

Performance measure of construction site managers on South-Western Nigeria

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Site management is a key occupational category in the construction industry. Extant literature has blamed construction site managers as contributing to time overrun due to errors in production management of construction projects. The purpose of this study is to determine predominant performance criteria and its influence on time performance. Using simple random sampling technique, seventy-eight (78) respondents that responded to the research instrument were used for the study. The objectives of the study were resolved using mean item score and regression analysis. The findings indicate that most of the construction site managers were rated average on the identified performance criteria by their direct boss (contracts manager). Site managers' scores identified time performance factors high in improving time performance. Identified performance criteria had a strong positive impact on time performance of construction projects. The study recommends among others, planned training to improve productivity, communication skills, work ethics and team building of construction site managers.

Keywords: Construction site manager; Performance criteria; Time performance

INTRODUCTION

According to Styhre and Josephson (2007), construction site managers carry out one of the challenging jobs in the construction process. Site management is characterized by a high work load, long working hours and many conflicting parties to deal with including management, subordinates, and the client. They are prone to stress and if not well trained with the required skills may perform below average. Yaghoobi and Haddadi (2016) in their study found that site managers contribute to time overrun. Such contributing factors like forgetfulness, carelessness, deficient judgement had been identified as errors committed by site managers and all these result in unnecessary work at construction sites.

One of the essential requirements of any construction organization is to evaluate and monitor employee performance as this helps in giving feedback to them on their performance level and stimulates them to work harder (Hanna & Bruce, 1997). Employee performance can be defined as the achieved work outcomes for each job function during a specified period of time (Deadrick & Gardner 2000). Performance evaluation or appraisal is "a formal, structured system of measuring and evaluating an employee's job related attributes, behaviours, and outcomes to assess an employee's productivity and judge whether he or she will perform as or more effectively in the future, so that the

employee, the organization, and society all benefit (Shaout & Al-Shammari, 1998). Performance of construction site managers refers to a systematic process for obtaining valid information about their performance and the factors that affect their performance (Yaghoobi & Haddadi, 2016). Performance assessment is an important task for construction companies as it helps in highlighting the main criteria resulting in the poor performance of site managers (Yung-YuLin & Nai-Hsin Pan, 2014). Performance has behavioural and outcome perspectives. The behavioural perspective defines performance in terms of measurable behaviours relevant to the achievement of organizational goals. The outcome perspective refers to the objective consequences of behaviour. Thus, in project context, the outcome perspective will evaluate performance on the basis of project outcomes such as quality and time.

Performance of construction workers can be evaluated either objectively or subjectively (Vinchor, Schippmann, Switzer & Roth 1998). Objective measures reduce both intentional and unintentional biases such as leniency and halo errors (Siders, George & Dharwadkar, 2001). Job performance measures are known to be criterion measures (Campbell, McCloy, Oppler, & Sager, 1993). Researchers of this school have investigated different clusters of performance criteria. Borman and Motowidlo (1997b) classified job performance into task performance

(job specific behaviours, such as core job responsibilities) and contextual performance (non job-specific behaviours, such as cooperation, interest)

Arazi, Mahmoud and Mohamad (2011) stipulate that construction project's time refers to the estimated period within which the project will start and finish. According to Arazi et al. (2011), the extent to which construction project meet time target determines its effectiveness. Consequently, time performance of construction projects can be judged based on a number of factors, such as completion within predetermined project duration, average delay experienced, irregular payments, time expended on implementation of variation orders and time needed to rectify defects that occurred during construction and defect liability period.

Unfortunately, construction project still experience unexpected delay and untimely delivery. The work of (Khamidi, Khan & Idris, 2011) attributed difficulty in completing construction project within predetermined time to its unique nature, improper planning, and poor management of construction time. Apart from the work of Mustapha and Naoum (1997) that examined "*criterion measures for determining the effectiveness of site managers*", limited research had been done in this domain of study. Dulaimi and Langford (1999) tested the relationship between project managers' performance criteria and project performance (time, cost), their result suggested that certain aspects of project managers' performance criteria (organizing, coordinating) are significantly related to project performance. Similar works need to be replicated for construction site managers using time performance. Hence this study aims to identify predominant criteria for measuring the performance of construction site managers, identify predominant factors influencing time performance of construction projects and determine the impact of performance measures on time performance of construction site managers

Performance Measures

The prevalent performance evaluation in the construction industry is by ratings, which are subjective evaluations obtained from sources including supervisors, peers, subordinates, self,

or even customers, with supervisors being the most commonly used source followed by peers (Viswesvaran, Ones & Schmidt, 1996).

