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# Stakeholders' Perceptions on Performance Measures for Construction Partnering Projects in Nigeria

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The purpose of this paper is to identify performance measures to evaluate the performance of partnering project in Nigeria base on the perceptions of the stakeholders. The Empirical data were collected through questionnaire survey administered on clients, contractors and consultants randomly selected in selected states in Nigeria. Data collected analysed using descriptive statistics, Kendal concordance and student *t*-test. Findings revealed that there is agreement on the identified measures of success among the practitioners and on the ranking of the measures of performance. For the project managers to be able to predict the effectiveness of their performance on the project and judiciously manage their resources the measures of project success should be agreed. Some of the measures identified are time, cost, quality, safety, and satisfaction. Identification of criteria for measuring partnering projects in Nigeria would assist the practitioners in monitoring, controlling and evaluating their partnering projects and it would improve the performance of the industry, future partnering projects and ensure best practices. In conclusion, results of this study would serve as an alert for construction practitioners on the performance of their projects.

**Keywords:** Performance Measures, Partnering, Practitioners, Perceptions, Procurement.

## 1. INTRODUCTION

The globe at large is dynamic in nature, likewise everything in the world. The construction industry and the environment where it operates are not stable. Due to the increasingly competitive environment and the complex global business, measuring performance has become critical to business success. Inappropriate performance measurement is one of the leading causes of failure in projects implementation<sup>1</sup>, and the construction industry has long been criticised for its underperformance. Several researchers have emphasised on the performance measurement as a means of improving the current state of the construction industry.<sup>2,3</sup>

Performance measurement is classified into three levels, namely; project level, organisational level, and stakeholder level. Most previous studies placed attention on the organisations and stakeholders performances but scanty on the project. The target of this paper is on the project level since other levels performances adjudged base on project outcomes. Toor and Ogunlana<sup>4</sup> asserted that performance measurement criteria vary from project to project. For example, Lam et al.<sup>5</sup> and Ikediashi et al.,<sup>6</sup> studied the design-and-build construction projects performance, Pillai et al.<sup>7</sup> focused on the research and development (R&D) projects

performance. The only research on performance measures in Nigeria focused on DB project in Refs. [6, 8], while that of partnering project is scarce. Since performance measures are context specific, generalising performance measures may not be too proper.

There is a limited study on partnering project performance measures. The focused of those few ones was in developed countries such as Hong Kong, Australia, UK,<sup>9–12</sup> which has different geographical local, culture and economy from Nigeria. Therefore, this study is to fill the gap in the literature by establishing performance measures for the partnering projects in Nigeria. The target of this paper is to identify and analyse measures of performance of partnering projects based on the perceptions of the practitioners (clients, consultants, and contractors) to establish suitable performance measures for assessing partnering projects in Nigeria. Partnering is acknowledged as a management technique that allows design and construction teams to work as a team to achieve overall project objectives.<sup>13</sup> Partnering is a means for transforming hostile, adversarial owner-contractor relationships into a more collaborative and productive team.<sup>13</sup>

There is adequate evidence both in developed and developing countries that an increasing number of clients are adopting relationship-based approaches to undertaking their building

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and construction works.<sup>14,17</sup> Due to numerous benefits attached to the relationship based contracting in construction, research on KPIs/ measures of success becomes necessary for partnering projects because it would assist in set a benchmark for assessing the performance of these projects, hence facilitating continuous improvement and promoting their application, and hence the dividends would be sustained. Establishment of performance measures is essential because it would assist both the project managers and construction senior executives to allocate their resources appropriately. In Nigeria, several partnering projects end up in the court of law as a result of poor performance simply because they failed to monitor, control and assess their works as they progress to ascertain when they are off track or behind Schedule to fast-track it. A decision on evaluating partnering projects mostly based on a guest and this cannot ascertain whether their actions are correct or not. In a project such as partnering, which involves parties from different organisations, it is necessary to understand the viewpoint of all the interest parties about the project success.

