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FACTORS INFLUENCING THE PERFORMANCE OF CONSTRUCTION PROJECTS IN AKURE, NIGERIA

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ABSTRACT: *This study was carried out to identify the factors influencing the performance of construction projects in Akure, Nigeria. A questionnaire survey was conducted and forty six (46) factors were identified, categorized into eight (8) groups, evaluated and ranked according to participants' perspectives. Fifty (50) questionnaires were distributed as follows: 12 to clients, 18 to consultants and 20 to contractors. The outcome of these analyses showed that all the respondents agreed that construction projects were influenced by all the forty six factors indicated by the questionnaire. However, the analysis indicated that the top ten (10) factors that have the highest average index showed how these factors are affecting construction projects. Based on these findings, this study recommended that contractors' progress payment should be made on time as well as minimizing change orders during construction to avoid delays. Also, consultants should give full commitment to monitor the project progress and ensure the work was according to specifications and satisfactory quality; meeting owner needs and expectation within the project budget and stipulated time. Finally, continuous coordination and relationship between project participants were required through the project life cycle in order to ensure project performance.*

KEYWORDS: Average Index, Construction, Multiple Regression Analysis, Project Performance, Questionnaire Survey

INTRODUCTION

Construction industry is complex in nature because it contains large number of project parties as clients, consultants, contractors, stakeholders, shareholders and regulators. The complexity and fragmented nature of the industry and its highly casual employment of labour makes it sensitive to poor contract performance. Basically, it is this unique characteristic of the industry that kept this problem in Akure unnoticed. However, poor construction performance has created economic situation which the industry cannot manage and at the same time the industry stakeholders or contractors do not know how to document these problems for future references. The construction industry performance is affected by national economies (Navon, 2005). Despite this complexity, the construction industry plays a major role in the development and achievement of goals in the society. Construction industry is one of the largest single industries that contribute greatly to the development of nation including Akure. The pace of the economic growth of any nation can be measured by the development of the physical infrastructure such as buildings, roads and bridges (Takin and Akintoye, 2002). Successful building construction projects are those projects finished on time, within budget, in accordance with specifications and to stakeholders' satisfaction (Chua

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et al., 1999; Puspasari, 2005, Ogunsemi, 2006; Yaman, 2007; Cheng *et al.*, 2009; Cheng *et al.*, 2011). Studies were conducted to examine factors impacting on project performance in developing countries. Shortage of skills of manpower, poor supervision, poor site management, unsuitable leadership, shortage and breakdown of equipment among others contribute to construction delays in the United Arab Emirates. (Faridi and El-Sayegh, 2006). According to Ajayi et al. (2010) the choice of contractor(s) is a critical factor for the project manager and usually has a significant impact on the success or failure of a project. The performance of a contractor will definitely correlate with the performance of the contract. He further observed that the evaluation of performance has been a challenge for the construction industry for decades. Several models and methods have been proposed by researchers for the evaluation of project performance. However most of these procedures according to Ajayi et al. (2010) limit their analysis to selected measures such as cost, schedule or labour productivity. Construction performance embraces client's satisfaction, time performance, cost performance, construction quality and sustainable development. Cheng et al. (2011) evaluated the performance of subcontractors and identified 12 factors that are tied to the performance of the subcontractor. Among the factors are construction techniques, duration control abilities, and material wastage and so on. Mbachu and Nkando (2007) established that quality and attitude to service is one of the key factors constraining successful project delivery in South Africa. The performance of contractors in Zambia is apparently below expectation. It is uncommon to learn of local projects that have not been completed or significantly delayed. This poor performance of many local contractors has huge implications in terms of their competitiveness (Zulu and Chileshe, 2008).

