

STEMMING QUACKERY ON CONSTRUCTION SITES IN ABUJA-NIGERIA: SUPERVISION AND PRODUCTIVITY NEXUS

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ABSTRACT

Productivity being a major concern to production and operation managers, higher productivity can be achieved through better utilization of available resources. Effective supervision of construction workers is one of the processes through which high productivity can be achieved. Hence, a combination of methods were used to compare the productivity and level of adherence to quality on 20 active construction sites through the use of direct measurement of productivity, personal un-obstructive observations and 10 structured interviews among construction professionals in Abuja-Nigeria. Findings showed that there was no difference between the sites supervised by professionals and non-professionals in terms of labour productivity. In a related development, there was also no difference in terms of adherence to quality between the sites supervised by professionals and non-professionals except in blocklaying due to the perceived “proficiency” by the non-professionals (masons as foremen). Quackery may continue to plague the Nigerian construction industry if clients held belief is not changed and construction foremen are not trained to meet up with the demands of the industry. Non-professionals such as foremen should be trained and certificated by Council of Registered Builders of Nigeria (CORBON) in order to improve supervision and by extension productivity on construction sites.

Keywords: Foremen, Non-professional, Productivity, Professional, Quality, Supervision

1. INTRODUCTION

Construction is the world largest and most challenging industry but human resources today have a strategic role to play for productivity increase of any organization and with the effective and optimum use of them, all the advantages supplied by the productivity growth can be obtained (Attar *et al.*, 2013). Construction is labour intensive and relies heavily on the skills of the workforce. This workforce is the industry's most valuable asset, which can significantly influence the cost, schedule, and quality of the construction project (Han *et al.*, 2008).

Construction industry occupies a vital position in the economy of any country because of its important contribution to the process of development (Oyewobi *et al.*, 2011). In Nigeria, construction industry is of paramount importance for employment and economic growth (Ogunsami and Jabgoro, 2006). Therefore, Construction is a key sector of the national economy for the countries all around the world, as traditionally it took up a big portion in nation's total employment and its significant contribution to a nation's revenue as a whole. However, until today construction industries are still facing a number of problems, regarding the low productivity, poor safety, and in sufficient quality of work (Attar *et al.*, 2013).

Productivity is one of the most important factors that affect overall performance of any small or medium or large construction firm, and there are number of factors that affect the productivity of labour, and it is important for organizations to identify and study those factors in order to take appropriate action for improving them (Attar *et al.*, 2013). These factors include absenteeism of gang members, instruction delays, supervisory incompetence, lack of materials, an unfriendly working atmosphere, and lack of proper tools (Odesola & Idoro, 2014). If productivity is improved, it ultimately decreases the unit cost of project and gives overall best performance of the project (Attar *et al.*, 2013). Lawal (2008) posited that construction workers in Nigerian public service have almost zero productivity.

Site supervision may affect the overall performance and efficiency of construction projects (Alwi *et al.*, 2001). Frimpong *et al.* (2011) asserted that inadequate supervision practices can lead to improper planning and poor management of tools, equipment, materials, and labour which affect the productivity. Alumbu *et al.* (2014) stated that the inefficient method, lack of appropriate tools, poor supervision and training contribute to the low productivity in the Nigerian construction industry. United States Agency for International Development (USAID) (2005) added that project supervisors/engineers are supposed to be jack of all trades because the success or failure of a project depends largely on their knowledge and experiences.

Therefore, inability of supervisor to plan work, communicate with workers and direct activities adequately is fundamentally linked to increase

amount of cost of rework (Alwi *et al.*, 2001). Eckles *et al.* (1975) (cited in Alwi *et al.*, 2001) established that supervisors are managers whose major activities focus on leading, coordinating and directing the work of others in order to achieve organizational goals. For project objectives to be met, supervisor needs several skills such as management skills, human relation skills and skills in leadership, motivation and communication (Aqua Group, 2002).

2. LITERATURE REVIEW

2.1 Productivity

Productivity is one of the key components of every company's success and competitiveness in the market. A construction contractor stands to gain or lose, depending on how well company's productivity responds to competition. Construction companies may gain advantage over their competitors by improving upon productivity to build projects at lower costs; yet, most contractors do not systematically and properly address this strategic issue or evaluate its impact on the project's profit (Hammad *et al.*, 2011).

