

Strategic Framework for Labour Productivity Improvement of Building Projects Performance in Nigeria

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Abstract

The stumpy level of diversification of construction resources based on variability in productivity experienced by many Construction Industries in Nigeria due to operational inefficiency have been identified as a vital issue that causes social and demographic changes in Nigeria. However, lack of reliable means of evaluating workmen efficiency in every work activity carried out necessitates the need for the study. This study therefore examines the strategies for improving labour productivity on building project performance in Nigeria. A well structured questionnaire was randomly administered among 240 Building construction professionals in Abuja. Data collected were analyzed using Statistical Packages for Social Sciences (SPSS). However, Mean Item Score techniques were used to examine the strategies for improving labour productivity on building project performance and Simple Regression Analysis was used to determine the level of relationship between Labour productivity and performance. The result of the analysis indicates that Capital Investment in Technology, Routine Evaluation of performance, Monetary and Non – monetary incentives, Team integration strategy, Labour education and Training with Mean Scores of 3.96, 3.80, 3.98, 3.58, and 3.25 respectively, had their contributory effects on Labour productivity. It was however deduce that understanding the significance of Time and Cost Performance has a major significant effect on the productivity of workmen in Nigeria with F_{cal} 11.744, 4.88 and p-value 0.003, 0.038 showing 0.599 and 0.434 degree of relationship. The study also signals the need for effective planning, Diagnosing and Evaluation of workmen performance as the strategic framework to reduce inefficiency and improve productivity.

Keywords: *Strategic framework, Labour, Productivity, Improvement, Performance*

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Background to the Study

Construction industry today became one of the largest industries in the world as a result of productivity which is the key asset to social and demographic changes of construction projects that happened over time (Statistics Brain, 2015). This productivity as it is generally stated by Rojas & Aramvareekul, (2003) shows the rate of production, efficiency, effectiveness and performance of work done to yield a productive output and also affects the overall performance of workmen in any small, medium or large construction organizations. However, since workmen performance is an indicator of construction company's competitiveness and success (Jarkas, Kadri & Younes, 2014), it therefore, defines productivity of labour as the overall performance of every construction projects toward successful completion (Takim & Akintoye, 2009).

In the research work of Harmon & Cole (2006), Labour productivity in the Nigerian construction industries became an important factor ever since labour cost generally account for 30% to 50% of overall project cost in construction. Unfortunately, the most pragmatic studies indicate that construction industries are greatly devoted to underperform when compare with other industries in the world as a result of the stumpy level of diversification of construction resources which is caused by variability in productivity experienced by many construction industries. This variability in productivity is as a result of operational inefficiency which has made some construction industries in Nigeria successful and others not successful. Unfortunately, lack of reliable means of evaluating labour efficiency in every work operations make it more difficult for many construction industries in Nigeria to improve because of their zero tolerance to productivity improvement and evaluation of performance.

Realizing this information however influences a further study on what causes labour productivity losses in the Nigerian construction industry and who should be held responsible. Many studies had been carried out to the challenges of labour productivity in many construction industries which has exhibited a biased attitude to work, causes defective work, delay of construction works on site and as well caused cost and time overrun.

For instance, Jarkas & Radosavljevic, (2013) studied productivity problems in construction industry of Kuwait. In their findings, most substantial factors that affect labour productivity were, late payment, rework, financial motivation, and change in instructions, unskilled supervisors, over-crowding, materials shortage, and unavailability of drawings. Zakeri, Harris, Olomolaiye & Holt (2016) also conducted a research to examine the factors that affect labour productivity in building construction of Indonesia. Most of the productivity problems highlighted include: materials shortage, rework, labour absenteeism, shortage of equipment and tools. All these factors were however filtered and only Fifteen (15) factors were identified for examination as the basic challenges affecting construction labour productivity in the Nigerian construction industries. Due to the fact that profit precincts are small on building projects, some construction industries in Nigeria despite working under the same working condition experienced different productive level associated with cost savings as a result of the above mentioned factors affecting different organizations.