Viswesvaran (1993) empirically identified ten popular component dimensions of job performance. They are productivity, quality, leadership, communication competence, administrative competence, effort, interpersonal competence, job knowledge, compliance with or acceptance of authority, and overall job performance. The study of Hanna and Brusoe (1997) identified 11 criteria for evaluating supervisors' job performance in electrical construction contractors, which include leadership, personal conduct, communication skills, quality of work, ability to deal with problems, delegation of responsibility, work ethics, initiative, accepts responsibility, ability to work with others, and knowledge of work. Dainty, Cheng & Moore (2003) based on their logistic regression analysis, found 12 competencies helping to distinguish between superior and average performers. These competencies are achievement orientation, initiative, information seeking, focus on client's needs, impact and influence, directiveness, teamwork and cooperation, team leadership, analytical thinking, conceptual thinking, self-control, and flexibility.

Igbaria (1991) studied the antecedents and consequences of job performance of management information system professionals. The resulting factor analysis of 17 job performance qualities produced two categories of job performance measures. Task category consists of ability, job knowledge, productivity, creativity, quality of work, initiative, judgment, planning, accuracy, and responsibility. Relationship category consists of cooperation, honesty, interpersonal relationship, attitude, dependability, communication skills, and punctuality. Another research group in the United Kingdom, when studying superior managers' behavioural attributes, extracted nine factors of performance effectiveness criteria for construction, which are teambuilding, leadership, decision making, trust, honesty and integrity, communication, understanding and applications, self-motivation, and external relations (Moore, Cheng & Dainty 2003).

Factors Affecting Time Performance

Various researchers have identified factors that can enhance time performance of construction projects. Research by (Tumi, Omran, Pakir, 2009; Danso & Antwi, 2012; Rahman, Memon, Magapan, Qbai & Azis, 2012) demonstrated that adequate pre- and post- contract planning, effective supervision of workforce, satisfaction of clients' needs and use of tools and techniques can improve time performance of construction projects. The study of (Enshasi, Al-Naffar, Kumaraswamy, 2009; Kaliba, Maya & Mumba, 2009; Pai and Bharat, 2013; Aziz, 2013) identified adequate project funding, commitment of construction companies top management and effective communication among workforce as factors that can improve time performance of construction projects. Empirically (Memon, Rahman & Azis, 2013; Gunduz, Nielsen & Ozdemir, 2013) established that the use of skilled craftsmen, enforcement of quality policy on site, on the job training of craftsmen and ability to read and interpret drawings can improve time performance of construction projects.

Relationship between Performance Measures and Project Performance

Different theoretical frameworks have been developed to understand the mechanisms underlying the relationship between performance measures and project performance. Dulaimi and Langford (1999) tested the relationship between project manager's behaviour and project performance (time, cost). Their results suggested that certain aspects of a PM's behaviour (that is organizing and coordinating) are significantly related to project performance. Gransberg, Dillion, Reynolds & Boyd (1999) studied the effect of partnership on project performance. They found that the continuous partnership results in improved project performance across the entire program. Brown and Adams (2000) investigated the impact of building project management on project outputs. Their results indicate that building project management does not have a significant impact on project performance. Odusami, Iyagba & Omirin (2003) examined the effects of project leadership and team composition on overall construction project performance in Nigeria. Results indicate that significant relationships were found among a

project leader's professional qualification, his leadership style, team composition, and overall project performance, but the project leader's profession was not related significantly to overall project performance. However, research into performance measures as an independent variable to explore its relationship with time performance is lacking. The present study represents an original inquiry that contributes to the existing literature in the study domain.

RESEARCH METHOD

The data for the study were collected through questionnaire addressed to site managers and contracts manager in contractors' organizations within the Nigerian construction industry. Additionally, archival data relating to performance criteria, factors affecting time performance were also sourced. Prior to data collection, pilot study was carried out using the initial draft of the questionnaire to ensure that the research instrument would establish the most productive form of data analysis. The input and the results generated from the pilot study were used to refine the questionnaire before the industry- wide survey was carried out. Reliability test was also conducted on the research instruments using Cronbach's alpha (α). The reliability coefficients for the instrument relating to performance criteria and the archival data were found to be 0.862 and 0.921 respectively. This signifies that the instruments used for the study were reliable.

