy. It is considered an economic measure since both the outputs and inputs are in dollar amounts. However, it is considered unsuitable for construction by many people, because the inputs of any given project are difficult to be predicted (Thomas *et al*., 1990).Productivity describes the output potential of a production process conditional upon its inputs (Bernstein, 2003). Many people; including Rojas & Aramvareekul,(2003a), measure productivity as output per hour of work. In contrast, (Allmon, Haas, Borcherding, & Goodrum, 2000) measured productivity in terms of unit labor costs, output, and direct work rates at the individual work task level. It was found that construction productivity has increased in the past few decades, as measured by cost per unit of work and physical output per hour of work (Rojas & Aramvareekul, 2003a). Productivity can be simply illustrated by an association between an output and an input.

Confusion sometimes arises because economists and business people have different ideas about what productivity means. To business people, productivity often means an increase in sales or output per worker, leading to increased profit margins, measured in current dollars. Economists have a related, but different definition of productivity. They define productivity as the relationship between outputs of goods and services and inputs of resources, in both human and non-human form, used in the production process, with the relationship usually expressed in ratio form. Both outputs and inputs are measured in physical volumes and are thus unaffected by price changes (Harrison, 2007).

2.3 Productivity Trends in the Construction Industry

Measuring productivity for the construction industry is challenging. Despite its importance to the national economy, there is no official productivity index for this industry. Such indexes are available for manufacturing, agriculture, and other industries that produce outputs that are easily recognizable and measured. Factors affecting construction and labour productivity include resources (materials, information, tools, equipment, workforce skills, and support services), the quality of on-site supervision, project management, work flow sequencing, weather, and safety. Goodrum, 2009). It is not appropriate to measure the construction industry's performance depending on some productivity measurements since it is a complex industry. If measured on the basis of labour productivity, the most recent figures collected by Statistics Canada for the construction sector from 1997 to 2002 shows an average increase of 1.9% per annum (with a decrease in 2001 of -2.3%) while the rest of the country's economy increased at an average of 2.3% per annum (Haas, 2009).

This difference in productivity measures caused different results. For example, in the U.S., aggregate level productivity measures show long-term declines, while activity level productivity measures show long-term improvements (Allmon *et al*., 2000). At the activity level, extensive research indicates that both labour and partial factor productivity have improved. When construction productivity has been measured at the aggregate level, research has shown a decline in productivity by 0.72% annually compounded from 1968 to 2000 (Teicholz, 2000.). Paul *et al.* (2001) collected data on 200 activities using the Means, Richardson and Dodge estimation manuals from the years 1976 and 1998 and foundan increase in construction productivity of 1.2% compounded annually. The discrepancy between macro and micro measures also affected the outcome results. For example, it was suggested that during 1979-1998 labor productivity in the construction industry has significantly declined and this is according to the macroeconomics data, which is the opposite of what is indicated by the microeconomic studies. The same was mentioned during the 1980s and 1990s. Industry analysts differ on whether construction industry productivity is improving or declining. Some analyses for the industry as a whole indicate that productivity has been declining for 30 years or more. Other studies document improved productivity for construction projects and construction tasks (e.g., the laying of pipe or concrete).

However, due to a lack of longitudinal productivity data in construction, there has been little effort to quantify the factors that impact productivity trends (Haas, 2009). On one hand, it was widely assumed that unlike other industries in recent years, construction industry has shown no development in productivity. Moreover, data showed that productivity is rather declining (Bernstein, 2003). It was noticed that there has been a decline in the productivity of construction industry in the Canadian economy in the early 1980s which is contrasted to an increase in productivity for all other sectors. However, Canada is believed to do much better than the U.S. in construction labor productivity (Rao *et al*. 2004). The current trends in construction productivity fell under large debate.

Paul McGinley Goodrum (2001) examined over 200 industry activities within 10 specific construction trades and found all of them to have productivity improvements between 0.8 and 2.4% annually compounded. One research (Allmon *et al*., 2000) supported the perception that construction productivity has not been declining over the last twenty years. Rojas & Aramvareekul, (2003a)concludes by arguing that the construction industry has achieved moderately improving productivity over the past two decades and that the challenge now is to broaden and accelerate those gains**.** He measured project-level productivity using two different methodologies. He concluded that productivity for individual projects increased about 33 percent, or 0.78 percent per year, between 1966 and 2003.He also stated that we are receiving more building for less money than we did 37 years ago, and moreover, the product is qualitatively superior. He concluded that these improvements are the result of increased productivity made possible by mechanization, automation, prefabrication, less costly and easier-to-use materials, and lower level of real wages. According to official Statistics Canada productivity estimates, the rate of growth of real output per hour in the construction industry in Canada over the 1981-2006 period was 0.53 per cent per year, one-third of the of the business sector average of 1.46 per cent (Harrison, 2007).

2.4 Forms of construction Skilled Trades.

A study of building workers carried out by the Building Research Establishment listed over 50 separate occupations associated with construction (Osebourn & Greeno, 2007).

The following are the common types of skilled trades in the Nigeria construction industry:

(i). Mason/Bricklayers

According to Langford (2009), the early pyramids were built by bricklayers with bricks, made from mud. Bricklayers are skilled craft operatives (Brett, 1997) who lay bricks, concrete blocks (Osobourn & Greeno, 2007), natural and artificial stones, glass blocks, tiles, prefabricated panels and mortar in the construction of all types walling. It takes a great amount of skill to assemble masonry units. The work output of bricklayers has to be durable, neat and attractive. In a study by Hagan, Lowe and Quingla (2011) cited by Ademeso et al. (2011), bricklaying was identified as askilled profession distinct from a labourer and is highly paid amongst the construction trades (Langford, 2009). A bricklayer as noted by Lagford,(2009),work with an assistant and other trade people in the building process and therefore, need to have strong interpersonal skills. Good physical condition and stamina are also assets for the trade.

