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Assessment of the Impact of Skills Acquisition on the Productivity of Nigerian Construction Craftsmen

Ayegba Ferdinand Fidelis¹, Adeagbo Dorcas² and Calistus Ayegba³

Abstract

Construction craftsmen performance is one of the crucial aspects of labour productivity that requires proper attention for effective projects delivery in the construction industry. The level of construction craftsmen low performance has been seen to be a significant factor which contributes toward inefficient construction projects productivity. Therefore, the objective of this research is to assess the impact of skills acquisition on the productivity of Nigerian construction craftsmen. A quantitative research methodology was employed in this study via a structured questionnaire. The questionnaire was distributed to 100 respondents that comprise of 85 craftsmen and 15 trainers in 2 training institutions associated with crafts training. The data were analysed using descriptive statistics such as mean, standard deviation, standard error and percentages. The finding shows that the skills required of craftsmen to improve productivity can be highly mitigated by factors such as job insecurity/employee turnover resulting from lack of construction jobs or redundancy and these skills acquisition towards productivity can also be driven by consistently engaging these craftsmen which enables them to acquire additional skills by performing multiple tasks. The findings indicate the need to link off-the-job and on-the-job training of craftsmen through the involvement of institutions associated with crafts training.

Keywords: craftsmen, construction industry, productivity, skills acquisition.

Introduction

The construction industry in many developing countries is greatly concerned with the low level of skilled workers' productivity due to economic, social, physical and psychological related factors influencing the performance of the skilled workers Naoum, (2016). Low productivity of skilled workers' is one of the most serious tasks facing the construction industry especially in developing countries such as Nigeria Kaming, (2007). In today's global economy, skilled workers' productivity is becoming more intense than ever due to the low level of quality performances of the skilled workers in the construction industries in most developing countries (Davenport, 2008). Arshad and Malik, (2015) assert that productivity improvement can be achieved when construction workers with high skills and knowledge, together with sound physical and mental health perform tasks with efficiency and effectiveness. In most countries, the cost of operatives comprises 30 % to 50 % of the overall projects' cost, and thus, it is regarded as an accurate reflection of the efficiency of the operation (Kazaz, Manisali & Ulubeyli, 2008).

Nigeria's commitment to improving the living standard of its citizens has led to the introduction of a long-term economic programme tagged 'Nigeria vision 20:2020'. The vision consists of a set of objectives and programmes designed to launch the nation into the league of the twenty most developed economies of the world by the year 2020 (Adewale, Siyanbola, & Siyanbola, 2014). Almutairi, Arif, and Khalfan, (2016) stressed that several studies had identified a large number of skilled workers' low performance, especially in

the construction industry as a critical factor for the vision 20:2020 to be achieved. Therefore, the issue of low-skilled workers' performance in construction projects is vital in order to establish a substantial foundation to improve it so as to achieve efficiency of work and higher productivity which inform the justification for this study.

Research Questions

This research addresses the following questions:

1. What are the factors that militate against effective skill acquisition of these craftsmen?
2. What is the most efficient training method(s) for craftsmen skills development?
3. What is the most efficient approach in addressing the challenges to craftsmen skills development?

Related Literature

Productivity Improvement of Nigerian Craftsmen

Solomon, Hashim, Mehdi and Ajagbe, (2012) mentioned that productivity improvement is a central challenge for managers in all types and sizes of organisations. Managers are being asked to get more mileage out of all their resources: human, financial, information, and materials. Productivity is an output-input ratio.

Abiola, (2004) added that inputs include all resources consumed to produce those outputs. The author mentioned that labour is one of the input resources consumed but so too are capital, material and energy. Productivity is reaching the highest level of performance with the least of expenditure of resources. It is ultimately the ability to produce the desired result. Training offers the craftsmen the ability to perform their work effectively and efficiently, and these qualities are a recipe for workers' productivity (Bilau Bustani, Sani and Ijigah, 2014; Abiola, 2004). Therefore, construction craftsmen when employed must be trained to the industries standards while those already employed must continuously be trained and retrained in order to improve their productivity. Realising these facts, however, many studies had been channeled to the challenge of productivity in the Nigerian Construction industry.