Successful construction project is one that is completed on time, within budget, meets specified standards of quality and strictly conforms to safety policies and precautions. This is feasible only if the premeditated levels of productivity can be achieved. All the same, productivity, or lack thereof, is one of the construction industry's most prevalent problems. Due to the nature of construction projects, its importance to society and the existing economic resources, more emphasis should be given to improving productivity (Kuykendall, 2007). Contractors must strive to improve productivity continuously or risk losing important contracts. A company has the ability to increase its competitiveness through enhanced productivity by raising the level of value-added content in products and services more rapidly than competitors. The concept of productivity is importantly linked to the quality of input, output, and process. Productivity is also key to long-term growth. A sustainable improvement in productivity, when associated with economic growth and development, generates non-inflationary increases in wages and salary (Hammad *et al.*, 2011).

However, sometimes the nature of construction industry makes the productivity concept a complex one, due to some variables such as small firm sizes, low profit margins, industry fragmentation, environmental issues, limitations on the supply of skilled labour, and other resources (Abd-El-Hamied, 2014). Despite the importance of productivity, productivity enhancement in construction has been overlooked for decades, while the manufacturing industry drew benefits from production management techniques (Neumann *et al.*, 2003). The construction industry lagged due to insufficient research in the area of productivity. One of the methods of improving construction productivity

according to Hammad *et al.* (2011) is to assist managers to identifying productivity barriers and offer solutions. In contrast, enhancement of productivity in construction site leads to the following:

1. Projects are completed more quickly.
2. Project cost is lowered.
3. The contractor can submit more competitive bids.
4. And the project can be more profitable.

2.2 Site Supervision

Researchers have assigned several definitions and interpretations to supervision, but almost all of them centre on a common aim or objective. The main objective of supervision is to help the workers to realize their full potential in their respective careers and has a lot to do with the communication and leadership. Workers are groomed by their superiors through discursive interaction to carry out tasks in line with the professional codes of conduct (Chika and Chijioke, 2013). In a similar vein, Pierce cited in Baffour-awuah (2011) established that supervision is a developmental process designed to support and enhance an individual's acquisition of the motivation, autonomy, self-awareness, and skills necessary to effectively accomplish the job at hand. Chika *et al.* (2013) added that supervision deals with guiding, advising, encouraging, refreshing, motivating and ascertaining the stated goals of the organization. Site supervision according to Aqua Group (2002) is the activities designed primarily to ensure that the employer's requirements as expressed in the contract documents are correctly integrated and that the problems which are bound to arise even on the smallest jobs are resolved.

To achieve an effective site management with focus on attainment of quality, cost, and building within the pre-set time frame and client satisfaction, certain actions becomes necessary: Among this item is the site management team which include consultants, Project Builder, Building supervisors and Trade foremen (Council of Registered Builders of Nigeria [CORBON], 2011). CORBON (2011) opined that Consultants in the building environment are expected to perform their supervisory roles according to their inputs at the pre design stage and among them those that have role to play in the effective site management practice are: Architect, Engineers (Civil, Structure, Mechanical and Electrical) Quantity Surveyor, Surveyors, and Consultant builder.

Ogbiti (2015) further revealed that the major task of contractors is to assemble and allocate the resources of labour, equipment and materials to the project in order to achieve completion at a maximum efficiency in terms of time, quality, and cost.

Project builder is the overall construction personnel in charge of building production management. He coordinates and manages the trades men and artisans in site execution process. He is empowered by the national building code to carry out all the function of building production process through management of both artisans and tradesmen on site (CORBON, 2011).

Similarly, Ekundayo *et al.*, (2013) discussed further that a project manager is one trained in one of the construction-related disciplines include architecture, quantity surveying, building and civil engineering, and qualify with either a degree or diploma (or both) from a recognized institution of learning.

Trades foremen are the next to the supervisors who had acquired all the required trade test 1, 2, 3 and reasonable length of experience in their trade before so appointed as trade foremen in their organization, and they are leaders of their respective trade such as: Masonry, Carpentry and joinery, Steel Bending, Painting and interior Decorations, Plumbing and Electrical works (CORBON & Nigerian Institute of Building [NIOB], 2010).