Also, many construction projects fail because of the catastrophic level of organizational governance and inappropriate strategic management procedures; therefore, developing a framework for its improvement will reduce competitive disadvantage and increase competitive advantage (Alsudiri, Al-Karaghoul, & Eldabi, 2013). Many research works; (Enshassi, Sheriff, & Eduard, 2015; Idiake & Bala, 2012 and Hammed, Omran, & Pakir, 2011) pointed at improving labour productivity by making necessary contributions to the improvement of project performances. For instance; Rahman, Kumaraswamy, Rowlinson, & Sze, (2003) suggested that productivity can be improved by the adoption of flexible organizational culture and evaluation of individual performance to enhance continuous improvement and also experience a paradigm shift in cost, time and quality. Son & Rojas (2010) also suggested a way to reduce operational inefficiency through pre – evaluation of risk factors and also exhibiting an unbiased attitude while adopting a systematic model. Idiake & Bala (2012) also highlighted that labour productivity cannot be improved by completing as many tasks as possible regardless of the plan or output or number of hours spent, but can be improved when operation workflow is made more predictable. Jang, Seokjin, & Seung (2010) develop an integrated framework for productivity improvement called “Five level Circulating process” using Lean construction theory (Action research Approach) but his study did not capture productivity measurement as we cannot improve that which cannot be measured. Nirajan (2015) also developed an automated framework for estimating labour productivity frontier (Using Video camera and Kinect sensor). His framework was also challenged with the appropriateness of the unit of analysis used. Lakew (2017) expanded on a conceptual framework titled “*expectancy theory of motivation*” on the Strategies for Improving Labour Productivity in Construction Companies in Doha Qatar which consist of three variables: instrumentality, expectancy, and valence. Unfortunately, his framework lacks reliability in evaluating the efficiency of labour – intensive operation on quality project, therefore show gaps pointing to project failure. However, their findings suggested a future studies to develop a more systematic framework for labour productivity improvement.

This study therefore adopts a combination approach of operational based framework on several building activities. Factual data on cost and time for building projects performance evaluation (residential and public projects) were obtained which serve as a basis for comparing different organization level of operation and also contribute to productivity improvement of labour. This study however hypothesized that workflow variation has no significant relationship with labour performance and this was examined using Time and Cost study techniques.

Methodology

Participants

The research participants for the study include active construction organizations and ongoing building projects (Residential or Public) handled by different construction organizations which are available and assessable within Abuja and the unit of analysis for the study constitutes both skilled and unskilled labour force handling a particular operation under the supervision of experienced construction professionals in the field of construction.

However 240 questionnaires were administered in the ratio of 1:2:3 to each professional in the three categories of construction organizations in Abuja which were randomly sampled from the 640 active construction organization contained in the list of construction contractors registered with FIRS in Abuja. 171 questionnaires were retrieved back which was found useful for research analysis with a response rate of 71.25%. This approach was however used before by Fagbenle, Olabosipo, Lawal & Omuh (2012) in determining the influence of training on Mason productivity in Nigeria. However, only 42 active project sites were visited for the field observation in proportionality working ratio (1:3) generated from 127 active projects available in Abuja with the data gotten from the Development control department of the Federal Capital Development Authority Abuja. This was used to get the required data needed for measurement, evaluation of performance and productivity.

Sampling

The study Adopted a multi – Strategic Sampling Technique

A simple Random sampling techniques was adopted in administering questionnaire to selected construction organizations and stratified Random sampling techniques was adopted for field observation. The sample size for the questionnaire survey was generated using Krejcie & Morgan (1974) table for generating sample size.

Research Design

The research design used for this study includes both qualitative and quantitative approach (Triangulation). Data was collected through both primary and secondary literature source, studying and surveying through several researches on labour productivity of several construction projects in Nigeria was carried out. Statistical package (SPSS) was used to analyze the qualitative data (questionnaire) addressed to construction professionals.

Methods and Instrument

A site observation which involves field data collection, measurement, action identification and classification was conducted, specific building elements (Frames, Upper floors, Internal and External walls and finishes) were observed using Time study and Cost Performance Index. A structured questionnaire was also used as the research instrument which was rated among experienced professionals in the field of construction to examine the strategic framework for labour productivity improvement.