Ling et al (2007) remarked that architectural, engineering and construction (AEC) firms may face difficulties managing construction projects performance in China because they are unfamiliar with this new operating environment. Kim et al (2008) stated that international construction projects performance is affected by more complex and dynamic factors than domestic projects; frequently being exposed to serious external uncertainties such as political, economic, social, and cultural risks, as well as internal risks from within the project. Puspassari (2005) identified 46 possible factors responsible for poor performance of construction contract. He further categorized these factors into eight groups as; factors caused by clients, factors caused by contractors, factors caused by consultants, factors related to subcontractors, factors related to material and labour, contractual relationship factors, project procedures and external environment factors. Unfortunately, Puspasari (2005) observed that due to many reasons, project performance and project success are not commonplace in the construction industry especially in developing countries. This may not be unconnected with the fact that construction project development involves numerous parties, various processes, different phases and stages of work and a great deal of input from both the public and private sectors with the major aim of bringing the project to a successful conclusion. In citation of previous studies, little attention is being paid to poor construction performance in Akure, Nigeria.

METHODOLOGY

The methodology was based on a survey of related works and data collected through questionnaires. The questionnaire survey was used to elicit the attitude of owners, consultants

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and contractors towards the factors influencing the performance of construction projects in Akure, Nigeria. The survey presented 60 building construction project performance factors generated on the basis of related research works which was modified by experts and reduced to 46 after proper scrutiny of each of the factors. The questionnaire was structured into eight groups which include: project characteristics related factors, labour and material related factors, contractual relationship, project procedures, external environment, clients' related factors, consultants' related factors and contractors' related factors. Questionnaires were sent to randomly selected clients, consultants and contractors. 50 questionnaire were distributed as follows; 12 to clients, 18 to consultants and 20 to contractors. Only 20(40%) of the questionnaires were returned; 6(30%) from client, 5(25%) from consultants, and 9(45%) from contractors. In the questionnaire, respondents were asked to indicate based on their local experience, the level of importance of each one of the identified 46 factors of performance on a five-point Likert scale as: not important, fairly important, important, very important and highly important. The respondents were experienced construction project managers, site/office engineers and organizations' managers with average experience ranging from 10 – 14 years. 46 factors believed to affect project performance were considered in this study and were listed under 8 groups based on the literature reviewed and data collected. The responses received were tabulated and analyzed using the average index.

The average index method (A.I) was used herein to determine clients', consultants' and contractors' perceptions of the relative importance of the identified performance factors. The average index was computed based on Abd. Majid and McCaffer, 1997 approach.

$$\text{Average Index (A.I)} = \Sigma\ (1X_1+2X_2+3X_3+4X_4+5X_5)/N \qquad (1)$$

Where
- N = Total number of respondents
- X_1 = Frequency of not important response
- X_2 = Frequency of fairly important response
- X_3 = Frequency of important response
- X_4 = Frequency of very important response
- X_5 = Frequency of highly important response

With the rating scale shown below (Abd. Majid and McCaffer, 1997)

1	=	Not important	($1.00 \leq$ Average index <1.50)
2.	=	Fairly important	($1.50 \leq$ Average index <2.50)
3.	=	Important	($2.50 \leq$ Average index <3.50)
4.	=	Very important	($3.50 \leq$ Average index <4.50)
5.	=	Highly important	($4.50 \leq$ Average index <5.00)

Also, in the questionnaire, factors that can contribute to improving the performance of construction projects were highlighted and the respondents were asked to tick using the 5- likert scale. The factors were analyzed using the multiple linear regression analysis.

Linear regression is an approach for modeling the relationship between a dependent/explained variable 'Y' and one or more explanatory variables denoted by 'X'. The case of one independent/explanatory variable is called 'simple linear regression' while for more than one

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independent/explanatory variable, 'the process is called multiple linear regressions and this was used in this study. It helps to understand which among the independent/explanatory variables are related to the dependent variable, and to explore the forms of these relationships. The model was specified as follows:

$$Y=\beta X + \varepsilon \quad (2)$$

Where,

Y = Performance of construction projects
X = the matrix of independent/explanatory variables,
β = the regression coefficients,
ε = the error term.