2.3 Impact of Supervision on Workers' Productivity on Construction Sites

Construction productivity largely depends on the performance of construction workers (Jergeas, 2009). In practice, most supervisory visits may be focused on inspection and fault-finding rather than providing workers the opportunity to improve their performance and solve problems during service delivery. This 'traditional' form of supervision may be detrimental to worker motivation. Instead, supervisors should encourage discussion of problems, provide immediate feedback and establish goals to assist workers in maximizing performance (Frimpong *et al.*, 2011). Willis-Shattuck *et al.* (2008) opined that the impact of supervision on construction workers outputs is felt particularly through improvements in motivation and job satisfaction.

The labour force plays a vital role in the construction process. Therefore, improvement in construction productivity needs to be achieved through greater resource allocation, human resource efficiency, supervision, increased innovation and technology diffusion (Jergeas, 2009). However, Construction labour productivity improves as construction supervision is provided. The additional supervision has the effect of reducing the construction gang sizes and is usually associated with defined construction packages to be executed (Merrow *et al.*, 2009). Frimpong *et al.*, (2011) stressed that supervision increases workers empowerment, time management, fewer complaints and more positive feedback. Supervisors encourage workers to adopt good practices in order to achieve a high level of performance. Such 'supportive' supervision is significant and more beneficial to productivity of construction workers. The benefits of supervision on construction workers using limited resources remain largely uncertain, even though the quality of supervision may be a key determinant of its impact on productivity (Merrow *et al.*, 2009). Fischer (2009) concluded that the impact of management styles and techniques on worker productivity is significant. It is through exercising power that leaders (supervisors) are able to influence others, this power can lead to one of the following reactions: commitment, compliance or resistance which affects productivity.

2.4 Supervisors roles in Achieving Construction Project Objectives

Projects success is basically to gain the project objectives that are

classically defined by the need to complete a project on time, within the budget, and with appropriate quality. Hence any disruptions to the project objectives will certainly contribute to project delays with its specified adverse effects on project objectives (Abedi *et al.*, 2011). Centeno (2004) implied that successful construction project is one that achieves the intended objectives in terms of cost, time, quality and safety. Construction workers must be closely monitored to achieve the desired levels of productivity (Hickson and Ellis, 2014). Productivity improvement is reduction in the non-productive time spend each day by the workers and a transfer of those man-hours to the direct productive work (Centeno, 2004).

Good planning, scheduling, and controlling can improve productivity on construction project (Centeno, 2004). According to Fisk (2000), several other factors must be considered by construction manager in other to achieve project objective. Some of these factors include the following: Conduct productivity/ performance study at the activity/ operational level to create benchmark, always adopt simple and efficient communication among labour as well as with link parties, ensure efficient and effective tools, equipment, and materials in order to continuous task performance so as to reduce joblessness of labour force, adopt motivational or personnel management measure to increase workers morale. For instance tie compensation to performance, allocate or recruit the right people to undertake a job, provide training to improve workers capability and skills, involve workers in making decisions that affect their jobs such as technique improvement, utilization of dataset from the construction industry.

3. RESEARCH METHODOLOGY

In an attempt to determine the relationship between supervision and construction workers productivity in the study area, mixed methods approach was adopted. Johnson *et al.* (2007) described a mixed methods approach as a class of research where the researcher mixes or combines quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study for the purpose of breadth and depth of understanding. Twenty construction sites were visited for the on-site un-obstructive observations and measurements of activities of workers. Observation is a method where data is collected by direct contact with real life situations and by behaviours that occur naturally (Sanoff cited in Okolie, 2009). The observation method involves the researcher in watching, recording and analysing events of interest (Blaxter *et al.*, 2006). In addition to this, ten construction professionals were interviewed. Interview is a method used to assess people's reactions to physical settings. It can be structured, where the type and order of questions are decided in advance or unstructured where the interviewer asks questions of interest while visiting a site. Semi-structured interviews lie between these two positions (Sanoff cited in

Okolie, 2009). The research employed the use of structured interview with ten project managers /site supervisors. This approach enhances the reliability of the results and the conclusions that were reached, due to the standardisation of questions asked (Haigh, 2008). In a related development, Hesse-Biber and Leavy (2011) are of the opinion that standardising the interviews ensures comparisons to be made between the interviewees. All interviews were conducted in English language and each lasted for about 35 minutes per project supervisor and was recorded using sound recorder.