Liberda, Ruwanpura and Jergea, (2003) identified the relative importance of fifty-one productivity factors which were classified into three groups as Human, External and Management. According to these authors, human factors include workers' boredom and fatigue, workers' attitude and morale, workers' physical limitations, workers' absenteeism, workers experience, workers' skill and the team spirit of the crew. External factors include union rules and influences, adverse weather conditions, noise, dust, radiation, congested work area, change in drawings and specifications, changes in the contract, demand over-quality work and the nature of the project (size and complexity). Management factors cover such aspects as protective gear, unrealistic schedules, overtime, multiple shifts, disrespectful treatment of workers, salary and benefits, incompetent personnel, and overcrowded work areas. Others are poor inspection programme, unsafe working conditions, inadequate equipment, inadequate supervision, crew composition, constructability, interruption and disruption, lack of cooperation between craftsmen, inadequate communication, lack of workers training and education, cleanliness of

construction site, changes in foremen, lack of detailed planning, and non-availability of information, materials, tools and equipment.

Implications of Unskilled Labour on Productivity on Cost, Time, Quality and Project Success

Labour is a significant component of construction work in Nigeria. Unlike in developed economies such as the UK, USA and Germany where operations on construction sites are highly mechanised. Construction work in Nigeria is low tech and labour intensive. Solomon et al. (2012) defined productivity as the amount of products or services produced compared to the amount of goods or labour used to produce them. In construction, labour productivity is better known as labour output and is measured as the amount of work done over a period. Olomolaiye and Ogunlana, (2009) observed that production outputs in key building companies in Nigeria were lower than they ought to be. Reasons for this were linked to inefficient methods, lack of appropriate tools and poor supervision. This agrees with a study carried out by Alinaitwe, Mwakali and Hasson, (2007) which ranked incompetent supervisors and lack of skills of the workers as the two most significant causes of low productivity of construction workers in developing countries.

Poor Workmanship

Several authors including (Medugu, Rafee, Bustano, Bala, Abdullahi and Mbamali, 2011; Dantong, Lekjeb & Dessah, 2011; Bilau, Bustini, Sani & Ijigah, 2014) agrees that poor workmanship is one of the problems that the Nigeria construction industries are facing the use of incompetent craftsmen lead to poor workmanship. Poor workmanship could result to rework due to incompetent craftsmen, though many factors leads to poor workmanship, that would not be discussed, only rework which result to cost and time overruns in project delivery process and has become a cankerworm within the Nigeria construction industry.

Rework

Rework in construction projects is referred to as the unnecessary effort of redoing a process or activity that was incorrectly implemented in the first instance (Ekambaram, 2006; Abdullah, Bilau, Enebuma, Ajagbe, Ali & Bustani, 2012).

In construction projects, rework which lead to cost and time overruns can result from an array of factors such as poor workmanship by incompetent craftsmen, errors, omissions, failures, changes, poor communication and poor coordination. To some extent, the level of rework in construction projects would be dependent on external factors such as excessive workload, market conditions for instance, increased defects and from limitations on the availability of competent subcontractors (Ayegba and Dzasu, 2014; Dai et al. 2009; Enshassi et al. 2007).

Rework and wastages are considered as non-value adding endemic symptoms that could adversely affect the performance, productivity and ultimately profit margins (Ekambaram, 2006; Abdullah et al. 2012).

Some Previous studies indicated that the costs of rework in poorly managed projects can be as high as 25% of contract value and 10% of the total project costs (Abdullah et al. (2012).

The significance of Reducing Rework: Durdyev and Mbachu, (2011) posit that project rework occurrences adversely impact project performance in such areas as costs, time and stakeholder satisfaction. Hanna et al. (2008) find that the direct impact of rework on project management transactions includes (a) additional time to rework (b) additional costs

for covering rework occurrences (c) additional materials for rework and subsequent wastage handling (d) additional labour for rework and related extensions of supervision.

Time overruns

Ijigah, Ogunbode and Ibrahim, (2012) opine that time overrun is one of the causes resulting from rework which adversely affect performance, productivity and ultimately profit margins. The problem of project time overrun is of international concern. As numerous studies related to causes of time or cost overruns have been conducted worldwide and mostly in developed countries (Ijigah, et al. 2012).

According to Hewage and Ruwanpura, (2006); Ibeanu, (2006); and Kazaz et al. (2008) time overrun is the extension of time beyond planned completion dates usually traceable to contractors. Ugwuja, (2010) defined it as the time lapse between the agreed estimation or completion date and the actual date of completion. Odesola and Idoro, (2014) describe time overrun as the time during which some part of the construction project is completed beyond the project completion date or not performed as planned due to an unanticipated circumstance. Time overrun affects the project owners, contractors, end users and other project participants. Project owners may be affected through lost benefits that could have accrued from the completed facility, while contractors may have to spend more on labour and plant, pay penalties as per the contract or even lose other profitable contracts because resources for the next job are tied up on delayed projects (Odesola et al. 2012; Olatunji et al. 2007).