## 2. LITERATURE REVIEW

All over the world, project performance measures remains an important issue in project delivery system because each project has a defined goals and objectives which must be accomplished. In addition, the project requires numerous resources which need to be judiciously utilised. To measure the performance of any given construction process, one must first determine the appropriate measures to focus. Inappropriate performance measurement systems can seriously inhibit the practitioners' ability to compete in competitive environment successfully. Identification of a suitable performance measurement plays significant roles in productivity improvement. Accurate analysis of construction performance could be attained only after the key indicators are determined and monitored.<sup>6</sup> Due to the importance of performance measures to the achievable industry objectives, researchers conducted research on it across the globe. Performance measurement has received substantial efforts of researchers in the construction industry, but yet there are no agreeable performance measures for the industry. Project success and its measures are common areas of research in the field of construction management but yet to be agreed on its evaluation and definition. Several studies believed that how to measure project success is ambiguous because performances of projects are assessed by different stakeholders who perceive success or failure factors differently.<sup>16,17</sup> In the early 1990s, the success of the project was tied to performance measures, which were in turn linked to project objectives.

In the construction industry, the following terms are used interchangeably to mean the same: success criteria, performance measures, benchmarking, and key performance indicators. Performance measures are used for tracking, measure and determine the organisation or project performance over time toward the attainment of its goals. Performance measures are a set of quantifiable measures to gauge or evaluate the performance. Each project has a set of goals to accomplish, and standard to measure its performance.<sup>18</sup> Each type of projects requires specific management procedures/approaches tailored to the needs of the project.<sup>19</sup> As the needs and goals of projects differ, performance measurement should, therefore, be tailored to each project.<sup>4</sup> Yeung et al.<sup>9</sup> asserted that partnering projects might

need different KPIs/measures different from construction projects in general. The reasons behind this were stated in Refs. [20, 21]. People judged projects success differently based on their personal objectives. A project that is judged as successful by a person, to another it may be judged as a failure.<sup>19</sup>

Lim and Mohamed<sup>17</sup> asserted that project success measures should be viewed from different stakeholders' perspectives. Chan and Chan<sup>22</sup> proposed a framework for measuring the success of construction projects using both objective and subjective measures. Performance measures have been identified for partnering projects by various researchers across different countries.<sup>9, 11, 23, 24</sup> For instance, Greenwood and Yates<sup>23</sup> explored the applicability of a theoretical framework for interpreting partnering outcomes. In their development of KPIs for the UK construction industry priorities were given to eight factors, namely; client satisfaction with both the services and the product; defects and Health and Safety performance; cost predictability; time predictability; and construction time and cost (regarding absolute values rather than relative certainty). Yeung et al.<sup>9</sup> developed a model to evaluate the performance of partnering projects using Delphi survey technique in Hong Kong. Their findings indicated seven top weighted KPIs, namely; time performance, top management commitment, cost performance, trust and respect, quality performance, innovation and improvement, and effective communications. They derived a composite Partnering Performance Index (PPI) to provide complete partnering performance assessment.

Furthermore, Yeung et al.<sup>11</sup> investigated the success of relationship-based construction projects in Australia construction industry using Delphi survey technique. The eight identified measures for evaluating the relationship are innovation and improvement, client's satisfaction, quality performance, safety performance, time performance, effective communication, trust and respect, and cost performance. Swan and Khalfan<sup>24</sup> identified the following as a measure of success in partnering project: time, cost and quality, safety, satisfaction, profit, environment and waste (environmental sustainability) are prevalent within the objectives.

Larson<sup>25</sup> studied the relationships between partnering and project success as well as alternative approaches to managing the owner-contractor relationship by study 280 construction projects. The project success is measured in terms of controlling costs, meeting schedules, the technical performance, avoiding litigation, satisfying customers, and the overall results. Weston and Gibson<sup>26</sup> compared partnering and non-partnering projects in term of performance.

The criteria used in measuring project performance in their research are cost change, change orders cost, duration change, claims cost, value engineering savings, and duration change. They discovered that partnering has a positive influence on project performance regarding cost growth, schedule growth, change-order cost, claims cost, and value engineering savings for these projects.