For the purpose of this research, small and medium sized construction firm with staff strength between 10 to 199 employees were considered (SMEDAN Abuja, 2007). Site supervisors and sites workers were observed on twenty (20) selected construction sites. The first ten (10) sites were observed with professional supervision while the second ten (10) sites were observed with non-professional supervision (foremen). The study considered duplex structure of four and five residential buildings with Gross Floor Area GFA ranging from 200m² to 470m².

Professional supervision in this context refers to supervision carried out by people who had attended tertiary education in construction related courses such as Architecture, Building, Quantity Surveying, or Civil Engineering and have attained corporate membership of their bodies with at least 5 years of working experience in the construction industry. Non-professional supervision (trades foremen) are supervision carried out by those who had acquired all the required trade test 1, 2, 3 and reasonable length of experience in their trades before being so appointed as trade foremen in their organizations, and they are leaders of their respective trades such masonry, carpentry and joinery, steel bending, painting and interior decorations, plumbing and electrical works (CORBON & NIOB, 2010).

The construction activities observed were foundation excavation, block laying, casting of columns and beams which were achieved 100% for the ten sites with professional supervision and ten sites without professional supervision observation, plastering was achieved 50% for the two categories of supervision observed, while painting only 30% was achieved in terms of completion. Checklist from CORBON (2011) was modified and used to determine the adherence level of quality of the activities observed. Paired samples T-test (this is applicable to sample size that is less than 30) at 95% confidence interval was used in analysing the results obtained from the observations and measurements that formed the basis for the conclusion reached and the recommendations made.

4. FINDINGS AND DISCUSSION

In this section, authors should discuss all the findings emerging from conducting the investigation so far. Even for early stages of research (e.g. the article may only aim to report an initial literature study), what have been

synthesised from the literature should be discussed. This may be done by highlighting the similarities and/or differences from a variety of literature sources on the issues being investigated and the contextual nature of the similarities / differences (such as geographical locations, culture or many other factors that may influence the discussion in those different literature sources). The results and discussion are as presented in the following section.

Table 1: Observed productivity per labour with professional supervision in 8 hour per day

| Activities | Unit | Mean | Site I | II | III | IV | V | VI | VII | VIII | IX | X |
|---------------|----------------|-------|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Foundation | M ³ | 0.886 | 0.842 | 0.866 | 0.876 | 0.847 | 0.904 | 0.933 | 0.837 | 0.866 | 0.958 | 0.928 |
| Blocklaying | M ² | 0.899 | 0.963 | 0.850 | 0.875 | 0.825 | 0.913 | 1.013 | 0.938 | 0.900 | 0.863 | 0.850 |
| Column & beam | M ³ | 0.116 | 0.117 | 0.117 | 0.117 | 0.111 | 0.117 | 0.117 | 0.117 | 0.111 | 0.117 | 0.117 |
| Plastering | M ² | 2.732 | - | 2.734 | - | - | 2.715 | - | 2.726 | - | 2.738 | 2.749 |
| Painting | M ² | 7.685 | - | 7.856 | - | - | 7.020 | - | 8.100 | - | - | 7.763 |

Table 2: Observed productivity per labour with non-professional supervision in 8 hour per day

| Activities | Unit | Mean | Site XI | XII | XII I | XI V | XV | XV I | XV II | XV III | XI X | XX |
|---------------|----------------|-------|---------|-------|-------|-------|-------|-------|-------|--------|-------|-------|
| Foundation | M ³ | 0.883 | 0.838 | 0.923 | 0.829 | 0.876 | 0.933 | 0.848 | 0.895 | 0.904 | 0.866 | 0.914 |
| Blocklaying | M ² | 0.887 | 0.913 | 0.775 | 0.838 | 0.863 | 0.888 | 0.963 | 0.925 | 0.850 | 1.013 | 0.837 |
| Column & beam | M ³ | 0.115 | 0.117 | 0.117 | 0.117 | 0.117 | 0.111 | 0.117 | 0.111 | 0.117 | 0.111 | 0.111 |
| Plastering | M ² | 2.723 | 2.730 | - | - | 2.708 | - | 2.736 | - | 2.719 | - | - |
| Painting | M ² | 7.470 | 8.370 | - | - | 6.615 | - | - | - | 7.425 | - | - |