(ii). Carpenters

The craft of carpentry dates back from the earliest use of tools by mankind (Basalla 1999). The job of a carpenter as noted in Osbourn and Greeno (2007) and Brett (1997) is carcassing and working timber and other materials. The carpenter mainly works on site and is employed on almost every type of construction activity. Skilled carpentry has existed in West Africa ever since colonists brought about changes in the technology of the indigenous people (Lloyd, 1953). Carpenter in 2005 reportedly made up the largest group of skilled workers employed in the building trades in Nigeria (National Bureau of Statistics, 2006).

(iii). Tillers

Tillers apply internal floor and wall finishes (Osbourn & Greeno, 2007).Unlike many construction jobs, tile setter jobs are relatively free from routine. Tile fixers work independently of most other construction workers and can plan their own work and schedule.

(iv). Iron Benders

Steel fixers, cut bend, shape and position the steel reinforcement used in concrete structures (Osbourn & Greeno ,2007). The work of a steel fixer requires high technical competencies because they have to read building and civil engineering plans and be knowledgeable about dimensions, scales and calculations.

(v). Painters

Aesthetics value of a building is more enhanced by applying paint of different colour on the building wall and ceiling, this type of work is attributed to painters who are trained and knowledgeable about the painting work. In ancient civilizations such as that of the Romans, piping systems called aqueducts were built to conduct water to baths in public places and houses prevent disease, with every occupied space in houses having facilities for ablutions (Langford,2009). Plumbers then referred to in Latin as plumbers meaning ―worker in lead‖, installed pipe fixtures at mountain sources that brought pure water into and took wastewater out of cities. These early plumber were respected for their role in maintaining the health conditions of the community. Today, in Nigeria, plumbers are often subjected to negative stereotypes because of the nature of their work, which involves water supply and drainage installation (Osbourn & Greeno, 2007),and cutting and fixing sheet metal roof coverings and flashings (Brett, 1997).

(vi). Electricians

The occupation of the electrician developed out of the need to wire, construct and test every electrical system, ground line and socket in the early 1900s. An electrician is someone who is involved in electrical installation, including telecommunications in the interior of the building and electrician have grown to become some of the most highly skilled trade‗s people in the building and construction industry.

(vii). Sheet Metal Works

The aesthetic beauty of metal can be found in many things. Although we see the finished brilliance of a metal product, rarely do we get the chance to appreciate the skill involved in bending, pressing and shaping it into a useful component. Sheet metal workers are best known for creating the intricate ventilation system that provide heat and air-conditioning, and keep the environment and people safe from harmful gases. Their skill and expertise extends beyond designing and implementing duct system to include roofing (Brett, 1997),wall components, stainless steel workspaces, balustrades and architectural ornamentation such as skylights, signs, awnings, ceilings and spouts.

(viii) Scaffolders

Buildings above ground floor required an access for work to be done in there, scaffolders put up and take down scaffolding. This allows other workers to reach the higher levels of buildings during construction, cleaning and renovation projects.

(ix) Plant operators

Plant operators work with machinery used on construction site and roadwork .Machinery includes 360 degree excavators, bulldozers and dumpers trucks for moving earth; static tower cranes mobile and rough terrain cranes for lifting and moving whacker plates used for flattening out work areas. Operators also use fork lifts and telescopic handlers to move or load building materials.

(x). Plant and equipment mechanics

Construction plant mechanics service and repair plant machinery, such as excavators, bulldozers, cranes dumper trucks, generators and concrete mixers.

2.5 Factors Affecting Labour Productivity

Productivity is the outcome of several interrelated factors. Factors affecting labour productivity as posited by Hanna and Heale (1994), are discussed below

[i]. Time: During construction projects, there are many tasks which cause a loss of productivity. Past study shows productivity decreases with working overtime. The most frequently stated reasons are fatigue; increased absenteeism; decreased morale; reduced supervision effectiveness; poor workmanship, resulting in higher rework; increased accidents (Horner and Talhouni, 1995). Working overtime initially result in increased output, but continuing overtime may lead to increased costs and reduced productivity (Hinze, 1999). Time used by a construction labourer on productive activities averages about 30% of the total time available. An employee in the field only works effectively for 3.5 hours of his 8-hour shift and spends 20% of his time on direct value-adding activities (Alinaitwe *et al*., 2005).