Cost overrun

Odesola et al. (2012) and Ijigah et al. (2012) posit that cost overrun is also one of the causes resulting from rework which adversely affect the performance, productivity and ultimately the profit margins of the construction work.

Awe, Stephenson and Griffith, (2010) contributed that rework also triggers claims for extra costs and time wasted in redoing or repairing defects by direct impacts of rework on project management transactions which include (a) additional time to rework (b) additional costs for covering rework occurrences (c) additional materials for rework and subsequent wastage handling (d) additional labour for rework and related extensions of supervision manpower (Oyelere, 2007; Wang, 2008; Awe et al. 2010).

Research Methodology

Quantitative research approach with descriptive research design was adopted and the administration of questionnaires for the study was limited to Abuja the Federal Capital Territory and the Plateau state of Nigeria. Abuja was selected considering its cosmopolitan nature, the political activities, as well as the large volume of construction and development, works going on in the city. Hence construction craftsmen with experience were readily available, while Plateau State is known as Home of Peace and Tourism and as such, an attraction for investors and further harbouring institutions associated with crafts training such as; the Industrial Training Fund (ITF), Technical College Kuru etc. was considered which gave the researcher an opportunity to interact and obtain the views of trainers and trainees of these institutions.

The interviews were conducted at the convenience of the craftsmen and trainers, mainly at the construction sites and institutions of training respectively. The study targeted construction sites where works were ongoing for ease of meeting craftsmen during their working day and because the lack of readily available craftsmen's contact details precluded

identification of other meeting places. On arrival at the site, effort was made to identify who was in charge of the site (employer, lead craftsman, contractor, foreman or the site representatives) and to seek their permission. In an effort to cause the least disruption, interviews were scheduled in the craftsmen's free time/breaks; for example, during the lunch break or at the end of the work day. These were conducted at the respondent's convenience by prior appointment. As with the craftsmen, before the commencement of the interview the respondents were given an explanation of the purpose of the interview and how they had been identified. The respondents were each given a chance to voluntarily participate in the interview and they were assured of the confidentiality of the information gathered.

Five commonly used categories of craftsmen were covered in this study, namely: carpenters, masons, iron benders, plumber and electricians which were assessed through the questionnaire. The questionnaire has a total of 21 questions divided into three sections. The first section solicited general information from the craftsman, for instance, a number of years worked in construction, age, and education. These questions were intended to collect biographical data that would provide a contextual background for the rest of the survey. Being direct and relatively easy to answer, these general questions were also intended to put the respondent at ease, hence their positioning at the beginning of the questionnaire (Bourque & Fielder, 2003). Subsequent sections dealt with issues concerning the aim and objectives of the study.

Simple random sampling technique was employed to cull a smaller sample size of 100 comprising 85 craftsmen and 15 instructors from a large population estimated to be 630 comprising 450 craftsmen and 180 trainers of craftsmen. This technique was adopted because it is the least bias of all sample techniques and also it is devoid of subjectivity; each member of the total population has an equal chance of being selected. The study covered five medium-sized construction sites in Abuja, Nigeria and two institutions associated with crafts skill training in Jos, Plateau state, Nigeria. The eighty-five craftsmen comprised; 24 masons, 17 carpenters, 13 electricians, 21 plumbers and 10 steel fitters responded to the questions while 15 trainers/instructors in ITF Jos and Technical College Kuru.

Statistical analysis was executed with the assistance of the International Business Machines, Statistical Package for the Social Sciences (IBM SPSS) statistics software. This software was selected because it is well established and suitable for analysing the type of data that were collected in this study. The data collected were mainly of a nominal or categorical nature and were manipulated using various descriptive statistics such as mean, standard deviation, standard error and percentages.

Results and Discussions

Table 1. Factors affecting Productivity of Craftsmen

| Factors | Mean | SD | Rank |
|---------------------------------------|------|------|------|
| Job insecurity/Employee turnover | 4.02 | 0.94 | 1 |
| Incessant Rework and Estimation Error | 3.98 | 1.10 | 2 |
| Time Overruns | 3.93 | 0.88 | 3 |
| Poor Workmanship | 3.90 | 0.86 | 4 |

| | | | |
|---|--------------|------|---|
| Absence of Training and Equipment Breakdown | 3.81 | 1.00 | 5 |
| Inappropriate Tools and Equipment Breakdown | 3.51 | 0.97 | 6 |
| Grand Mean | 23.18 | | |

Table 1 and figure 1 gives an in-depth analysis of factors affecting the productivity of craftsmen for productive performance; job insecurity/employee turnover was considered very high in terms of its severity with a mean score of 4.0241. And next in ranking includes; incessant rework and estimation error 3.9882 and time overruns 3.9398 while the absence of training and equipment breakdown and inappropriate tools/equipment breakdown had mean scores of 3.8118 and 3.5181 respectively. This simply means that disengagement of crafts workers due to redundancy periodically confronting Nigerian construction industry due to change in political leadership, late budget approval and allocation of inadequate funds to the construction sector which also leads to lack of construction activities, deeply affects their productivity as it offers them no room to practice and improve their skills.