The results of the site observations and measurements are shown in Tables 1 and 2. When compared across sites, it was discovered that the mean observed productivity of blocklayers in sites I to X were higher than that of sites XI to XX. In the laying of 225mm sandcrete blocks for example, the mean productivity in

sites I to X (Table 1) was 0.899 m² per man-hour while it was 0.887 m² per man-hour for sites XI to XX (Table 4.1). For the plastering the mean productivity was 2.732 m² per man-hour and 2.723 m² per man-hour for site I to X and sites XI to XX respectively. While casting of columns and beams, the mean productivity was 0.116 m³ per man-hour and 0.115 m³ per man-hour for sites I to X and sites XI to XX respectively. The significantly higher level of productivity achieved in sites I to X could be attributed to the observed professional supervision impact on the sites workers (sites I to X). The supervision was assumed to have established close monitoring, training programmes, simple and efficient communication among employee as well as with link parties and adopted motivational measures to increase workers morale. The result corroborated Ameh, and Osegbo, (2011) study which stated that contractors and subcontractors should ensure adequate training and supervision of the operatives on construction sites as it would improve on the quality of output as well as minimize the chances of doing wrong work or even application of wrong construction method by the workers. It also lends credence to Fischer (2009) study which implied that effective delegation of responsibilities and management of required number of workers by the supervisors will give better performance and increase in productivity. Construction labour productivity improves as construction supervision is provided. The additional supervision has the effect of reducing the construction gang sizes, idle time and is usually associated with defined construction packages to be executed (Merrow *et al.*, 2009).

Table 3: Paired samples T-test of labour productivity with professional supervision and non-professional supervision

| Variable | Correlation | Degree of freedom | P-value | Remark |
|------------------------------------|----------------------|-------------------|---------|-----------------|
| X (Professional) | Y (Non-professional) | 1.00 | 4 | 0.315 NS |
| Key SS = Statistically Significant | | | NS= | Not Significant |

Inference drawn from these observations was that, no significant difference existed between the labour productivity with professional supervision and non-professional supervision at 95% confidence level. The inferential statistics lay credence to the opinion held by many clients in that the same results will be obtained when non-professionals are given construction projects to handle as supervisors. This may be the reason why quackery may be difficult to eradicate any time soon with the attendant consequence of incessant building collapse within the construction industry if this held belief is not changed.

Table 4: Adherence level on foundation excavation with professional supervision

| Variable | Sit e I | I I | II I | I V | V I | V I | VI I | VII I | I X | X I | Mea n | Rankin g |
|-------------------------------------------------------------------------|---------|-----|------|-----|-----|-----|------|-------|-----|-----|-------|-----------------|
| Are termite treatment apply on the excavated surfaces of foundation? | 4 | 1 | 3 | 5 | 1 | 3 | 3 | 5 | 4 | 3 | 3.2 | 3 rd |
| Are the levelling and compaction of bottom of excavation done? | 5 | 4 | 4 | 4 | 3 | 3 | 4 | 4 | 5 | 5 | 4.1 | 2 nd |
| Are the foundation width of 225mm thick block work appropriate (675mm)? | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 4.9 | 1 st |

Rating scale used: High adherence-5; adhere-4; moderately adhere-3; slightly adhere-2; no adherence-1

Table 5: Adherence level on foundation excavation with non-professional supervision

| Variable | Site XI | XII | XIII | XIV | XV | XVI | XVII | XVIII | XIX | XX | Mean | Ranking |
|----------------------------------------------------------------------|---------|-----|------|-----|----|-----|------|-------|-----|----|------|-----------------|
| Are termite treatment apply on the excavated surfaces of foundation? | 1 | 3 | 4 | 3 | 1 | 2 | 1 | 3 | 1 | 2 | 2.1 | 3 rd |
| Are the | 4 | 3 | 2 | 3 | 4 | 4 | 3 | 4 | 3 | 5 | 3.5 | 2 nd |

levelling and compaction of bottom of excavation done?