Olayeni et al.<sup>27</sup> asserted that the Nigerian construction industry has performance challenges such as poor quality of work, cost overruns, time overruns, and low productivity among other. Elinwa and Joshua<sup>28</sup> affirmed that poor performance of contractors in Nigeria in term of time and cost factors are the most prominent challenges of the industry. Aliyu et al.<sup>29</sup> asserted that most of the dispute and poor performance that marred the industry are mostly results of the time and cost related claims

associated with contractor's performance and is an area of leakage in the Nigerian construction industry. Dada<sup>30</sup> conducted research on the measures of contracting/contractors' performance a case studies of Lagos State indigenous contractors. The result indicated that there are no significant differences in the ratings of the identified measures of contractor's performance. Aliyu et al.<sup>29</sup> asserted that construction project performance measures are a complex issue because each project is unique in areas such as design specifications, location, administration, delivery methods, and participants. Inappropriate measurement of performance is one of the causes of problems in the Nigeria construction industry Kuroshi and Zakariya,<sup>31</sup> especially partnering implementation.

Famakin and Ogunsemi<sup>32</sup> investigated the measures of performance of joint ventures projects in Nigeria. The study revealed that client satisfaction, time, sharing resources and cost performance were ranked as the most important performance measures for joint venture construction projects in Nigeria. Ikediash et al.<sup>6</sup> developed a set of KPIs for measuring Design and Build projects in Nigeria construction industry. Ikediash et al.<sup>6</sup> uncovered in their findings, there was no significant difference in the rankings of time performance, turnover, rework and quality of work. Similarly, Olayeni et al.<sup>27</sup> established the measures used in construction firm by small and medium entrepreneurs (SMEs) in Nigeria for evaluating performance. The findings revealed that the main performance measures used by construction SMEs are cost, time, quality, customer satisfaction, the profitability of the project, labour productivity, safety, and teamwork. Kuroshi and Zakariya<sup>31</sup> studied the effectiveness of KPIs used by Nigerian construction firms, the indicators identified were; quality, time completion, and cost. In the present economic condition of Nigeria, identification of performance measures is necessary due to the scarcity of fund.

Partnering implementation is becoming increasingly popular in Nigeria for both new and existing projects. Many infrastructure projects that had been developed through partnering, although in countries with a relatively long history of partnering applications have failed due to lack of performance measures. In spite of extensive research, there is no general agreement on a set of performance measures for the Nigeria construction projects to date most especially partnering project.<sup>29</sup>

### 3. RESEARCH METHODOLOGY

The research was conducted in Nigeria using questionnaire survey, self-administered by the researcher. Before the field survey, an excessive literature review was carried out, followed by a pilot study. Some measures of performance of partnering projects were identified through literature review and subjected to pilot study with an interview of five construction practitioners that had handled partnering projects before and had a minimum of ten years' experience in Nigeria construction industry. All the experts' interviewed agreed with the partnering performance measures presented as relevant. The drafted questionnaire was pilot tested with fifteen practitioners to ascertain their understanding and wording of the questionnaire. The questionnaire was refined and rephrased based on the observations and comments. After which proper administration of the questionnaire was done in selected states in three geopolitical zones. The three zones were purposely selected based on the volume of partnering projects carried out (more than 75% of the projects). The lists of professional that participated in those partnering projects was obtained from procurement

offices of the states randomly selected from each zone of the case study. The population of professionals that participated in partnering projects in the three zones is 746. The procurement office is responsible for the government construction projects in the country. The questionnaire was designed for the respondents to rate the importance of the various measures of performance of partnering projects they participated using a 5 point Likert's scale of 1 to 5, in which 1 represented a factor that is less important and represented an most important factor. A total of five hundred and fifty (305) questionnaires were randomly administered to construction practitioners in three geopolitical zones of Nigeria (Southwest, Northeast, and Northcentral including Abuja). The target population was clients, contractors, consultants. Two hundred and thirteen (213) questionnaires were returned, representing a 60.9% response rate. Out of which only 202 were analysed, eleven of them dropped for not properly filed.