[ii]. Schedule Compression: When there are early delays in a project, compressions of the overall time frame for a later activity are often the way to compensate interruptions and to complete the assigned task on schedule. From a professional scheduling perspective, schedule compression may be possible without accelerating individual work activities by utilizing float in the project‗s overall schedule. However, on many projects, schedules are not fully resource loaded. As a consequence, a properly updated schedule reflecting the delays may

show the project finishing on time without shortening individual activities.
[iii]. Type of Project: To accomplish substantial productivity, every member of a crew requires adequate space to perform task without being affected with/by the other crew members. When more labours are allotted to perform particular task, in a fixed amount of space, it is probable that interference may occur, thus decreasing productivity. Additionally, when multiple trades are assigned to work in the same area, the probability of interference rises and productivity may be reduced. Interference among the various crews and labourers is due to mismanagement on construction sites. For example, a steel-fixture crew has to wait before fixing the reinforcement rods if the carpenter‘s framework is incomplete. The types of activities and construction methods also influence labour productivity (Sanders and Thomas, 1991).
[iv]. Safety: Accidents have high impacts on labor productivity. Various accident types occur at the site, such as an accident causing death and resulting in a total work stoppage for a number of days. An accident that causes an injured person to be hospitalized resulted in a work decrease of the crew for which the injured employee worked. Small accidents resulting from nails and steel wires can stop work and, thus, decrease productivity (Sanders and Thomas, 1991). Even insufficient lighting shows decreased productivity because sufficient lighting is required to work efficiently because insufficient lighting has negative effects. Employing a safety officer helps labours to recognize the required safety regulations and follow them, which can reduce the number of accidents, thus increasing productivity.

2.6 Review of activities of Tradesmen on Building Project Productivity
Productivity is considered as one of the most important factors that affect the success and overall performance of every organization, whether large or small, in today‘s competitive market Attar *et al*. (2012). However, Park *et al*. (2005) identified construction productivity as a cause of great concern. Veiseth et al. (2013) and Hewage and Ruwanpura (2006) observed that for decades, many researchers have reported the decline in construction productivity. Lawal (2008) reported that in Nigeria, construction workers in the public service have almost zero productivity while Kaming et al . (1997) identified poor productivity of craftsmen as one of the most daunting problems confronting the construction industry especially in developing countries. In view of this, there is a growing and continuous interest in productivity studies all over the world because of its contribution to successful project delivery. Hendrickson and Au (2003) stated that ―good project management in construction must vigorously pursue the efficient utilization of labour, material and equipment and that improvement of labour productivity should be a major and continuous concern of those who are responsible for cost control of constructed facilities‖. Understanding the productivity of building craftsmen is complex because several factors influence it and therefore cause differences from place to place and from individual to individual. Previous studies identified and assessed factors affecting construction labour productivity (Durdyev and Mbachu, 2011; Odesola *et al*. 2013; Odesola and Idoro, 2014). The results of these studies have indicated that while some factors have significant effects , there may not be significant but their relative effects generally could differ from place to place.

Odesola (2015) attempted a comparative study among six states in South-South of Nigeria and reported average productivity to be 2.68m2/hr and that significant variation exist in labour productivity across the states. The comparison was based on productivity determined from project‘s records of cost incurred on the activity and the quantity of work involved as indicated in the Bill of Quantities. In addition, the study was based on the assumption that the same normal eight working hours were observed during the construction stage of the building projects and that provided the labour costs were adjusted to ensure that the same amount of wage for artisans and labourers applies, a higher value indicated by the productivity measure will imply higher labour productivity and vice versa. Relying on productivity values obtained through this procedure will be subjected to the fulfillment of these assumptions which therefore, underscores the importance of using work study approach Basically, the concept of productivity measurement is rooted in what is called work study or time and-motion study. Work study is a category of operations management but it is fundamentally different from operations research (Uher, 2003). According to Mojahed (2005) , some of the common work measurement techniques for productivity measurement and obtaining information about the time spent on productive and non-productive activities by workers are; work samplings, five minute ratings, craftsmen questionnaires, foreman delay surveys, time lapse photography or video recordings, and group timing techniques.

3. METHODOLOGY

Survey research is defined as collection of different data by asking people questions (Fowler, 1993). The data collection process to be used in this research had the option of two basic methods: questionnaires and personal interviews. A questionnaire was preferred so as to aid effective and suitable data-collection technique as well and reducing the error (Fowler, 1993).This research was tailored towards this widely accepted mode of data collection. Questionnaire was described as a self-administered tools directly or indirectly, an appropriate response. Data was collected from literature reviews from books, journals, articles, seminar conferences which emphasize building construction's labour productivity. Survey questionnaire were given to employees from different trades involved with the construction project. Guidelines were provided to the respondents to ensure that the procedure is followed properly to reduce errors. During the survey period, some oversights were provided to help ensure the process goes smoothly and consistently.

3.1 Considerations for the Survey

The main consideration for a survey was that it should be carefully worded, simple, easy and orderly arranged for respondents. Care was taken so that the initial questions did not negatively influence the results of subsequent questions. Preliminary statement was introduced for explaining the survey project to the respondents. A logic-based question was avoided because they could cause respondent frustration and increase the drop-out rate.

3.2 Organization of the Questionnaire

One of the biggest concerns of the research study was about number of responses with complete information. Recognition of respondents about the benefits and uses of this research study is also of great concern. The following criteria were used for the questionnaire design process: Questionnaire Response Rate , Exactness Duration, Applicable Ease of Completion ,Completeness and Understanding . Productivity was achieved by examining the accuracy and completeness of the related questions, taking into consideration the previous studies. Even though, great measures were taken to make the questionnaire efficient, it was however not assured that the response wouid be of high percentage. Great care was taken to assure respondents get precise duration to respond to the survey questionnaire. Considering the length, importance, sensitivity, past experience of researcher's advisor and feedback to be collected from pilot survey, the average time to complete the whole survey questionnaire was determined. Duration of 8 weeks was assigned to complete and submit the survey questionnaire.