Y represents performance of construction projects which is dependent on the explanatory variables X_1, X_2, X_3,…X_n, ε i.e. how much of the performance of construction projects is accounted for by each of the explanatory variables and how much is unexplained as measured by the error term ε. The regression model was implicitly specified as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots\ldots + \beta_n X_n + \varepsilon \quad (3)$$

More specifically, the variables specification was specified as follows:

Y = Level of performance of construction projects.
B_0 = the constant
$X_1 \ldots X_n$ = the factors contributing to improving the performance of construction Projects.
$\beta_1 \ldots \beta_n$ = the estimates of the independent variables. I.e. the coefficients of the independent variables.
ε = the error term.

DESCRIPTION OF THE STUDY AREA

The study area is Akure, the capital of Ondo State. Akure Township with 387,087 people (Nigerian Population Commission, 2006) was established in AD 1440. It is located on latitude 70° 20"N and longitude 50° 15''E as shown in Figure 1. In consonance with the origin and development of most Yoruba cities, Akure developed from a small settlement called Igbo Alakure founded by two itinerant hunters called Oloja and Akosede, who migrated from Ile-Ife, the cradle of the Yorubas. As a result of sudden upsurge in the population of the town, relocation of civil servants and the influx of the people from the rural areas brought about the need for more rapid construction works to cater for residential accommodation and also the expansion of the limited road networks as well as the dualization of Arakale road. In terms of building, more modern residential buildings were constructed in Alagbaka, Ijapo as well as Oba Ile and so on, which are the major estates in Akure.

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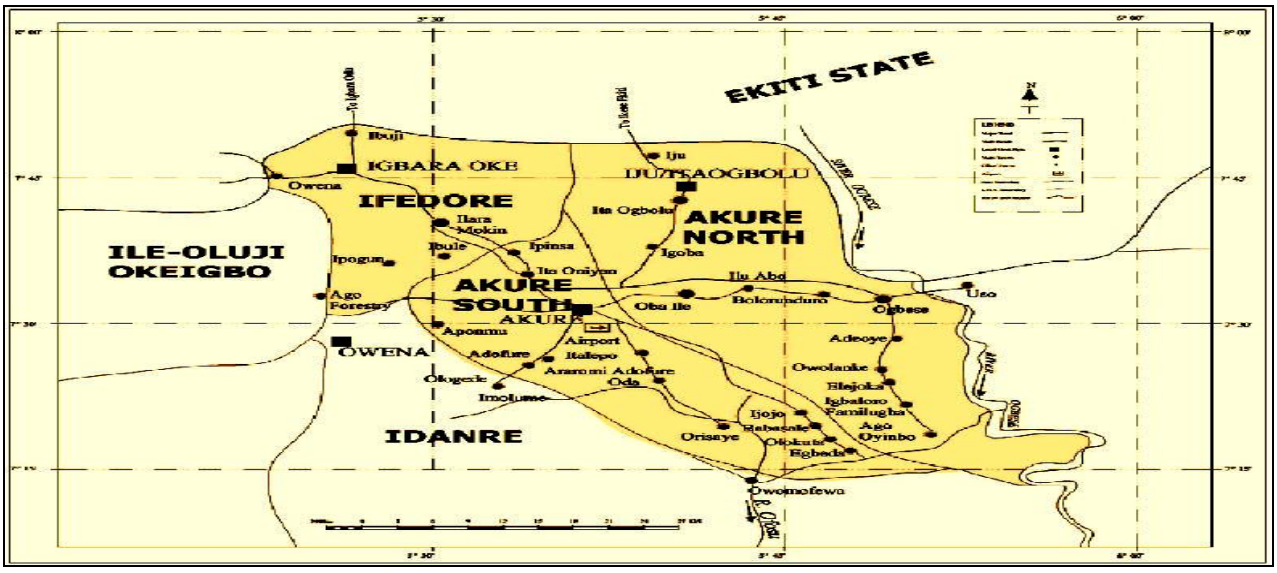

Figure 1: Map of Akure Metropolis (Source: Olamiju and Olujimi, 2011)

RESULTS AND DISCUSSION

Table 1 summarizes the average index (A.I) and rating scale of the factors influencing the performance of construction projects according to each category. The average index ranges from 3.95 - 4.85, while rating scale ranges from 4-5.