### 4. RESULTS AND DISCUSSION

The questionnaire was analysed with aids of the SPSS v22. The statistical methods adopted are descriptive statistics, Student *t*-test, Kendall's coefficient of concordance, and Spearman correlation. The background information in the questionnaire analysed using descriptive statistics. Kendall's coefficient of concordance and Spearman correlation were used in testing if there is any significant difference in the perceptions of the respondents. Those performance measures that are similar in meaning in the literature compressed to a composite name. Finally, the identified measures of performance were ten in numbers. Out of the returned 213 questionnaires, 11 dropped for lack of detailed information. The breakdown of the analysed questionnaires is as follows: 67 contractors (33.2%), 87 consultants (43.1%), and 48 clients (23.7%). The respondents are the following professionals: quantity surveyors, engineers, builders, and architects. 13.9% of the respondents have less than five years' experience, 19.8% have 5–9 years of experience, 26.7% have 10–14 years of experience, 25.2% respondents have 15–19 years of experience, and 14.4% respondents have more than 20 years of experience. The hypothesis formulated is as follow:

Null hypothesis H0: there is disagreement among owners, consultants, and contractors on the overall ranking of performance measures.

Alternative hypothesis H1: there is agreement among owners, consultants, and contractors on the overall ranking of performance measures.

Kendall's concordance analysis was carried out to evaluate the agreement among the clients, contractors, and consultants on their rankings of performance measures based on mean values, to ascertain If Kendall's coefficient of concordance (*W*) at 0.05 level of significance. Details for calculating *W* presented thus in:<sup>27</sup>

$$W = \frac{\sum(R_i - R)^2 / n(n-1)}{12}$$

Where *R<sub>i</sub>* represents the average of ranks assigned by the organisations; *R* is average of ranks assigned to the *n*th measures of performance; *k* = number of the judges (three in this case); *n* = number of performance measures being ranked; and  $n(n-1)/12$  = maximum possible squared deviations. The above statistical technique had been used in a similar research in Ref. [14]. The value Kendall's Coefficient of Concordance (*W*) obtained through the calculation is 0.9403. Siegel and Castellan<sup>33</sup>

**Table I. Ranking of measures of performance by the clients, contractors, and consultants.**

Measures of performance	Clients		Contractors		Consultants		Overall		$(R_i - \bar{R}^2)$
	Mean	RK	Mean	RK	Mean	RK	Mean	RK	
MP1 Time performance	4.52	1	4.52	2	4.44	2	4.49	1	20.2
MP2 Cost performance	4.46	2	4.49	3	4.44	2	4.46	2	12.2
MP3 Quality performance	4.31	3	4.54	1	4.46	1	4.43	3	6.25
MP7 Claim occurrence	4.25	4	4.28	7	4.24	5	4.28	4	0.25
MP4 Stakeholders' satisfaction	4.19	5	4.39	6	4.25	4	4.23	5	6.26
MP10 Profit and financial objectives	3.94	7	4.45	4	4.24	5	4.21	6	2.25
MP5 Health safety performance	3.85	9	4.31	5	4.17	7	4.11	8	2.25
MP6 Productivity	4.15	6	4.25	8	4.17	7	4.19	7	20.2
MP9 Environmental performance	3.94	7	3.99	9	4.13	9	4.02	9	12.2
MP8 Conflicts and disputes occurrence	3.65	10	3.91	10	3.91	10	3.82	10	0.25

asserted that if the number of variables is greater than 7,  $\chi^2$  is used as a near approximation instead. The critical value of  $\chi^2$  is obtained from the  $\chi^2$  distribution table. The  $\chi^2$  calculated obtained using the formula:

$$\chi^2 = k(n - 1)W$$

Using this formula the value of  $\chi^2$  is 25.461, and  $\chi^2$  table value for  $n = 10$  is 16.919 at  $\alpha = 0.05$  while the degree of freedom  $(n - 1)$  is 9. The results implied that the null hypothesis ( $H_0$ ) rejected, and alternative hypothesis  $H_1$  is accepted since  $\chi^2$  calculated is less than  $\chi^2$  in the table. Therefore, concluded that there is a significant degree of agreement between the three groups of participants on the overall ranking of the performance measures.