Questionnaire

The questionnaire design practice advanced on daily basis and for the purpose of this study, questionnaire was categorized into profile of the respondent and various factors affecting labour productivity in building construction. Questions in the respondent profile were created to collect information such as job position, experience of the work, locations of the current and/or previous works and contact information. It was practical to anticipate that a location can have an impact on the loss of productivity due to various field disturbances, especially geographical and climatic conditions.

The next set of questions (Appendix B) was targeted on the factors affecting labour productivity in the five different groups. Each respondent had a choice to select only one option for each factor. The responses were to be based on the understanding, knowledge and experience of the respondents and not related to any definite project. This simple and straight method was selected to establish a means of developing a list of factors affecting labour productivity in building construction.

Pilot Survey and Questionnaire Revision

To improve the questionnaire section, a pilot study was adopted. This section contained identification of different causes, collection, and conclusions of data. The application of this section benefited in better formation of the survey development

Questionnaires were distributed to contractors, painters, bricklayer, tillers, carpenter, iron bender, plumber and project engineers of various building construction organizations. Information obtained and the recommendations provided in from pilot survey were used as part of guiding and correcting rule towards having and executing a good survey. Better and accurate questionnaire related to the topic was achieved from the pilot study.

Questionnaire Distributions

The target groups in this study were both professionals and non-professionals from building construction industry. The professionals include managers and consultants while the non- professionals here in this study were the artisans which include bricklayers, carpenters, iron benders and tillers. Questionnaire was distributed to this sets based on their availability on each of the site, two hundred and twenty copies of questionnaires were distributed to both the professionals and the artisans in the study area. The distribution was 70% to Lagos state and 30% to Oyo state based on the population and volume of work in this selected states, this was done based on the fact that volume of building construction project is always going on in Lagos state and most of these craftsmen and professionals concentrate much in those states. Total number of two hundred and ten copies of questionnaire were retrieved and used for this study.

Table 1: Statistical Data of Questionaire Sent and Received

Item		No of Respondent
1	Total number of questionnaire sent	220
2	Total number of questionnaire received	210
3	Invalid	10
4	Total used for the study	210

The sample size was calculated with the following equation for a 95% confidence level (Al-Shahri, M et al., 2001; Israel, 2003; Moore et al., 2003,Fagbenle 2004):

$$n = \frac{n''}{1+n''/N}$$

Where, N= Total number of population n = Sample size from a finite population
n" = Sample size from an infinite population = S^2/V
S^2 = the variance of the population elements and
V = a standard error of the sampling population. (Usually, S= 0.5, and V = 0.06.)
It is based on the above formula that one will know the sample size to use from the population size or from the target population.

3.3 Method of Analysis

In order to facilitate the study after the Literature Review and the focus interviews, a plan was formulated for collecting field information and creating an evaluation process and numerical values. It was necessary to provide straightforward communication to respondents to ensure a clear understanding of all the applicable definitions, procedures, and guidelines that were used in collecting data. Because the data-collection process included individuals, the study was conducted in accordance with the existing regulations. Three different methods were used to analyze the survey results.

[i] Ranking of the various factors according to their significance and calculating their Relative Importance Index (RII)

[ii] Statistical software package [SPSS] was used to analyze the data in order to critically examine the correlation as well as the significant effect of the factors considered.

[iii] Most contributed factors in the questionnaire was tested using hypothesis testing.

[iv] Analysis of variance test was used as well as chi-square test to ascertain the dependence and independence of the factors considered

The Relative Importance Index (RII) was used to decide various professionals' opinions of the RII in construction projects.

1. Not applicable 2. Somewhat affects it 3. Does not affect it
4. Directly affects it × Number of respondents for each degree

Research was conducted considering factors affecting labour productivity for building construction, and their RII was calculated. These factors were classified into five groups: manpower factors, external factors, communication factors, resources factors, and miscellaneous factors. Different groups used in the study were then discussed in detail.

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 Data Collected from the Survey

A total of 220 questionnaires were sent to construction professionals, resulting in a nearly 95% response rate (Table 3.1). Missing data frequently occur after the respondent chooses not to respond to questions or when the respondent declined to answer the questions. (Kim, 1993). The most serious concern presented in the responses was some missing data. A total of 10 questionnaire was not responded to.

It is commonly believed, while performing different tasks on construction projects, disturbances can exist with diverse degrees of danger. In order to overcome these different degrees, it was decided to consider four condition levels: not applicable, does not affect it, somewhat affects it, and directly affects it. A clear specification of the standard conditions was necessary to enable respondents to clearly distinguish the degree of each adverse condition levels. Further, detailed questionnaire was developed to calculate the factors affecting skilled labour productivity in building construction.

In order to select the suitable technique of study, the level of measurement was studied. For each measurement type, there were appropriate methods that were applied. In this research, ordinal scales were used. An ordinal scale, as shown in Table 4.1, is a ranking or a rating of data that normally uses discrete data in ascending or descending order. The numbers assigned (1, 2, 3, 4) neither indicate that the intervals between scales are equal, nor do they indicate absolute quantities. They are merely numerical labels based on a Likert scale (Cheung *et al*., 2004; Iyer and Jha, 2005; Ugwu and Haupt, 2007 and Fagbenle (2004).

Table 4.1: Ordinal scale used for data measurement

Item	Not Applicable	Does not Affect it	Somewhat Affect it	Directly Affect it
SCALE	1	2	3	4

4.2. Analysis of Method Used

In order to facilitate the study, interview was conducted through questionnaire method, It was necessary to provide straight forward communication to respondents to ensure a clear understanding of all the applicable definitions, procedures, and guidelines that were used in collecting data. Two different ways were used to analyze the survey results, they are;

i. Ranking of the various factors according to their significance through the use of percentage composition as well as the ranking as shown in the SPSS result.

ii. Analyze the factors in the questionnaire based on the use of SPSS software package to know whether it is significant or insignificant.