In order to have a defined sample size, 462 construction companies in Lagos state that have current financial status with Federation of Construction Industry (FOCI) were retrieved from their web site. Using a stratified sampling technique, one out of every construction company in the sample frame was selected and given the research instrument. A total of 154 questionnaires were distributed to site managers of selected construction companies and another set of questionnaires were also given to contracts manager for the evaluation of site managers' performance. A total of 78 questionnaires were retrieved from the respondents and used for this study.

DISCUSSION

From the biographical information of the respondents presented in Table 3; civil engineers

constitute the largest majority of the respondents. This is seconded by builders and lastly architects.

This agrees with the employment structure of most construction companies in the study area.

Table 1: Biographical Information of Site Managers

Profession	Frequency	Percentage
Civil Engineers	38	48.72%
Builders	30	38.46%
Architects	10	12.82%
Total	78	100.0%
Industry Experience of Site Managers		
Less than 10 years	15	19.23%
11- 20 years	25	32.05%
21-30 years	25	32.05%
More than 30 years	3	16.67%
Total	78	100.0%

With regards to industry based experience of the respondents, most of the study samples have between (11-30) years' work experience in the industry. This means that most of the respondents have relevant experience to make contribution to the study.

Predominant Performance Measures

Based on the responses of the respondents as tabulated in Table 2; four performance criteria (productivity, communication skills, team building and job knowledge) were adjudged as very important by the respondents on the one hand while the remaining thirteen performance

criteria (analytical thinking, work ethics, quality of work, interpersonal relationship, dependability, planning, leadership, ability to deal with problems, initiative, ability to accept responsibility, focus on clients' needs, punctuality and ability to take decisions) were adjudged to be important on the other, by same respondents. Findings in the adjudged very important performance criteria is consistent with the findings of Viswesvaran (1993), Hanna and Brusoe (1997), and Dainty et al (2003); in that their respective studies identified these performance criteria as very important.

Table 2: Performance Criteria of Construction Site Managers

Performance Criteria	M.I.S
Productivity (quantity of work done)	0.86
Communication skills	0.83
Team building	0.81
Job Knowledge	0.80
Analytical thinking	0.79
Work ethics	0.78
Quality of work	0.76
Interpersonal relationship	0.75
Dependability	0.73
Planning	0.71
Leadership	0.70
Ability to deal with problems	0.69

Initiative	0.67
Accepts responsibility	0.66
Focus on Clients needs	0.65
Punctuality	0.64
Ability to take decision	0.60

(0.80-0.99) very important criteria; (0.60-0.79) important criteria; M.I.S = Mean Item Score

The predominant performance criteria are both objective and subjective performance measures and this confirms the findings of Vinchor et.al. (1998) that performance of construction workers can be evaluated both objectively and subjectively. Although Siders et.al.(2001) is of the opinion that emphasis should be on objective measures so as to reduce intentional and unintentional biases (leniency and halo errors) inherent in subjective performance measures.

Evaluation of Construction Site Managers Performance

Table 3 depicts the result of performance evaluation of construction site managers. Construction site managers were evaluated as good on (quality of work, ability to deal with problems, analytical thinking, leadership and interpersonal relationship). Mustapha and Naoum (1998) in their study of factors influencing the

effectiveness of construction site managers also identified some of these factors as highly effective. The main divergence of this result with the findings of Mustapha and Naoum (1998) is that the direct supervisors scored construction site managers higher than the scores contracts manager gave to site managers in this study. Site managers were scored average performance on (Accepts responsibility, job knowledge, planning, productivity, team building, communication skills, ability to take decisions, focus on clients' needs, dependability and work ethics). Their performance evaluation on their initiative and punctuality was poor. This performance evaluation is consistent with the findings of Styhre and Josephon (2007) that the nature of work of construction site managers is stressful and if lacking in required skills may result in poor performance.