Methods of Data Analysis

The study employs the use of descriptive methods and an inferential method of analysis. Mean scores and standard deviation were used for the descriptive statistics to rank the identified factors and strategies in order of importance based on a five-point Likert's Scale and simple regression analysis was used to determine the level of relationship between labour productivity and performance.

Results and Discussion

Questionnaire Administered and Response Rates in the Study Area

An extensive and intensive literature review was carried out to identify several factors that have both direct and indirect effect on the productivity of workmen on building projects and

strategies to improve the operational skills of workmen for quality project delivery. Those factors were then filtered to 15 most relevant factors with respect to low labour productivity applicable to Nigerian Construction Industries and also 10 strategies for improving the operational skills of labour. These questionnaire were randomly administered among different professionals in the field of construction of which, 81(47.4%) works with Small scale construction firm, 63(36.8%) works with medium scale construction firm while 27(15.8%) works with large scale construction firm. 39(22.8%) of the respondents were Architects, 43(25.1%) were Engineers, 50(29.2%) were Quantity Surveyors, 27(15.8%) were Builders, 8(4.7%) were Project Managers while 4(2.3%) occupy other positions in the organization. The information given by these respondents are however quantified into numeric series and then converted to percentage, mean and standard deviation. The research findings were however outlined below.

Table 1: Mean Scores of Factors That Affect Labour Productivity

S/N	Assessment of low labour productivity	Low(%)	High (%)	Average(%)	Mean	Std. Deviation	Rank
1.	Inadequate Construction Materials	21(12.3)	120(70.2)	30(17.5)	3.98	1.18	2 nd
2.	Inaccurate Drawings/Specification	24(14.1)	99(57.9)	48(28.1)	3.63	1.11	9 th
3.	Lack of mechanized tools and Equipment	20(11.6)	149(87.2)	2(1.2)	4.17	1.11	1 st
4.	Poor Supervision of Operatives	17(9.9)	129(75.5)	25(14.6)	3.98	1.01	3 rd
5.	Lack of Skilled Training from Workers	28(16.4)	123(71.9)	20(11.7)	3.89	1.24	4 th
6.	Tools/Equipment Breakdown	22(12.8)	88(51.4)	61(35.7)	3.55	0.99	12 th
7.	Unfriendly Working Atmosphere or Weather Condition	26(15.2)	96(56.1)	49(28.7)	3.64	1.09	8 th
8.	Unbalanced Distribution of working resources (Materials)	25(14.6)	69(40.4)	77(45)	3.39	0.89	15 th
9.	Injury or Accident Involving Workers	36(21.1)	94(55)	41(24)	3.60	1.23	10 th
10.	Reduced wages of workers	31(18.2)	104(60.8)	36(21.1)	3.57	1.21	11 th
11.	Use of Wrong Construction Method	23(13.4)	109(63.7)	39(22.8)	3.78	1.10	6 th
12.	Delay in decisions making	42(24.6)	90(52.7)	39(22.8)	3.46	1.14	14 th
13.	Fatigue (physical stress boredom)	39(22.8)	94(55)	38(22.2)	3.50	1.29	13 th
14.	Poor Motivation of Workmen	32(18.7)	107(62.5)	32(18.7)	3.69	1.25	7 th
15.	Lack of construction knowledge by workmen	26(15.2)	106(62)	39(22.8)	3.82	1.16	5 th

Source: Field work, 2018.

The result of Table 1 analysis implies that the activities of workmen on various building projects are severely affected due to; Lack of mechanized tools and Equipment, Inadequate Construction Materials, Poor Supervision of Operatives, Lack of Skilled Training from Workers, Poor construction knowledge by workmen, Use of Wrong Construction Method, Poor Motivation of Workmen, Unfriendly Working Atmosphere, Inaccurate Drawings/Specification and Injury or Accident Involving Workers, among others with the Mean Score of (4.17, 3.98, 3.98, 3.89, 3.82, 3.78, 3.69, 3.64, 3.63 and 3.60) respectively, which hence serves as a financial, technical and attitudinal constraints to labour productivity which has indeed exhibited higher variability (Inconsistency) in productivity, caused biased attitudes to work, defective work, delay of construction works on site and also caused cost and time overrun as asserted by Son & Rojas (2010) and Sulaiman (2016).