4.3. Size of Organization (Employees)

The average number of employees in the considered organization was eight because it was discovered that most of the artisans and professionals in each location were found to be more than seven. Only building construction projects were considered for the study.

4.4. Number of Projects per Year

My visits to various construction site in my study area indicate the average number of construction projects undertaken in some of the sites showed that they have a minimum of four projects per year. However only building construction projects were considered for the study.

4.5. Types of Skilled Labour in Construction Iindustry

The types of skilled labour that responded as shown in the questionnaire in the appendix is briefly summarized in table 4.3

TABLE 4.2: Types of Studied Skilled Labour in Building Construction Industry

Skilled labour	Respondents
Professionals	70
Bricklayer	60
Painter	11
Electrician	14
Tiller	16
Plumber	14
Carpenter	25

Research was performed considering the forty (40) factors affecting labour productivity on building construction sites and their Relative Importance Index (RII) were calculated. These factors were classified into five groups: manpower factors, external factors, communication factors, resources factors, and miscellaneous factors.

4.6. Analysis of Factors Affecting skilled Labour Productivity

The results as shown in table 4.3 indicate that experience improves both the intellectual and physical abilities of both the professionals and the artisans which consequently, increases skilled labour productivity. Labour disloyalty had a great effect on labor productivity and ranked in the 7th position for the manpower group, with an importance index of 373.75, and 39th among all 40 factors in terms of negatively affecting labour productivity.

Table 4.3: Relationship between various Factors Affecting the Labour Productivity at the Job Sites

Factors	Pearson R	Spearman	Significance Of The Effect
Lack of construction material and different site condition for the plan	0.559	0.597	Moderately positive association and there is statistical significant effect of the factors on productivity.
Lack of construction material and poor access within construction job site	0.706	0.638	High correlation and strong statistical significant effect on productivity of labour.
Lack of construction material and violation of safety law	0.815	0.810	Strong positive association between these two factors and Highly statistical significant effect significant effect imposed on productivity because the effect of these factors is increasing together.
Lack of construction material and inadequate infrastructure	0.897	0.927	Strong positive association between these two factors and Highly statistical significant effect imposed on productivity because the
			effect of these factors is increasing together.
Lack of required tools and different site condition for plan	0.677	0.749	High correlation and strong statistical significant
Lack of required tools and poor access within construction job site	0.762	0.656	Moderately high positive relationship between the two factors and there is also significant effect
Lack of required tools and violation of safety law	0.798	0.771	Strong positive correlation and high statistical significant effect on productivity
Lack of required tool and inadequate infrastructure	0.741	0.736	Strong positive correlation and high statistical significant effect on productivity
Increase in the price of material and poor access within construction job site	0.912	0.902	Strong positive association between these two factors and Highly statistical significant effect significant effect imposed on productivity because the effect of these factors is increasing together.
Increase in the price of material and violation of safe	0.682	0.653	Strong association and high statistical significant
Increase in the price of material and inadequate infrastructure	0.650	0.628	Strong association and high statistical significant
Poor site condition and different site condition for plan	0.842	0.832	Strong positive association between these two factors and Highly statistical significant effect imposed on productivity because the effect of these factors is increasing together.
Poor site condition and violation of safety	0.636	0.635	Positive strong association between the two factors and their effect on the productivity is also relatively significant
Material storage location and violation of safety law	0.647	0.597	Moderately positive correlation and significant effect of the factors as it affects labour productivity.
Weather condition and accident	0.940	0.957	High positive correlation and high significant effect of the factors.
Lack of experience and accident	0.858	0.731	High positive correlation and high significant effect of the factors.
Misunderstanding and working overtime	0.882	0.927	High positive correlation and high significant effect of the factors.
Misunderstanding and accident	0.885	0.924	High positive correlation and high significant effect of the factors.
Personal problem and violation of safety law	0.659	0.649	Moderate positive association and the effect of the factors is significant.
Alcoholism and violation of safety law	0.862	0.802	High positive correlation and high significant effect of the factors.
Alcoholism and working overtime	0.840	0.774	High positive correlation and high significant effect of the factors.
Delay in authority and violation of safety law	0.713	0.652	High positive correlation and high significant effect of the factors.

Factors	Pearson R	Spearman	Significance Of The Effect
Delay in authority and working overtime	0.910	0.908	High positive correlation and high significant effect of the factors.
Delay in authority and accident	0.923	0.925	High positive correlation and high significant effect of the factors.
Delaying payment and accident	0.918	0.874	High positive correlation and high significant effect of the factors.
Training sessional and accident	0.881	0.761	High positive correlation and high significant effect of the factors.

Source: Author's field survey, 2016

The statistical significant effect of the combination of these factors on productivity was derived from the Pearson chi-square sig-values (p-values). This is because their p- values < (0.05), which gives the statistical evidence that the effect of the combination of the factors on labour productivity at their jobsite is significant. The correlation analysis showed that the associations between the factors considered are very strong and positive, and therefore their effect are increasing asymptotically.

