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# EVALUATION OF FACTORS AFFECTING LABOUR PRODUCTIVITY IN CONSTRUCTION INDUSTRY: A CASE STUDY

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## Abstract

Construction labor productivity is critical to the success of the industry. It is thus, important for the estimation and scheduling of construction project. However, most of the traditional construction firms have no accurate data on labor productivity. Therefore, this paper aims to identify through literature review those factors that affect labor production rate and evaluate their effects on the performance of the industry. The research made use of the 44 returned questionnaires from the contractors firms. Statistical package for social sciences (SPSS) to compute the mean score for each factor. These factors were subsequently ranked based on the mean score value.The results of the analysis has shown that, based on the management level factors "lack of motivation and incentive, lack of equipment, disruption of power and water supply and inspection delay" are the most significant factors affecting labour productivity each with mean score values of 0.79, 0.44, 0.38 and 0.35 respectively. Also based on the site level factors "lack of adequate skillful worker with specific scope of work" at site, delay in material supply, weather, access to the site, crew size and communication problems between foreign and local staff are the top six most significant factors affecting labour productivity each with the mean score values of 0.77, 0.75, 0.75, 0.66, 0.61 and 0.53 respectively. Similarly, all the respondents seem to have agreed in their perception on the severity of factors affecting labour productivity.

*Keywords*: Construction industry, labour, productivity



## 1.0 INTRODUCTION

Assessment and the improvement in productivity is a crucial for labor intensive processes [1]. This has been an issue of concern in construction industry. Retarded economic growth and competition level compel the construction companies to look for ways of improving performance. Poor labour productivity plays a major contribution in the frequent delays of many projects, consequently these projects suffer a serious cost overrun [2].This has generated a lot of dispute among the construction stake holders. Construction labor productivity is the ratio of quantity of work completed to the labor hours [3-4]. Labor performance related problems generated alarming decline in construction productivity for decades [5-6]. .Management support and related issues also affect construction productivity [7-8]. All over the world improving labor efficiency is one of the major target for many construction company since they are dynamic and their costs represents almost half of the total construction cost [9-10]. The productivity of labor determines the profitability of many projects [11]. Labour productivity can be analyzed at different levels. These are industry level consisting clients organization, contractors' organizations and consultants organizations. It can also be measured at company level which only focuses on either clients' organization, consultants' organization or contractors' organization. Project is another level at which productivity can be analyzed [12]. Following the role of the construction industry in the national economy as employer of labour and

which remarkably contribute to growth domestic project, it is imperative to measure its productivity. At company level, other indicators like safety is also a performance indicator apart from the usual traditional financial measure [12]. However, traditional construction company lack accurate data on labor productivity [13]. Thus, productivity development has been so slow and relatively worst [14]. Furthermore, majority of the companies do not measure and monitor the productivity. Also most managers do not mind the safety and other health related issues of their employee. Unless working condition at site is satisfactory otherwise, labor productivity will always be affected [15]. It may amount to accident and injuries which consequently causes delay. Construction productivity is affected by number of factors. These factors can have similar impact on productivity but at different rate [16]. Worker performance rating can be used to improve productivity at site through Motivation and technical skill [5]. Management commitment has also played a critical role [7, 17]. Availability of material, power tool, absenteeism, health and safety training, availability of drawing, waiting for equipment to move material are known to influence on-site labor productivity[18] Late payment of salary and wages, supervisory incompetence and lack of man power skill have also affect labor production at site. Design and equipment related issues also have high effect [6]. Shortage of material has more effect on productivity than other related factor [17]. Workers are more motivated if they are given financial incentives [19].Thus, they would be more productive. And higher labor productivity is known to cause improvement in the nation's gross domestic output by extension.

There arefew researches made nationwide on labor productivity measurement in Nigeria [13].Thus, lack of productivity accurate data and measurement method however, made the magnitude of productivity problem in to be largely unknown in the construction industry. Most of researches conducted were the job site specific [20-23]. However, others attempted to measure labor productivity off-site. External factors have also influence labor production both at job site and off-site. Factors affecting productivity needs to be investigated and evaluated to improve construction standard a both in terms of labourand management issues [5, 24].

Chandana and Janaka [5] have studied critical factors that enhance construction labor productivity. The most significant factors that affect labour productivity were the technical skill of the worker, motivation and other management related factors. Other factors such as absenteeism, availability of power tools, availability of materials, waiting for people to move equipment or material and availability of health and safety training were found to heavily influence thelabour productivity [18]. The safety measure is virtually impossible without management commitment [7].Therefore, there is need of clear organizational policy concerning the issue of safety of workers on site [8].Generally, unsatisfactory working condition due to safety and health related issues affect labour productivity [15]. Also owner financial problem, delay in arrival of materials, repairs and repletion of works and bad weather will have undesirable effect on labour productivity on site [25]. Consequently. These affect the progress of work. Lack of necessary equipment and tools, incompetent supervision leading to re-work and shortage of materials were parts of the major constraints affecting labour productivity in Nigeria [27].