Realizing the challenges that causes labour productivity losses in the Nigerian Construction Industry, the result of the factor assessment however made it possible to examine the strategies for labour productivity improvement. Table 2 therefore showed premium strategies to improve performance and reduce inefficiency of workmen productivity.

Table 2: Assessment of Strategies for Improving the Operational skills of Labour

	Assessment of operational skills of Labour	Low (%)	High (%)	Average (%)	Mean	Std. Deviation	Rank
1.	Sustainable Awareness of workers to work task	42(24.5)	93(54.4)	36(21.1)	3.46	1.31	6 th
2.	Capital Investment in Technology	18(10.5)	123(71.9)	30(17.5)	3.96	0.97	2 nd
3.	Routine Performance Evaluation of Workmen	26(15.2)	115(67.3)	30(17.5)	3.80	1.13	3 rd
4.	Adequate Motivation of workmen on site (Monetary or Grant)	19(11.1)	123(72)	29(17)	3.98	1.10	1 st
5.	Provision of Health and Safety Regulation for workers	31(18.1)	102(59.6)	38(22.2)	3.69	1.23	4 th
6.	Organization of incentive programs for workers	45(26.3)	90(52.6)	36(21.1)	3.46	1.28	7 th
7.	Establishment of Vocational Training institute for workmen	38(22.2)	95(55.6)	38(22.2)	3.58	1.27	5 th
8.	Upskilling	46(26.9)	84(49.2)	41(24)	3.36	1.22	8 th
9.	Organizational commitment to employees	48(28)	81(57.4)	42(24.6)	3.27	1.25	9 th
10.	Establishing effective team integration strategies and team quality	50(29.3)	46(26.9)	75(43.9)	3.25	1.23	10 th

Source: Field work, 2018

The summary in Table 2 pointed out most preferred strategies to be adopted in improving labour productivity and reducing inefficiency. The result of the analysis shows that; Monetary or Non – Monetary motivation of workmen, Technological investment, Performance evaluation of workmen, Provision of Health and safety Regulation, Establishment of Vocational Training Institute, Sustainable awareness to work task, Organization of Incentives, Upskilling, Organizational Commitment and Effective Team integration among others are essential strategies to improve workmen productivity and performance with the Mean Score of (3.98, 3.96, 3.80, 3.69, 3.58, 3.46, 3.46, 3.36, 3.27 and 3.25) respectively thereby increases the bottom line of profitability, reduces cost and time limit and gives room for more competitive bids. This however supports the view of Rahman *et al.*, (2003), Son & Rojas (2010), Idiake & Bala (2013) on Labour productivity improvement. The figure below hereby outlines the strategies for labour productivity improvement.

To ascertain the reliability of the strategic framework, the study pressed further to evaluate the impact of Labour productivity on Workmen Performance (Time and Cost). The result of the field observation is hereby presented below;

Field Observation and Measurement

In an attempt to examine the impact of labour productivity improvement on building project performance, workmen performance with respect to time and cost was evaluated and related to labour productivity with a null hypothesis stated thus; there is no significant relationship between labour productivity and performance (Time and Cost). Forty – Two (42) construction sites were visited for the on – site observation and measurement of work activities. The activities observed include; Concrete work, Block work and Finishes and the instrument used in carrying out the observation include; Stopwatch, Measuring Tape, Time and cost study sheet and other visual and manual devices. The result in Table 3 and 4 below gives the summary of the findings.

Table 3: Result of Simple Linear Regression of Observed Output and Labour Productivity on Time Performance

Variables		Observations			Inferences		
Predictor	Dependent Variables	R (%)	DF	F _{cal}	Sig.	Strength of Relationship	Remark
Standard Time	Total Mean Output	0.599	22	11.744	0.003	Weak	Significant
	Labour Productivity	0.093	22	7.184	0.067	Weak	significant

Source: Field Survey (2018)

Table 4: Result of Simple Linear Regression of Observed Output and Labour Productivity on Cost Performance

Variables		Observations			Inferences		
Predictor	Dependent Variables	R(%)	DF	F _{cal}	Sig.	Strength of Relationship	Remark
Labour Cost	Total Mean Output	0.197	22	4.851	0.036	Weak	Significant
	Labour Productivity	0.434	22	4.876	0.038	Weak	Significant

Source: Field Survey (2018)

Based on the result of the site observation and measurement, Table 3 showed that 35.9% of the variation in values of the mean output produced per workman can be predicted by change in the values of standard time. F_{cal} is 11.744 and the p-value 0.003, indicating that H_0 is rejected since the p-value is less than the significance level (α) which is 0.05, thereby showing a significant relationship between Labour productivity and Time performance.