Table 4.4: Significant Effects of Factors Affecting Productivity on Construction Sites

Factors	Effect On Productivity
Lack of Construction Material	Significant
Increase In Price Of Material	Significant
Poor Acceess Within Construction Jobsite	Significant
Inadequate Infrastructure	Significant
Different Site Condition For Plan	Significant
Violation Of Safety Law	Significant

These factors were categorized as significant factors affecting skilled labour productivity because the P-values in the table above are all less than 0.05, therefore it was concluded that these factors contributed immensely towards reducing the productivity of workers at their job sites. If any one of these factors occur in any construction site or job site , it can stop the flow of their operation completely, and thereby leading to total reduction in the productivity of the workers, or the workers will tend to withdraw from the site and this may result to dispute between the major functionaries in the job site and leading to total failure in achieving any stated or targeted productivity.

Table 4.5: Increase in Price of Materials

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	somewhat affect it	4	5.7	5.7	5.7
	does not affect it	12	17.1	17.1	22.9
	directly affect it	54	77.1	77.1	100.0
	Total	70	100.0	100.0	

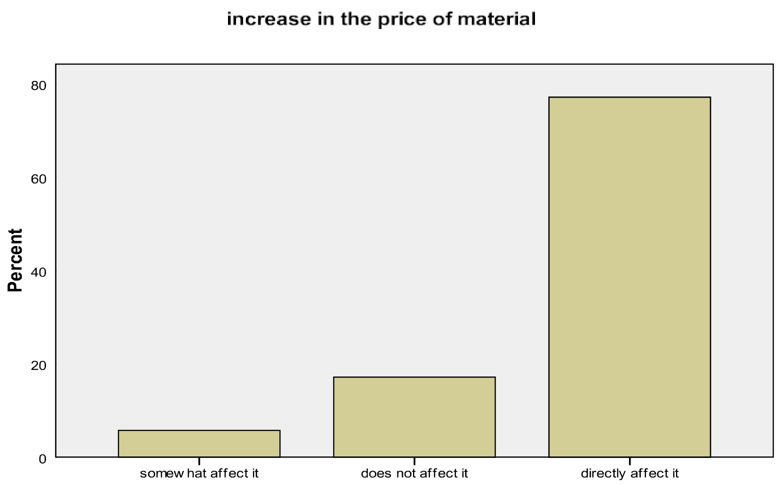

Figure 4.1: Percentage increase in the price of material

From the chart above, it was discovered that lack of construction materials directly affect the labor productivity at the job site because 77% of the respondents agreed that lack of construction materials is an important factor among factors which lead to poor performance of the workers. When required materials are not supplied, the workers become redundant and this in turn affects productivity immensely.

4.6.1 Lack of construction materials and violation of safety law Hypothesis

H_o: construction materials and violation of safety law is insignificant vs H_1: construction materials and violation of safety law is significant

Decision: From the Pearson chi-square in the Table 4.6, p-value or sig (0.00) < (α=0.05), we have statistical reason not to accept H_o the calculated value has compared with the p-value showed that we do not have sufficient evidence to accept null hypothesis,hence, construction materials and violation of safety law is significant and therefore contribute negatively to the total productivity of the workers at their job site.

Table 4.6: Result of lack of construction materials and violation of safety law

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	96.691[a]	9	.000
Likelihood Ratio	81.687	9	.000
Linear-by-Linear Association	45.874	1	.000
N of Valid Cases	70		

Table 4.7: Result of lack of construction materials and violation of safety law Symmetric Measures

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Interval by Interval	Pearson's R	.815	.030	11.614	.000[c]
Ordinal by Ordinal	Spearman Correlation	.810	.040	11.377	.000[c]
N of Valid Cases		70			

From the Table above, the spearman correlation and pearson R are high which indicate a strong positive association [81.5% and 81.0%] between lack of construction material and violation of safety law.

Table 4.8: Results of Poor site condition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not applicable	1	1.4	1.4	1.4
	somewhat affect it	60	85.7	85.7	87.1
	does not affect it	5	7.1	7.1	94.3
	directly affect it	4	5.7	5.7	100.0
	Total	70	100.0	100.0	

The frequency table above states that 85.7% of the respondents believed that poor site condition somewhat affect the productivity of the workers at their job site, since the effect of poor site condition indirectly affects the productivity, then this can also affect and influence the performance or behaviour of worker which in turn reduces productivity.

4.6.2 Poor Access within Construction Job Site

The frequency table below (table states that 71.4% of the respondents believed that poor access within construction job site directly affect the productivity of the workers at their job site, since the effect of poor access within construction job site directly affect the productivity, then this can also affect and influence the performance or behaviour of workers which in turn reduces productivity.

Table 4.9: Result of poor access within construction job site

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	not applicable	2	2.9	2.9	2.9
	Somewhat affect it	10	14.3	14.3	17.1
	does not affect it	8	11.4	11.4	28.6
	directly affect it	50	71.4	71.4	100.0
	Total	70	100.0	100.0	

4.6.3 Lack of Construction Material and Inadequate Infrastructure

H_o: construction materials and inadequate infrastructure is insignificant . H_1: construction materials and inadequate infrastructure is significant

Decision: From the Pearson chi-square in the table 4.10 below, p-value or sig (0.00) < (α=0.05), hence reject H_o and conclude that the effect of lack of construction materials and inadequate infrastructure is significant and therefore contribute towards total productivity of the workers at their job site.