In testing for agreement in the ranking among any two groups, Spearman correlation analysis is frequently used. The rank correlation coefficient ( $r_s$ ) ranges from  $-1$  to  $+1$ . A correlation coefficient of  $+1$  represents a perfect linear correlation while a value of  $-1$  indicate a negative correlation while zero value, means there is no linear association exists. Kometa et al.<sup>34</sup> have previously used this method.

$$R_s = 1 - 6 \sum d_i^2 / n(n^2 - 1)$$

Where the difference in rank between one organisations and another considered is  $d_i$ ; and  $n$  is the number of data set pair.

$$t = r_s \sqrt{(n - 2) / (n - r_s^2)}$$

The measures of partnering project performance assessed from three organisations perspectives (clients, contractors, and consultants) in Nigeria. The means for each organization for each identified measures were calculated and ranked in descending order of importance, as shown in Table I. The mean scores for the measures of performance assessed by the client's respondents ranged

from 3.65 to 4.52. For contractors, the mean values ranged from 3.91 to 4.54, while that of consultants ranged from 3.91 to 4.46. The analysis of the overall means score for the ten measures ranges from 3.82 to 4.49. The variations in responses were 0.87, 0.63 and 0.55 for client, contractors and consultants' respondents, respectively. All the ten measures are above 3.50 means scores. These showed that the variations in responses given by the three respondents are close, but contractor and consultant responses are nearly the same. From the lists in the Table I, time performance was rated 1st with an overall mean score of 4.49. In individual's organisation rating, clients rated time performance 1st with 4.52 means score, with the same mean score of 4.52 contractors rated it 2nd; with a mean score of 4.44 the consultant rated it 2nd. Cost performance was ranked 2nd with mean score of 4.46 and quality performance was ranked 3rd with mean score of 4.43 in the overall ranking. While claims occurrence was rated 4th with mean scores of 4.25 and closely followed by the satisfaction that was rated 5th with mean score of 4.19.

The next analysis is the test of agreement among the respondents on the ranking of measures of performance. The Spearman correlation coefficient ( $r_s$ ) for the client and consultants is 0.84,  $t_{cal}$  is 5.94 with a  $p$ -value  $< 0.05$ . The  $r_s$  for consultants and contractors is 0.91,  $t_{cal}$  is 8.51 with a  $p$ -value less than 0.05. While  $r_s$  for client and contractors is 0.68,  $t_{cal}$  is 3.4 with  $p$ -value less 0.05 (Table II). The low significance value together with high Spearman rank correlation implied that there was no significant disagreement on the rankings of measures of performance of partnering projects between respondents of the two groups. All the respondents agree on the time, cost and quality as the three most important measures of partnering performance in line with.<sup>9</sup> Other measures identified such as claims and satisfaction are in line with<sup>24</sup> findings. A solid relationships would be developed if the partnering project team increase their efforts to achieve these performance criteria.

**Table II. Test for agreement on the ranking of measures of performance as perceived by the three groups of respondents (clients, contractors, and consultants).**

Participants	$r_s$	$t_{cal}$	$t_{tab}$	Reject $H_0$	$p$ -value
Clients and consultants	0.84	5.94	1.86	Yes	Significant $p < 0.05$
Consultants and contractors	0.91	8.58	1.86	Yes	Significant $p < 0.05$
Clients and contractors	0.68	3.4	1.86	Yes	Significant $p < 0.05$

Notes:  $t = t$ -statistics;  $H_0 =$  null hypothesis;  $r_s =$  Spearman's rank correlation coefficient;  $p =$  probability of accepting or rejecting the null hypothesis.

## 5. CONCLUSION

This paper identified measures of performance for partnering projects from the viewpoints of clients, consultants, and contractors in Nigeria. Ten measures of performance were identified from the literature and through an empirical questionnaire survey; these were ranked by a group of construction practitioners who had experience in partnering projects. The level of consensus among the respondents was analysed and compared to the mean score using the Spearman rank correlation coefficient ( $r_s$ ), Kendall's coefficient of concordance ( $W$ ), and student

*t*-test. The statistical analyses revealed that there was substantial agreement within the respective groups. A partnering project is assumed to be successful if the project is completed to the required standard of quality; stakeholders satisfied with the performance of the project, and the project fulfills its functional requirements. Furthermore, the project should be completed with a low accident rate, completed on budget, within time frame, profitable and produce long-term gains; all these are the measures of performance of partnering projects. For outstanding performance to be achieved there should be a clear definition of project success. For the project managers to be able to predict the effectiveness of their performance on the project and judiciously manage their resources the measures of project success should be general agree on. This study provides a clear definition and understanding of partnering project performance measures. The would be beneficial to project managers, designers, clients, as well as contractors by providing useful information necessary for the achievement of a successful partnering project. It would also assist in providing a comprehensive base for the development of a general framework for future research.

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