Table 1: Average index and rating scale of factors influencing the performance of construction projects in Akure, Nigeria according to each category.

S/N	FACTORS	AVERAGE INDEX (A.I)	RATING SCALE
1	**Project characteristics related factors**		
a	Type of project	4.15	4
b	Nature of project	4.35	4
c	Complexity of project	4.45	4
d	Size of project	4.15	4
e	Completion period given for the contract okay	4.25	4
2	**Labour and material related factors**		
a	Skillful workers	4.35	4
b	Quality control of materials	4.60	5
c	Insufficient supply of materials	4.70	5
d	Escalation of material prices	4.85	5
3	**Contractual relationship**		
a	Communication system among project participants	4.45	4
b	Feedback capabilities between project participants	4.45	4
c	Control mechanism of the project activities	4.45	4

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d	Overall management actions	4.50	5
4	**Project procedures**		
a	Tendering method	4.25	4
b	Procurement method	4.35	4
5	**External environment**		
a	Economic environment	4.50	5
b	Social environment	4.00	4
c	Political environment	4.45	4
d	Physical environment	4.40	4
e	Industrial relations environment	4.20	4
f	Technology advancement	4.35	4
6	**Consultants related factors**		
a	Consultants commitment to ensure construction work is done according to specification	4.60	5
b	Consultants involvement to monitor the project progress	4.40	4
c	Consultants cooperation to solve problems	4.45	4
d	Adequacy of design and specification	4.45	4
7	Clients related factors		
a	Client's experience whether he is a sophisticated or specialized client	4.20	4
b	Size of client's organization	4.25	4
c	Client's emphasize on low construction cost	4.10	4
d	Client's emphasize on quick construction instead of quality	3.95	4
e	Client's ability to make project decisions	4.20	4
f	Client's ability to brief the project objectives	4.20	4
g	Client's interference during construction	4.30	4
h	Delay of progress payment to contractors	4.60	5
8	**Contractors related factors**		
a	Project team leaders working relationship with others	4.45	4
b	Motivating skills of the project team leaders	4.65	5
c	Project team leaders experience	4.60	5
d	Project team leaders commitment to meet cost, time and quality	4.45	4
	Planning effort	4.40	4
f	Budget progress monitoring	4.35	4
g	Technical skill of the project team leader	4.55	5
h	Project team leader early and continuous involvement in the project	4.45	4
i	Project team leader adaptability to changes in the project plan	4.30	4
j	Implementing an effective safety, quality assurance program	4.45	4
k	Control of subcontractors works	4.45	4

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l	Organizing skill of the project team leader	4.40	4
m	Developing an appropriate organizing structure	4.30	4

Table 1 showed that majority of the respondents rated all the factors as very important and highly important. In Akure, all construction contract partners agreed that all factors which appear on the table affect contract performance. Furthermore, the factors with the highest average index (between 4.50 and 4.85) were highlighted separately as shown in Table 2.

Table 2: Top 10 significant factors influencing the performance of construction projects in Akure, Nigeria with the highest Average Index (A.I)

S/N	FACTORS	A.I
1	Escalation of material prices	4.85
2	Insufficient supply of materials	4.70
3	Motivating skills of the project team leader	4.65
4	Quality control of materials	4.60
5	Consultants commitment to ensure construction work is done according to specification	4.60
6	Delay of progress payment	4.60
7	Project team leaders experience	4.60
8	Technical skill of the project team leader	4.55
9	Overall management actions	4.50
10	Economic environment	4.50

Often, there may be several possible causes associated with the problems and likewise there may be several factors necessary for a solution. Complex statistical applications are needed; as a result, multiple linear regression analysis of ordinary least square method was used to develop a model, to predict the factors that can contributes to improving the performance of construction projects in the study area

The values of X_1……. X_{16} used were collected through questionnaire based on a five point likert scale. The values of Y are obtained by adding the variables. I.e. X_1……. $X_{16.}$ These values are input into the SPSS to get the regression coefficients, R square, adjusted R square, t – values and significance. Table 3 shows the analysis of factors that contribute to improving the performance of construction projects by each of the participants.