Table 4.10: Chi-Square Tests showing the effect of lack of construction materials and inadequate infrastructure

	Value	df	Asymp. Sig. (2- sided)
Pearson Chi-Square	113.019[a]	9	.000
Likelihood Ratio	106.840	9	.000
Linear-by-Linear Association	55.553	1	.000
N of Valid Cases	70		

Table 4.11: Results of lack of construction materials and inadequate infrastructure symmetric Measures

		Value	Asymp.Std. Error[a]	Approx. Tb	Approx. Sig.
Interval by Interval	Pearson's R	.897	.023	16.761	.000[c]
Ordinal by Ordinal	Spearman Correlation	.927	.027	20.441	.000[c]
N of Valid Cases		70			

The correlation between lack of experience of materials and inadequate infrastructure is 0.897 and 0.927 for pearson R and spearman correlation respectively, and it shows a positively strong association between lack of experience of materials and inadequate infrastructure.

Table 4.12: Effect of inadequate infrastructure

	Freque ncy	Percent	Valid Percent	Cumulative Percent
Validnot applicable	4	5.7	5.7	5.7
somewhat affect it	28	40.0	40.0	45.7
does not affect it	8	11.4	11.4	57.1
directly affect it	30	42.9	42.9	100.0
Total	70	100.0	100.0	

From Table 4.12 above, 40% of the respondents believed that inadequate infrastructure somewhat affect labour's productivity and 42.9% says it directly affect productivity. For this reason, inadequate infrastructure is one of the major factors affecting productivity.

4.6.4 Inadequate infrastructure

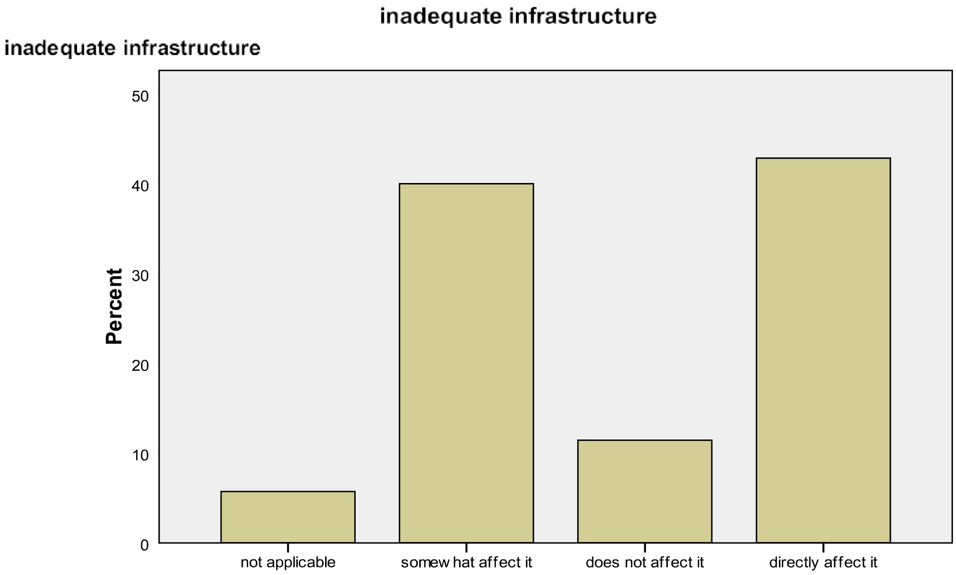

Figure 4.2: Bar chart showing the graph of the effect of inadequate infrastructure

The pie chart shows that increase in the price of materials directly affect the performance of labour at their jobsite.

4. 7 Delay in Authority

The chart below shows that delay in authority directly affects the labour productivity on the job site about 68.1% ascertained that delay in authority affect workers'productivity.

Table 4.13: Result of delay by authority

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	somewhat affect it	1	1.4	1.7	1.7
	does not affect it	10	13.9	16.7	18.3
	directly affect it	49	68.1	81.7	100.0
	Total	60	83.3	100.0	
Missing	System	12	16.7		
Otal		72	100.0		

4.7.1 DELAYING PAYMENT

The chart below shows that DELAYING PAYMENT directly affects the labour productivity on the job site.

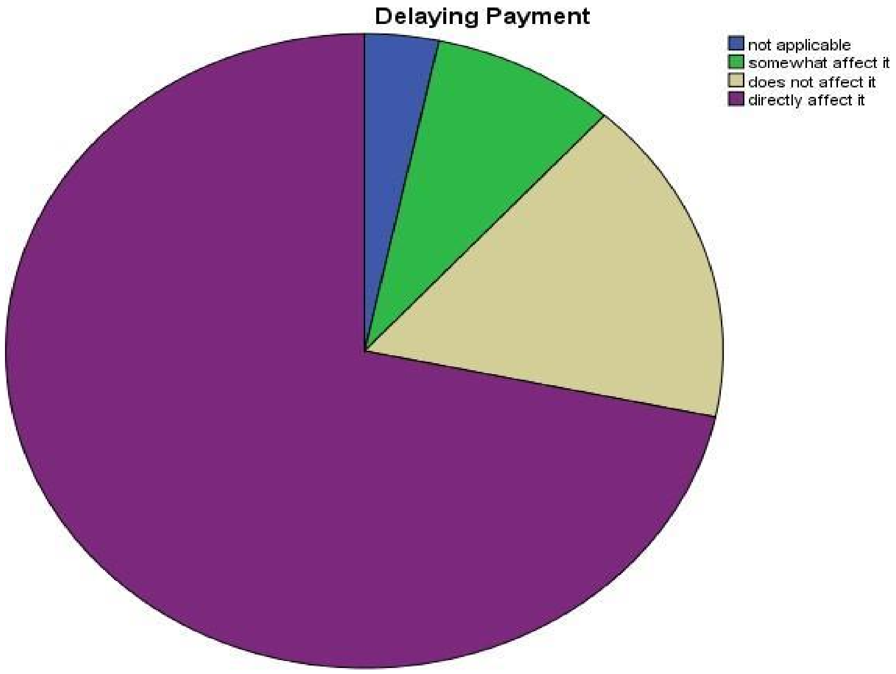

Figure 4.3 :The pie chart showing the graphical spread of how delaying payment as it affect labour productivity