Table 2. Additional Skills, Skill Upgrading Institutions and Criteria for Selection of Trainee

| Description | | Options | Frequency | Percentage (%) |
|--|------------------|----------------------------|-----------|----------------|
| Additional Skills Performed by Craftsmen (Trade skills) | | Masonry | 5 | 5.9 |
| | | Bricklaying | 7 | 8.2 |
| | | Carpentry & Joinery | 1 | 1.2 |
| | | Electricals | 7 | 8.2 |
| | | Plumbing | 3 | 3.5 |
| | | Painting | 3 | 3.5 |
| | | Roofing (metal structure) | 5 | 5.9 |
| | | Roofing (timber structure) | 2 | 2.4 |
| | | Steel fixer (bar bender) | 3 | 3.5 |
| | | Tiler | 3 | 3.5 |
| | | Plant operator | 13 | 15.3 |
| | | Non | 38 | 44.7 |
| | | Others | 10 | 11.8 |
| Total | 85 | 100.0 | | |
| Skill Institution (Training source) | Upgrading | ITF Training | 18 | 21.2 |
| | | NBTE Training | 13 | 15.3 |
| | | Others | 4 | 4.7 |
| | | Total | 35 | 41.2 |

| | | | |
|--|-----------------------------|----|------|
| | Missing System | 50 | 58.8 |
| | Total | 85 | 100 |
| Criteria for Selection of Trainee | Ability to pay training fee | 2 | 13.3 |
| | Level of education | 1 | 6.7 |
| | Age | 7 | 46.7 |
| | Aptitude | 5 | 33.4 |
| | Total | 11 | 100 |

In addition to the trade skills and in contrast with formal training curriculum, the respondents acquired additional skills such as; plant operation, painting and so on. Table 2 shows some of these additional skills possessed by the craftsmen and plant operation had the majority of 15.3% followed by electrical and bricklaying with 8.2% each. These findings suggest that the acquisition of additional skills is part of the progression of craftsmanship following subsequently to the attainment of trade skills and improvement of productivity.

Skill upgrading is necessary to prepare craftsmen for changes in the construction sector, for instance, new technology and materials. Nevertheless, the majority (51.4%) of the respondents formally upgraded their skills after their initial training in Industrial Training Fund (ITF) while 37.1% upgraded theirs in National Board for Technical Education (NBTE) as presented in Table 3. The lack of formal skill upgrading does not necessarily imply that these craftsmen are not upgrading their skills but rather the format of their training continues to be informal. From the study, it was further discovered that 11.4% received further training in other institutions like polytechnics which are also associated with craft training.

Instructors in training institutions explained that; ability to pay fees and age (18.2% and 63.6%) respectively represents the trainee's inherent ability to learn the respective skills and further argue that youthfulness and fee payment were driving factors that make trainee show more commitment in training and further argue that other criteria like aptitude test and physical fitness were insignificant for the selection of trainees.