Table 3: Analysis of factors contributing to improving the performance of construction projects in Akure, Nigeria.

Variables	Variable Description	Coefficients	Std. Error	t-value	Sig.
	(Constant)	-1.079	4.603	-0.234	0.820
X_1	Should pay contractors progress payment on time	1.266*	0.369	3.430	0.008
X_2	Should minimize change orders during construction to avoid delays	0.674*	0.228	2.952	0.016

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X_3	Is not bound to award the contract to the lowest bidder, but only to the proven contractor with the resource and skill	0.733	0.474	1.548	0.156
X_4	Project team leader must be committed to his responsibilities and monitor the project progress closely especially on cost, time and quality	1.172*	0.424	2.762	0.022
X_5	Contractor should manage his financial resources and plan cash flow by utilizing progress payment.	0.423	0.514	0.823	0.432
X_6	For sites management and supervision, administrative and technical staff should be assigned as soon as project is awarded to make arrangement to achieve completion within specified time with the required quality and estimated cost	1.176*	0.322	3.653	0.005
X_7	Materials supplied should be recorded and monitored closely in order to have continuous and sufficient supply	2.488*	0.630	3.949	0.003
X_8	Consultants should give full cooperation to contractors or clients when their expertise help are needed	0.704*	0.279	2.523	0.003
X_9	Upgrade communication system used. Use more technology when giving information for efficiency such as e-mails, etc. it is better to give information in written form rather than verbal instructions or information	0.743	0.651	1.141	0.283
X_{10}	Give prompt feedback/action when matters are raise by one of the project participants	0.695	0.374	1.857	0.096

$R^2 = 0.968$ Adjusted $R^2 = 0.932$ * = significant at 5%

As shown in Table 3, the calibration reduced the variables from sixteen (16) to ten (10) variables. The regression model equation is given as:

$$Y = -1.079 + 1.266^{*}X_1 + 0.674^{*}X_2 + 0.733X_3 + 1.172^{*}X_4 + 0.432X_5 + 1.176^{*}X_6 + 2.488^{*}X_7 + 0.704^{*}X_8 + 0.743X_9 + 0.695X_{10} + \varepsilon \quad (4)$$

From the analysis, all the variables with asterisks (*) are significant at 5% which means that these factors will contribute more to the improvement of project performance in the study area.

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Also, whenever the t-value is equal to and greater than 2, it means the variable is significant at 5%. The fit of the model is described by the coefficient of determinant (R^2) which is given as 0.968 from the analysis, which indicates the percentage of the dependent variables explained by the independent variables, while the adjusted R square is equal to 0.932.

The reliability of the model must be known. The calibrated equation was validated using another set of variables. The results are shown in Table 4.

Table 4: Validation of model

S/N	Respondent	Model	Difference	Percentage Difference
1	43	42.211	0.789	2
2	34	32.531	1.469	4
3	40	39.297	0.703	2
4	35	32.764	2.238	6
5	35	35.428	0.428	1
6	38	43.269	4.190	11
7	40	40.602	0.602	2
8	39	42.829	3.829	10
9	36	35.248	0.752	2
10	37	34.590	2.410	7

The result shows that 60% of the variables are less than 5% difference. 30% of the variables are less than or equal to 10% difference while only 10% of the variables are more than 10% difference. This means that 90% of the data validated are less than or equal to 10%.

CONCLUSION

A structured questionnaire survey approach was used to study the impact of various attributes and factors affecting construction projects performance in Akure, and the attitude of project clients, consultants and contractors in the Nigerian construction industry. Forty six (46) factors were considered in this study and were listed under eight groups based on relevant literature review and data collected. 50 questionnaires were distributed as follows: 12 to clients, 18 to consultants and 20 to contractors. 20 questionnaires (40%) were received as follows: (30%) from clients, 5(25%) from consultants and 9 (45%) from contractors as respondents. The results were analyzed, discussed to identify the most important factors, in which average index method (A.I) was used to determine clients, consultants and contractors perception of construction projects in Akure, Nigeria. According to the questionnaire received from clients, consultants and contractors, the escalation of material prices was rated as the most important performance factor with A.I of 4.85 for the three parties with insufficient supply of materials rated as the second factor affecting the performance of construction projects with the A.I of 4.70. Multiple linear regression analysis was used to determine the factors that will contribute to the improvement of construction projects. In the analysis, sixteen (16) variables were reduced to ten (10) variables after calibration. The coefficient of determinant was 0.968 while the adjusted R^2 was given as