However, the result of Table 4 also showed that only 18.8% of the variation in values of the mean labour productivity can be predicted by change in average cost. F_{cal} is 4.876 and the p-value 0.038 indicates that the H_0 is rejected since the p-value is less than the significance level (α) which is 0.05. This also shows a significant relationship between labour productivity and Cost Performance. The figures below therefore represent the result of the analysis;

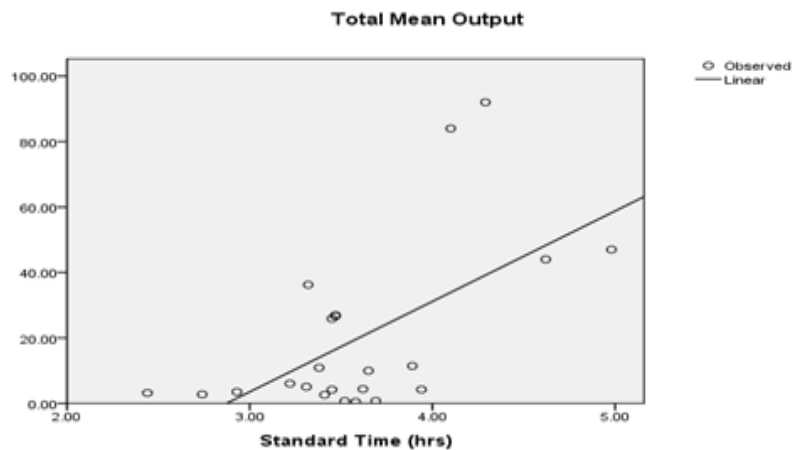


Figure 1: Regression of Total Mean Output on Time Performance

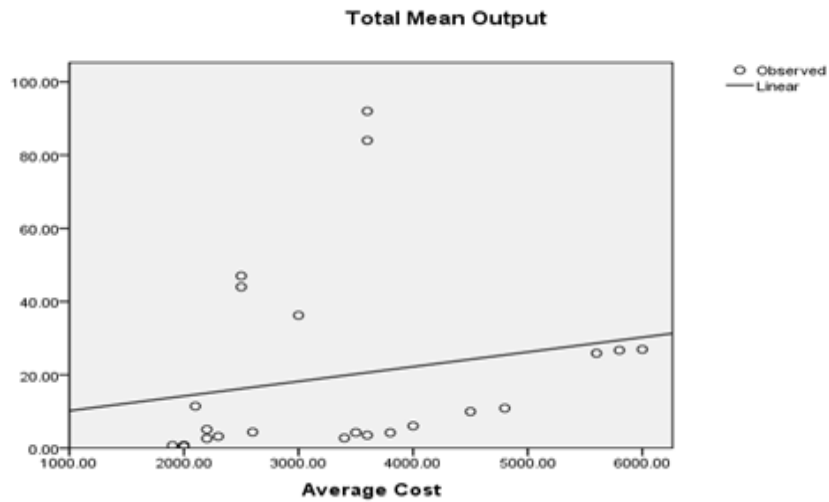


Figure 2: Regression of Total Mean Output on Cost Performance

This therefore makes it evident that a well committed workman with reliable work efficiency has a high productivity thereby supporting Idiake & Bala (2012) approach to productivity, who stated that; “labour performance productivity cannot be improved by completing as many task as possible but can be improved when operation workflow is made more predictable”. This however will generate potentials for specific adaptation to suite construction management and production system and also reduces time and cost overrun.