4.8 The Regression Model

The regression model result as shown in the table below was obtained from the analysis using SPSS

Table 4.14: Result of regression analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.302	.629		-.481	.633
	Disloyalty	.812	.305	.697	2.666	.010
	personal problem	.015	.227	.012	.067	.947
	Government	-1.024	.349	-.751	-2.936	.005
	Delay in Authority	.059	.350	.030	.167	.868
	Change Order from the Owner	.508	.152	.333	3.333	.002
	Delaying Payment	.422	.163	.385	2.591	.013
	Complex Design	-.113	.240	-.066	-.469	.641
	Disputes with the Owner	1.044	.329	.812	3.174	.003
	Lack of construction Materials	-.230	.262	-.161	-.875	.386
	Different Site Condition from Plan	-.401	.342	-.227	-1.174	.246

The Regression Model
Y= -0.302+0.812d+0.015p-1.024g+0.059de+0.508c+0.422dp-0.113cd+1.044do-0.230m- 0.401ds
The regression models above represent the effect of each of the factors on skilled labour productivity

4.9 Test for The Adequacy of the Model
Table 4.15: ANOVA Table

Model		Sum of Squares	D.f	Mean Square	F	Sig.
1	Regression	37.537	10	3.754	27.672	.000[b]
	Residual	6.647	49	.136		
	Total	44.183	59			

HYPOTESIS:
H_o: $\beta_0=0$ (there is no linearity between factors affecting labor roductivity) H_1: $\beta_1\neq0$ (there is linearity between factors affecting labor productivity)
Decision: Since P-value (0.00) is less than $\alpha= 0.05$, There is therefore statistical reason not to accept H_o and conclude that there is linearity between factors affecting labor productivity.
It can be concluded that the model is adequate for forecasting because linearity existed between the variables under investigation.

Also, to ascertain the validity and reliability of our model, coefficient of determination (R^2) was conducted and the result is as shown in the Table 4.15 below
Table 4.16: Result of delay in Authority

TABLE 4.9: Result of delay in authority	R	R Squar e	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Chang e	df1	df2	Sig. F Change	
TABLE 4.9: Result of delay in authority	.937[a]	.877	.861	.250	.877	54.512	8	61	.000	1.149

The adjusted R-square is 0.861 and shows that about 86.1% of the factors affecting labours‘ productivity can be explained by lack of experience, and the correlation between the factors is 0.937 and shows a strong positive correlation between the variables under investigation as they affect the productivity of workers at their job site..

5.1 Conclusion

Construction tasks are expensive and frequently cause arguments and claims, which generally affects skilled labour productivity and the progress of construction projects. The environment of construction organizations should be suitable to implement projects with successful completion. In building construction industry, it is necessary to find the weaknesses of particular factor and its effect on others in order to solve and overcome them. Study and knowledge of factors that affect and effect skilled labour productivity in building construction are very important because they cause losses to the governing agencies and also influence the economy of the construction industry. Prior knowledge of labour productivity during construction can save money and time. Investments for these projects are very high and because of the complexity in construction, various factors can highly affect overall productivity. This research identified the causes of probable factors affecting skilled labour productivity in building construction as well as all possible factors through a structured questionnaire administered in the two considered state in southwestern Nigeria. The data collected were subjected to analysis using SPSS. Forty factors considered for the study were categorized in five different groups‘ manpower, external, communication, resources, and miscellaneous groups.

5.2 Recommendations

Recommendations below were found to be important factors for improving skilled labour productivity in building construction industry.
i] A detailed schedule of material supply for each project should be provided by the contractors. It should contain the time required to supply materials and the availability of the local market to furnish the required materials on time. Extra attention is required on quality of construction materials and tools used in their projects because using suitable materials and tools reduces both the time taken to finish the work and wastage of materials.

i. Purchased materials should be stored at appropriate location and should be easily accessible and close to constructed buildings to avoid wasting labour time for multiple- handling materials.

ii. Recruiting manager should recruit appropriate candidates to particular task.
iii. To achieve desired results, time required implementing change orders and to make corrections in drawings and specifications should be estimated and scheduled without affecting the project-time completion.
iv. Various external and natural factor risks should be considered in the budget estimation to minimize delays due to closures and material shortages
v. A financial incentive in the form of best employee of the year should be implemented to create competition among the employees, thus achieving better productivity.
vi. Drug and alcohol tests should be implemented on a surprise basis and strict action should be taken with the employees who test positive.
vii. Complex design and incomplete drawings should be avoided and care should be taken to avoid confusion among the various construction agencies.
viii. Change orders and design error should be avoided as much as possible. These factors can be costly and time consuming if the work has been done. Work sequences can also be affected due to rework.

5.3. Future Research

The research study was limited to the factors that affect skilled labour productivity in building construction industry in southwestern Nigeria, especially in Lagos and Oyo States. Future study could be done in other parts of the country and could emphasize specific types of building construction, including commercial, education, government buildings, skyscrapers, etc

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