Table 3: Evaluation of Construction Site Managers Performance

Performance Criteria	M.I.S
Quality of work	0.66
Ability to deal with problems	0.65
Analytical thinking	0.63
Leadership	0.62
Interpersonal relationship	0.61
Accepts responsibility	0.56
Job knowledge	0.55
Planning	0.52
Productivity	0.49
Team building	0.48
Communication skills	0.47
Ability to take decision	0.46
Focus on clients' needs	0.45
Dependability	0.44
Work ethics	0.43
Initiative	0.25
Punctuality	0.21

(0.80-0.99) excellent; (0.60-0.79) good; (0.40-0.59) average; (0.20-0.39) poor;

(0.00-0.19) very poor; M.I.S = Mean Item Score

Factors Affecting Construction Time Performance

The results in Table 4 indicate factors affecting construction time performance. Based on the responses of the respondents, adequate project funding and adequate pre- and post- contract planning of projects have very high improvement on construction time performance. This agrees with the findings of Enshasi et.al. (2009); Kaliba et.al.(2009); Pai and Bharat, (2013) and Azis, (2013) in that in their various studies, these two factors were ranked as predominant factors that affect construction time performance. Eight factors (effective supervision of workforce, commitment of top management, effective communication among the workforce, use of skilled craftsmen, enforcement of quality policy

on site, on the job training of craftsmen, ability to read and interpret drawings and satisfaction of client’s needs) were adjudged by the respondents as factors that have high improvement on construction time performance. This finding agrees with the research output of Tumi et al. (2009); Danso & Antwi, (2012); Rahman et.al. (2012) that demonstrated that effective supervision of workforce and satisfaction of clients’ needs can improve construction time performance. This result is also consistent with the research findings of Memon et al. (2013) and Gunduz, (2013). Their studies found out that the use of skilled craftsmen, enforcement of quality policy on site and on the job training of craftsmen can improve construction time performance.

Table 4: Factors affecting Construction Time Performance

S/N	FACTORS	M.I.S
1	Adequate project funding	0.920
2	Adequate pre and post contract planning	0.915
3	Effective supervision of work force	0.762
4	Commitment of top management of construction companies	0.758
5	Effective communication among the workforce	0.752
6	Use of Skilled Craftsmen	0.728
7	Enforcement of quality policy on site	0.694
8	On the job training of craftsmen	0.689
9	Ability to read and interpret drawings	0.652
10	Satisfaction of client’s need	0.610
11	Effective use of tools and techniques	0.552

0.800-0.999 (very high improvement); 0.600-0.799 (high improvement); 0.400-0.599 (moderate improvement) 0.200-0.399 (low improvement); 0.000-1.999 (very low improvement)

Impact of Performance Criteria on Construction Time Performance

ANOVA result in table 5 relating to the impact of performance criteria on construction project time performance is very high with a p-value of 0.031 ($P \leq 0.05$).

This also means that performance criteria are directly related to construction project time performance. This confirms the findings of Dulami and Langford (1999) that some

performance measures are significantly related to project performance. This result further reinforces the research output of Gransberg et al. (1999) and Odusami et al (2003) that established significant relationship between project leaders’ qualification and project performance. The implication of this result is that acquiring skills in predominant performance measures will enhance construction time performance

Table 5: One Way Analysis of Variance of Impact of Performance Criteria of Construction Project Time Performance (N = 78)

Source of Variation	DF	SS	MS	F-Ratio	P-Value	Remarks
Between groups	2	1,411.133	671.200	3.580	0.031	S*
Within groups	76	13,621.123	189.275			

Total	78	15,032.256
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*Significant at $P \leq 0.05$; DF= Degree of freedom; SS= Sum of Square; MS =Mean sum

CONCLUSION AND FURTHER STUDIES

The purpose of our study was to determine predominant performance criteria and its influence on construction time performance. We contribute to extant literature by identifying predominant performance criteria and factors influencing construction time performance. Secondly by determining the level of impact of performance criteria on construction time performance, we have added incremental knowledge in this domain of study. Our results were consistent with (Igbaria, 1991; Viswesvaran, 1993; Hanna & Brusoe, 1997, Dainty et.al.2003).

These findings further strengthen our understanding that most of the predominant performance measures can be used to evaluate the performance of various designations within the construction industry. The findings of this study that performance criteria had significant impact

on construction time performance is consistent with the findings of Odusami et.al.(2003) that established significant relationship between some biographical data of the project leader and project performance. A major contribution of this study is that we have been able to identify predominant performance criteria and factors influencing construction time performance. Secondly, we were able to establish that performance criteria have positive significant impact on construction time performance. The study recommends that construction site managers should be trained to acquire skills on the predominant performance criteria as this will enhance construction time performance. We measured construction site managers' performance solely from the perspective of their supervisors. It would be useful for future research to complement supervisory judgement with perception of peers.

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