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0.932. The calibrated model was validated to know the reliability of the model. It was observed that 90% of the variables are less than or equal to 10% difference which means that the model was okay.

REFERENCES

Abd. Majid. Z. M. and Mc Caffer, R. (1997). "Assessment of Work Performance of Maintenance Contractors in Saudi Arabia". Journal of Management in Engineering, ASCE, Vol. 17 No. 1:91.

Ajayi, O. M., Ogunsami, O. E., Ajayi, A. K and Ofili, C.M. (2010). Factors Affecting Performance of Contractors on Construction Projects in Lagos State. Proceedings of the Construction, Building and Real estate Research Conference of the Royal Institute of Chartered Surveyors, Paris 2-3 September 2010.

Cheng M.Y., Tsai, H.C and Sudjono, E. (2009). Evolutionary Fuzzy Hybrid Neural Network for Conceptual Cost Estimates in Construction Projects. 26th International Symposium on Automation and Robotics in construction (ISARC2009): 512-519.

Cheng, M.Y. Tsai, H.C. and Sudjono, E. (2011). Evaluating Subcontractors Performance Using Evolutionary Fuzzy Hybrid Neural network. International Journal of Project Management. 29(2011):249-356.

Chua, D.K., Kog,Y.C. and Loh P.K. (1999). Contract success factors for different project objectives. Journal of Construction Engineering and Management. 125(3):142-150

Faridi, A. and El-Sayegh, S. (2006). Significant factors causing delay in the UAE construction industry, Constuction Management and Economics, 24(11): 1167-1176.

Kim Du, Y., Han, S. H., Kim, H. and Park, H. (2008). Structuring the prediction model of project performance for international construction projects: A comparative analysis, Expert Systems with Applications.

Ling, F.Y., Low, S. P., Wang, S.Q., and Lim, H.H. (2007) Key project management practices affecting Singaporean firm's project performance in China, International Journal of Project management.

Mbachu, J. and Nkando, R. (2007). Factors constraining successful building project implementation in South Afica, Construction Management and Economics 25(1): 39-54.

Navon, R. (2005). Automated project performance control of construction projects, Automation of Construction, Vol. 14, Pp. 467-476.

Olamiju. I.O and Olujimi. J. (2011). Regional Analysis of Locations of Public Educational Facilities in Nigeria: The Akure Region Experience, Journal of Geography and Regional Planning. Vol. 4(7), Pp. 428-442.

Ogunsemi, D. R. (2006). Predicting the Final Cost of Construction in Nigeria. The Quantity Surveyor 54(4):3-6.

Puspasari, T.R. (2005). Factors causing poor Performance of Construction Projects. An Unpublished Master project Report, submitted to the Faculty of Civil Engineering, University of Technology, Malaysia.

Takin, R. and Akintoye, A. (2002). Performance Indicators for Successful Construction Project Performance. *In* Greenwood, D. (Ed). 18th Annual ARCOM Conference. 2-4 September, 2002. University of Northumbria. 2: 545-555

ISSN 2055-6578(Print), ISSN 2055-6586(online)

Yaman, H. (2007). A building cost estimation model based on functional elements. Publication of Istanbul technical University, A/2(4):73-87.

Zulu, S., Chileshe, (2008). The impact of service quality on project performance: a case study of building maintenance services in Zambia, in proc. of the 3rd Built Environment Conference, Association of Schools of Construction of Southern Africa, Cape Town, South Africa.

ISSN 2055-6578(Print), ISSN 2055-6586(online)