| | | | | | | | | | | | | |
|-------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|-----|-----------------|
| Are the foundation width of 225mm thick block work appropriate (675mm)? | 5 | 4 | 5 | 5 | 4 | 5 | 5 | 4 | 4 | 5 | 4.6 | 1 st |
|-------------------------------------------------------------------------|---|---|---|---|---|---|---|---|---|---|-----|-----------------|

Rating scale used: High adherence-5; adhere-4; moderately adhere-3; slightly adhere-2; no adherence-1

The results of the foundation observation adherence to quality are shown in Tables 4 and 5. When compared across sites, it was discovered that the mean adherence to quality of foundation excavation in sites I to X are higher than that of sites XI to XX. For example, the mean of adherence to quality for foundation width of 225mm block (675mm) with professional supervision in sites I to X (Table 4) was 4.9 while it was 4.6 for sites XI to XX (Table 5). For anti-termite treatment applied on the excavated surfaces of foundation, the means adherence to quality were 3.2 and 2.1 for sites I to X and sites XI to XX respectively. The same trend was observed in other activities as contained in the 2 Tables. Raji and Firas (2011) stated that quality management of works means checking and judging site works against the required specifications; before, during and after the completion of the works.

Table 6: Paired samples T-test of adherence level of quality in foundation excavation with professional supervision and non-professional supervision

| Variable | Correlation | Degree of freedom | P-value | Remark | |
|------------------------------------|----------------------|-------------------|---------|-----------------|----|
| X (Professional) | Y (Non-professional) | 0.999 | 3 | 0.104 | NS |
| Key SS = Statistically Significant | | | NS= | Not Significant | |

Based on the paired samples T-test above, it shows that no significant difference existed between adherence level of quality in foundation excavation with professional supervision and non-professional supervision.

Table 7: Adherence level of quality in 225mm blocklaying with professional supervision

| Variable | Sit e I | I I | II I | I V | V 5 | V 4 | VI I | VII I | I X | X 4 | Mea n | Rankin g |
|-------------------------------------------------------------------------------|------------|--------|---------|--------|--------|--------|---------|----------|--------|--------|----------|-----------------|
| Are the bonding adequate up to 12.5mm thick? | 5 | 5 | 5 | 4 | 5 | 4 | 4 | 5 | 4 | 4 | 4.5 | 3 rd |
| Do they form Stretcher bond or just stack arrangement ? | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4.9 | 1 st |
| Are the mix ratio of mortar uniform? | 4 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 4 | 4.5 | 3 rd |
| Are the masons using wall range and builders levels to check against bulging? | 5 | 4 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 4.8 | 2 nd |

Rating scale used: High adherence-5; adhere-4; moderately adhere-3; slightly adhere-2; no adherence-

Table 8: Adherence level of quality in 225mm blocklaying with non-professional supervision

| Variable | Site | XI | XII | XI | X | XV | XV | XVI | XI | X | Mean | Ranking |
|-------------------------------------------------------------------------------|------|----|-----|----|---|----|----|-----|----|---|------|-----------------|
| Are the bonding adequate up to 12.5mm thick? | 4 | 5 | 4 | 3 | 3 | 4 | 5 | 5 | 3 | 4 | 4.2 | 2 nd |
| Do they form Stretcher bond or just stack arrangement? | 5 | 5 | 5 | 4 | 5 | 4 | 5 | 5 | 4 | 5 | 4.7 | 1 st |
| Are the mix ratio of mortar uniform? | 4 | 5 | 4 | 3 | 4 | 5 | 3 | 4 | 3 | 4 | 3.9 | 3 rd |
| Are the masons using wall range and builders levels to check against bulging? | 4 | 4 | 3 | 4 | 3 | 5 | 4 | 5 | 3 | 4 | 3.9 | 3 rd |

Rating scale used: High adherence-5; adhere-4; moderately adhere-3; slightly adhere-2; no adherence-1

Comparing the results across sites, it was discovered that the mean adherence to quality of 225mm block laying in sites I to X are higher than that of sites XI to XX. For example, the mean of adherence level of forming stretcher bond on sites I to X (Table 7) was 4.9 while it was 4.7 for sites XI to XX (Table 8). For the uniformity in mix ratio of the mortar used, the mean adherence levels were 4.5 and 3.9 for sites I to X and sites XI to XX respectively. The same trend was observed in other activities as contained in the two Tables.