Motivation was used for enhancing labour productivity in Nigeria [26]. Generally financial incentive is more effective than other forms of motivation [19]. Wrong method of construction and inadequate construction materials were some of the major causes of poor labour productivity in Nigeria [27]. Size of the crew may lead to a relatively more congested working space, thus, influence the labour production rate. Therefore, site managers need to take this into account during site planning. Otherwise, it would lead to delay in accomplishing some vital task within a schedule. The effects of project-related factors on construction labour productivity were investigated in Nigeria. It was found that specification, project goals, availability of drawing and high quality of required work were the top most significant factors [28].Isaack and Idoro [20] have extensively investigated the influence of site level factors on construction labour productivity in Nigeria. The results have shown that health and safety policy, using experience workers, minimization of rework were the major factors affecting labour productivity on site. Also poor communication among workers at site especially between foreign and local staff may affect labour productivity. Hence it is important to ensure good communication in the construction works to produce information that are required by top management for tracking of work progress at site [29]. Therefore competent and timely inspection of labour from management is essential for addressing many issues prevailing on site [301. The influence of these factors coupled with stoppage of material delivery due to financial difficulty, equipment breakdown were found to largely affect construction labour productivity [31-34]. The top management commitment with respect to competent and timely supervision, incentive programs and health and safety has been emphasized [6].

Few numbers of researches on factors affecting labour productivity have been reported nationwide in Nigeria with the majority of it conducted in the southern part of the country [13, 20, 28]. Thus, productivity data and measurement methods are lacking. This makes the magnitude of productivity problem in to be largely unknown in the construction industry., especially in other part of the country. Hence it becomes crucial to identify and examine those factors that critically contribute to the low labour productivity in the construction industry.

The research only considered such companies that participated in the projects executed by Kano State government of Nigeria within the period 2003–2011 in the northern region of the country. This is because most

of the researches in this regard were conducted in the southern part of the country [20, 29]. Also, influence of labour productivity variables from both management and site level perspectives as suggested by Khaled and Raymon [34] have been considered. Thus, construction practitioners could identify critical areas that need more focus to improve labour productivity.

The objectives of this study are to: (i) To identify and evaluate the factors that contribute to the labor productivity in the Nigerian construction companies. (ii) To rank the factors according to their severity based on their mean score. (iii) To determine the level of agreement of ranking of these factors among the respondents with respect to management and site level factors.

### 1.1 Hypothesis Test

To test the agreement of ranking of these factors within the group respondents:

- $H_O$: There is no significant difference among the perceptions of the respondents with regard to severity of factors affecting labour productivity
- $H_A$: There is significant difference among the perceptions of the respondents with regard to severity of factors affecting labour productivity.

## 2.0 METHOD

In this research a descriptive survey method is adopted via qualitative data gathering through a questionnaire. Thus, a questionnaire survey was used to seek the perception of the respondents. Stratified sampling method was used to select the respondents. Consequently, these respondents were randomly selected from group of contractors. Hence, this group is used as a unit of analysis. Accordingly, the responses were subsequently analyzed.

The research made use of 44 returned questionnaires out of the 60 administered. Thus, represents 73% response rate. These questionnaires were used to source the required data. It consists of three parts. First part deals with the personal information regarding the respondents' characteristics such as academic qualifications, construction industry work experience and membership with Professional organization. Part two deals with such information about the contractors' organizations as area of specialization, ages, and type of projects executed by each of the companies respectively. The last part of the questionnaire deals with such information on the variables affecting construction labor productivity which were identified through literature review, thus, suggested to respondents.

The respondents rated the variables which they perceived to be the likely contributing factors influencing labor productivity in building and civil engineering projects by responding on a scale from 1 (Unimportant) to 5 (Extremely). The five-points Likert rating scale was 1 Unimportant, 2 Not much important, 3 Moderately Important, 4 Very Important, and 5 Extremely Important. This five point scale is used to calculate the mean score for each factor. And they were subsequently ranked accordingly; such mean score with low magnitude is assigned low ranks while those with the highest score are allocated thehighest rank. The mean score (MS) for each factor was computed using SPSS.

## 3.0 RESULTS AND DISCUSSION

The mean score values of administrative and site level factors as perceived by the respondents have been summarized and presented in the Tables 1 and 2.