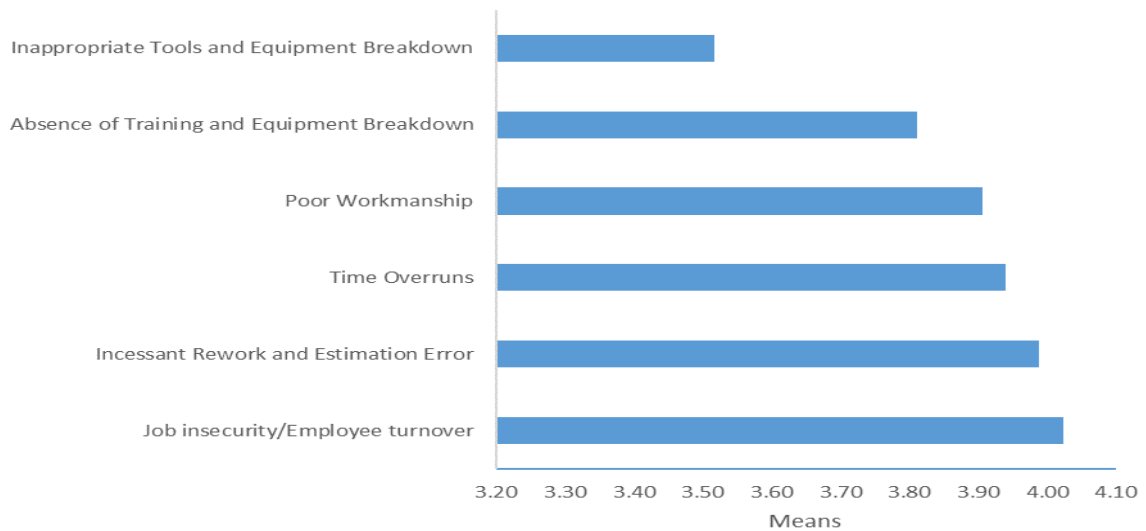


Figure 1. Factors Affecting Productivity of Craftsmen

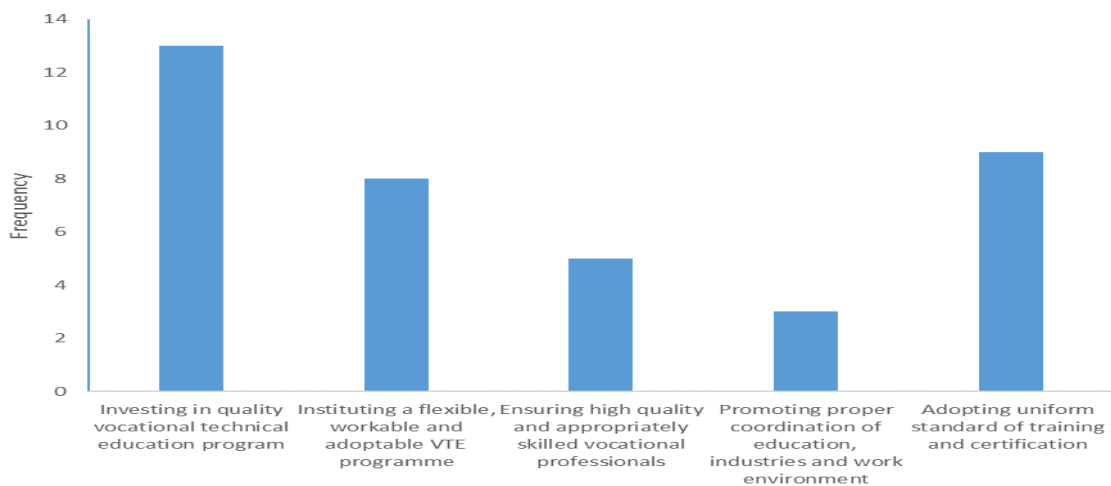


Figure 2. Addressing Challenges to Craftsmen Skills Development

Conclusion

The research indicates that the skills required of craftsmen to improve productivity can be highly mitigated by factors such as job insecurity/employee turnover resulting from lack of construction jobs or redundancy and these skills acquisition towards productivity can also be driven by consistently engaging these craftsmen which enables them to acquire additional skills by performing multiple tasks. The study further indicates the need to link off-the-job and on-the-job training of craftsmen through the involvement of institutions associated with crafts training since the collapse of the formal method of craft training has led to the existence of alternative methods of skilling particularly given the rapid growth of the informal construction sector. These alternative modes of skilling are classified as of-the-job or informal skilling, and finally, the study considers criteria for training.

Contribution to Knowledge

This research represents a significant contribution to knowledge and understanding of efficient methods of skills development amongst craftsmen in Nigeria. It highlights the type of skills that craftsmen acquire and the motivation behind such acquisition. In addition, it has identified the factors that militate against effective skill acquisition of craftsmen as well as the most efficient approach in addressing the challenges to craftsmen skills development. Given that construction craftsmanship is a significant part of the construction industry in many countries particularly in the developing world, and the problems facing the construction sector are mirrored in other countries as indicated in the literature review, the research forms a basis for the enhancement of appropriate and sustainable craft training systems in many countries other than Nigeria. In addition, the findings form a basis for the formulation of policies aimed at the creation of viable training programs for construction craftsmen. Such policy interventions should ideally encourage the building of linkages between the formal training institutions and informal trainers in an effort to address the weaknesses of skilling e.g. by increasing the level of theoretical instruction and introduction of appropriate technology. This would allow for the integration of both formal and informal craftsmen training as a means of addressing the shortages and inadequacies in craftsmen skills.

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