Table 9: Paired samples T-test of adherence level of 225mm blocklaying with professional supervision and non-professional supervision

| Variable | Correlation | Degree of freedom | P-value | Remark | |
|------------------------------------|-------------------------|-------------------|---------|-------------|----|
| X (Professional) | Y (Non-professional) | 0.456 | 3 | 0.051 | SS |
| Key SS = Statistically Significant | | NS= | Not | Significant | |

Since the calculated p-value of 0.051 is equal to critical p-value of 0.05, it can be concluded that significant difference existed between adherence level of 225mm in blocklaying with professional supervision and non-professional supervision. From the authors' personal experiences, many foremen serving as supervisors had masonry background in most cases. Due to the supposed 'proficiency' they have acquired over the years, they might lower their guard during supervision thereby compromising adherence to quality.

Table 10: Site Control

| Interviewees | Site control to achieve effective labour output |
|-------------------|-------------------------------------------------------------------------------------------------------|
| Supervisor one | Ensure good relationship with workers and apply factors of motivation. |
| Supervisor two | Ensure proper coordination of work and control of the use of materials and equipment. |
| Supervisors three | Involvement of experienced professionals, have a proper planning and good division of work schedule. |
| Supervisor four | Friendliness, good supervisor-workers relationship, and motivation were necessary. |
| Supervisor five | Assigning duties to workers and ensure close monitoring. |
| Supervisor six | Site should be well secured through fencing |
| Supervisor seven | Always work with competent labour on the site. |
| Supervisor eight | Ensure regular payment of workers, work breakdown schedule and close monitoring. |
| Supervisor nine | Good skill labour should be employed. Specialised work should be assigned to the right people. |
| Supervisor ten | Keep careful checking of project activities over a period of time and principle of division of labour |

The responses of the interviewees' corroborated Fagbenle *et al.*, (2012) findings

that training/retraining is not the only factor that has positive contribution on productivity, equal attention should be paid to other factors such as monetary and non-monetary incentives, organizational procedures and planning, scheduling, control and supervision of workers as well as general management. It also lends credence to Hammad *et al.* (2011)'s study on ways to improve productivity in the construction industry.

Table 11: Decision Making

| Interviewees | Involvement of workers in making decision |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------|
| Supervisor one | Through meeting with their heads. |
| Supervisor two | Sharing ideas with workers during work. |
| Supervisors three | Inviting their foremen for meetings and allow for freedom of expression. |
| Supervisor four | Through training. |
| Supervisor five | By explaining and showing workers what to do. |
| Supervisor six | Assigning responsibility to every worker and their heads should be involved in meetings, while sometimes, seek for their opinions. |
| Supervisor seven | Attaching the less experience worker with the more experience ones to share ideas. |
| Supervisor eight | Through training on how to carry out some specialty work. |
| Supervisor nine | Through site meeting, by interacting with workers at the process of the work, and through training. |
| Supervisor ten | Through good communication and meetings. |

The result corroborates the findings of Hammad *et al.* (2011) that the key to improving productivity is to train the crew. This is especially for construction supervisors, whose knowledge and skills can make or break a project in sound management principles and techniques. Equally, weekly staff meeting is recommended among the project manager, the project superintendent and their assistants.

5. CONCLUSION AND RECOMMENDATION

The paper examined professional and non-professional supervision in relation to labour productivity and adherence to quality on construction sites in Abuja. Findings showed that there was no difference between the sites supervised by professionals and non-professionals in terms of labour productivity. In a related development, there

was also no difference in terms of adherence to quality between the sites supervised by professionals and non-professionals. However, adherence level to quality when laying 225mm blocks on sites supervised by professionals and non-professionals was found to be different using paired samples T-test at 95% confidence level. Based on these results, quackery may continue to plague the Nigerian construction industry if clients held belief is not changed and construction foremen are not trained to meet up with the demands of the industry. Non-professionals such as foremen should be trained and certificated by Council of Registered Builders of Nigeria (CORBON) in order to improve supervision and by extension productivity on construction sites. This will to a large extent bring the incidences of building collapse under check and the industry will become better sanitised. In addition to this, clients should be enlightened on the dangers inherent in patronising quacks since it is at times difficult to identify the professionals by the clients.

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