**Table 1** Management factors

| S/No | Factors | Mean Score | Rank |
|---|---|---|---|
| 1 | Motivation and Incentives | 0.79 | 1 |
| 2 | Lack of equipment | 0.44 | 2 |
| 3 | Disruption of power/Water | 0.38 | 3 |
| 4 | Inspection Delays | 0.35 | 4 |
| 5 | Labor Work | 0.32 | 5 |

**Table 1** Site level factors

| S/No | Factors | Mean Score | Rank |
|---|---|---|---|
| 1 | Lack of skillful labour with specific scope of work Incentives | 0.77 | 1 |
| 2 | Delay in material delivery to site | 0.75 | 2 |
| 3 | Whether | 0.66 | 3 |
| 4 | Access to the site | 0.61 | 4 |
| 5 | Crew | 0.53 | 5 |
| 6 | Communication problems between foreign and local staff | 0.37 | 6 |
| 7 | Congestive work area within project site | 0.37 | 6 |
| 8 | Absenteeism at work site | 0.35 | 7 |
| 9 | Material shortage | 0.32 | 8 |
| 10 | Labor disruption | 0.32 | 8 |

Accordingly, the factors were ranked based on their mean score values. As can be seen from Table 1 that motivation is the most critical factor affecting the labor productivity on site with the mean sore value of 0.79. It is thus, ranked the first as the most significant factor. Recognition and award of excellence were reported to motivate workers on site. However, the financial incentive is more important than all other forms of incentives [5,19].The next important factor is lack of sufficient equipment with mean score value of 0.44 and ranked the second most significant factor affecting productivity on site. Thus, time spent waiting for the arrival of equipment reduces the quantity of work expected during a given man hour time period. Another factor that retard labor productivity is the disruption of power supply with the mean score value of 0.38, and ranked third important factor. Adequate supply of power and water on site is necessary for the maximum labor efficiency [18]. The next factor critical to labor productivity is delayed supervision with the mean score value of 0.35 and is thus, ranked fourth important factor. Generally, supervisory incompetence has demoralized the morale of workers at site [6].

From Table 2 it can be seen that lack of skillful labors with specific scope of work is the most important factor affecting labor productivity on site. It has a mean score value of 0.77 and thus, ranked the first. Consequently, this will lead to rework. Generally poor technical work on site generally leads to correction of bad work/rework [5].The second most important factor affecting labor output is the delay in delivery of material to the site, with the mean score value of 0.75 and ranked as the second. The next important factor is the effect of weather with the mean score value of 0.75 and thus, ranked second most significant factor. This was followed by accessibility to the site, crew, communication problems between foreign and local staff, congested area within the project site, absenteeism, material shortage and labour disruption each with mean score values of 0.66, 0.61, 0.53, 0.37, 0.37, 0.35, 0.32 and 0.32 respectively. Consequently, they were ranked as third, fourth, fifth, sixth, sixth, seventh, eighth and eighth factors respectively.

Table 3 and 4 have indicated the level of agreement or ranking of these factors based on the perception of the respondents. Rs indicate the correlation while t-calculated and t-tabulated implies the t-test within the group of the respondants at a probability of 5% significant level. As can be seen from Table 3 there is no significant difference in the perception of the respondents and hence the ranking of the management level factors since t-calculated is greater than t-tabulated thus, $H_0$ is accepted. Also Table 4 has shown that there is no significant difference in the perception of respondents with regard to site level factor since t-calculated is more than t-tabulated, consequently, $H_0$ is accepted.

**Table 3** Test of agreement of ranking of factors affecting labour productivity with respect to management level factor

| $R_s$ | t-cal | t-tab | Accept $H_o$ | P-Value |
|---|---|---|---|---|
| 0.71 | 0.86 | 0.79 | Yes | <0.05 |

**Table 4** Test of agreement of ranking of factors affecting labour productivity with respect to site level factor

| $R_s$ | t-cal | t-tab | Accept $H_o$ | P-Value |
|---|---|---|---|---|
| 0.5 | 0.84 | 0.45 | Yes | <0.05 |

## 5.0 CONCLUSION

Factors affecting labor productivity at site were identified. Company management level related factors were also identified. Mean score values of these factors were computed to determine their relative significance. They were then subsequently ranked accordingly. Lack of skillful man power with specific scope of work was found to be the most important factor affecting labor productivity on site. And ranked the first based on its mean score value of 0.77. The next important factor affecting labor productivity at the company management level is the motivation with the mean score value of 0.79.The result of the hypothesis has shown that all the respondents have agreed on the severity

of factors affecting labour productivity in the Nigerian construction industry.

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