Strategic Framework Development

The strategic framework however explains the level of improvement of labour to work task which gives them the room to focus on maintaining a predictable workflow and thus be able to match the available workload with capacity. The schematic framework is however tagged as the “*Quantum League to Labour Productivity Improvement*” using Benchmarking principle. This concept was however generated from Takata *et al.*, (2004) on the factors for determining maintenance strategies for construction project development. It is hereby outlined below;

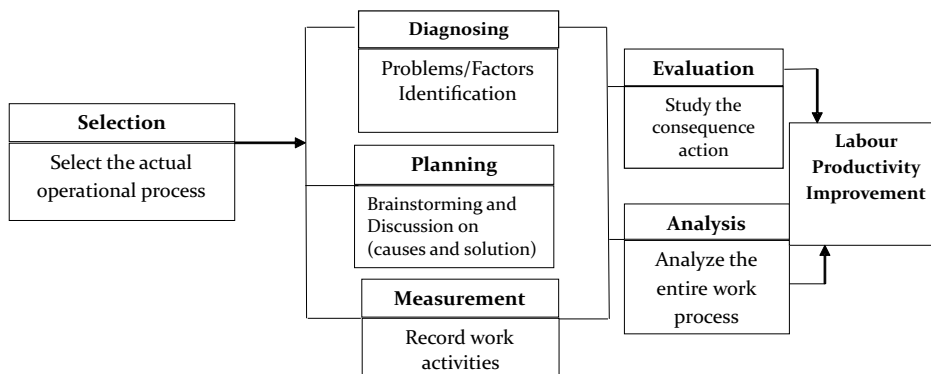


Figure 3: Strategic Framework for improving worker's Efficiency.

Source: Fieldwork, 2018.

The framework above reinforces the need for the attitudinal changes of workmen to work task and empowered them as an integral asset to construction project development. It plays a pivotal role in ensuring that variability in productivity is reduced and operational inefficiency is avoided during construction. It started with the **Selection** of the actual operational process to be carried out and also the nature of work operation, followed by *Diagnosing* which implies identifying the factors that affect each level of operation and what constitute variability in productivity and workmen inefficiency. This is however done in conjunction with the examination of the causes that are been diagnosed and provide a measure for improvement. This is regarded as *Planning and Measure Taken* like; applying an appropriate leadership style; providing training and development; and implementing effective integration scheme. This is followed by *measurement* which quantifies the efficiency and effectiveness of workmen performance on every work activity. This was exempted in Jang *et al.*, (2010) and Lakew (2017) approach, as we cannot improve that which cannot be measured. Recording the observed occurrences in figures and determining the appropriate capability of workmen per level of activity plays a vital role in improving workmen efficiency. This is because it shows the level of production of workmen on every level of activity. These are then subject to **Evaluation** which study and show the consequences of each action taken to improve the productivity of workmen and maintain a predictable workflow. This was then subject to **Analysis** to determine the level of accuracy and reliability of the measures taken. Hence, increase the bottom line of profitability and improve productivity. However, the priority of the strategic framework is to; Support a step change in efficiency and productivity, Support improved intervention, prevent inequality and support thinking about future resilience.

Conclusion and Recommendation

The study had highlighted the challenges of labour productivity with respect to building project performance in Nigeria and also examines various strategies to reduce variability and improve productivity. It also shows the level of significance between labour productivity and performance. The study therefore concluded that practical support should be provided to workmen on site by providing sufficient resources that will be adequate enough to carry out work activities. The study also asserted that routine performance evaluation of workmen is highly important and should be adopted in every work operation to determine the level of efficiency of workmen. Worker's commitment to work task also need to be addressed as it is time and cost bound.

However, adequate attention is required to address the following issues to enhance growth and development of Nigerian construction industries.

1. There is a clear need for technological advancement and adoption of mechanized tools and equipments to improve productivity
2. To enhance a high rate of work efficiency, performance evaluation scheme also need to be adopted by the three categories of construction organizations in Nigeria in order to improve work performance. With these, Projects can be completed more quickly, project cost can be lowered and be more profitable, and Contractors can submit more competitive bids.

3. This research hereby gives room for further strategies and efforts toward Labour productivity improvement to serve as a basis for comparison of analysis provided.

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