IMPACT OF CONTRACTORS' PREQUALIFICATION CRITERIA (CPC) ON TIME PERFORMANCE IN CONSTRUCTION PROJECTS EXECUTION

AMEH, O. J.[1], KAYODE, I. O.[1] and AJAYI, M.O.[2]
[1]Department of Building, University of Lagos, Akoka, Lagos, Nigeria
[2]Department of Quantity Surveying, University of Lagos, Akoka, Lagos, Nigeria

ABSTRACT
Delay in project delivery and abandonment could be linked to poor methods and procedures of selection of contractors. This research aims to examine the impact of Contractor Prequalification Criteria (CPC) on-time performance in construction projects execution. This study was carried out in Ondo State and the population of the study comprised of registered construction professionals in the study area who were registered members of their professional bodies, drawn from contracting organisations, consulting organisations and public client organisations. A total of 189 survey sample was drawn from 350 sample frame using the Digee bird statistics sample size calculator. A stratified random sampling technique was adopted and questionnaires were used to gather data. Statistical Package for Social Science (SPSS) version 21.0 was used to analyse the data using frequency, percentage, factor analysis and regression. The frequency of use of contractors' prequalification criteria was presented using frequency table and the results in order of hierarchy are personnel capability, technical capability, organization reputation, work experience and capability, management capability, health and safety practices and financial capability. Factor analysis was used to reduce and regroup the variable listed on the CPC, and multiple regression model to determine the relationship with execution time performance. It was found that management capability, personnel capability, organisation reputation, financial capability and work experience and capability have an impact on time performance in construction projects execution. In conclusion, not engaging contractors with these criteria is like calling for a project failure. It is therefore recommended that construction practitioners should ensure that Contractor Prequalification Criteria (CPC) should include management capability, personnel capability, organisation reputation, financial capability; and work experience and capability should be given high priority during contractor selection to ensure the contractor meet up the time frame of the project.

KEYWORDS: *Contractor, construction project, prequalification criteria, time performance.*

1. INTRODUCTION

Contractors' prequalification is an important decision to select a suitable contractor to reduce delay, substandard work, dispute and bankruptcy that may arise during the execution of the project. A competent contractor is required to successfully execute a project within the scheduled time, budgeted cost and quality standard because the performance of a construction project extensively depends on the ability and experience of the contractors. Therefore, there is a need to prequalify construction contractors with the right criteria to ensure satisfactory performance in the course of executing the projects (Ajayi, Ogunsanmi & Idoro, 2016).

Aje (2012) opined that prequalifying contractors is a required step in the procurement of construction projects under the Due Process Policy (DPP) in Nigeria. Aje (2012) further stated that one way to boost construction efficiency is to pre-qualify contractors before the bidding process to ensure contractors are capable to carry out the assigned contract in compliance with the project goals. The prequalification process gives room for clients, the client's adversary team and consultants to recognize and pick contractors depending on the performance and reliability of quality service provision by the contractors.

Determining and picking a competent contractor is important to clients' satisfaction through the successful completion of their projects. Tarawneh (2004) stated that the prequalification process offers contractors the chance to be recognized as a standout from other competitors. Therefore, reduction in the risk of delay, substandard work, dispute and bankruptcy are the significant intents that could be attained by the selection of contractor through a prequalification process (Russell & Skibniewski, 1990; Aje, 2012). In support of the above view, Ajayi and Ogunsanmi (2012) asserted that the process of choosing a contractor for a planned project is a significant decision that can affect the progress of any construction project and its completion. It is therefore important to know the impact of the current contractors' prequalification criteria on time performance in construction projects execution. Hence, the need for this study to evaluate the frequency of use of the current contractors' prequalification requirements in use in the Nigerian construction industry and to determine their relationship on project execution time performance to aid in the selection of suitable contractors while considering the project and client's objectives at the execution phase. The objectives of the study are to; assess the frequency of use of contractors' prequalification criteria, assess the time performance indicator on construction projects execution, examine the relationship between contractors' prequalification criteria and construction project execution time performance. The study also hypothesised that there is no significant relationship between contractors' prequalification criteria and project execution time performance.

2. LITERATURE REVIEW

2.1 Project Time Performance

The clients are willing to engage the services of the contractors that are capable of meeting the completion dates. Sometimes, bonus clauses are embedded in some contracts just to motivate the contractor to meet up the target date (Hatush & Skimore, 1997). Time is one of the most important performance indicators to measure the efficiency, expertness and competence of contractors on construction projects (Ajayi, et al., 2016). Completion of the project within the given time measures how good the contractor is at organising and controlling site operation and resources allocation.

Construction project time is recognized by the participants in the construction sector many years ago as an inevitable performance criterion to measure the success of construction projects (Chan & Chan, 2004). This is very useful when evaluating project performance. According to Ajayi et al (2016), 50% - 80% of 1627 World Bank-funded projects within the years 1974 to 1988 experienced delay. Also, 23.2% increase in time on construction projects funded by the UK government within the year 1993-1994 (Chan & Kumaraswamy, 2002). Finding out the cause of time overrun on projects is one of the crucial steps in keeping the construction time within the agreed period. Consequently, Lim and Mohammed (2000) also concluded from the viewpoint of the client, end-users, stakeholders, or the general public that the completion period should be the first metric for assessing project performance.

So, executing the project within the stated time is very crucial when the success of a project is measured by people from a macro perspective. Time Variation (TV) and Time Performance Index (TPI) are the notable techniques for measuring performance indications of construction projects in the construction industry (Odeh & Battaineh, 2002; Salter & Torbett, 2003). If TV is zero, then the project is perfectly on schedule and if TV is greater than zero, it means the project is ahead of schedule. If TV is less than zero, then the project is behind schedule. Time variance can be calculated using: TV = BTWP – ATWP, where BTWP is the budgeted time of work performed and ATWP is the actual time of work performed. The indication from this can create an awareness to the project manager that the project is not running as planned. In addition, the delivery of projects on time has been proposed as one of the client's key criteria in construction contracts (Leong, Saman, Ariff & Tan, 2014).

This study measured time performance as the percentage change in the initial contract period over the final contract period. Projects whose percentage falls below 0% are very good, 0%-5% are good, 6%-10% are satisfactory, 11%-19% are poor while those greater than 20% are very poor (Ajayi, et al., 2016).

2.2 Criteria For Prequalification

Contractor prequalification is important for the successful delivery of construction projects. The capability of a contractor is established using the key criteria and sub-criteria. A contractor's financial soundness ensures that there are sufficient funds to achieve the cost performance standard (Jerome 2005). Financial soundness is a major determinant of prequalification because it reveals the financial record of the contractor which helps in determining the contractor's current financial position (Mangitung, 2010). The current fixed asset, income statement, company audited account, and banking arrangement and bonding are the paramount criteria in determining the contractors' financial soundness (Ajayi, et al, 2016). Technical capability is principally concerned with the experience that is still recent and shown ability and capability significant to a monetary edge in any of the recommended fields of work to be executed. To match the prerequisites, the contractor must tender the detailed information of work that includes experience on similar work including the method statement and outline program. Also, the complexity of work executed, size of the project completed, types of the past project completed, curriculum vitae of technical staff, quality of personnel, and plant and equipment owned will all be supplied. (Jerome, 2005; Oke & Aje, 2012).

Management capability of the contractor is the measure of the quality of work executed in the past, and the total capacity/workload that can be undertaken by a contractor with the available resources within the contractor's disposal (Al-Rehaid & Kartman, 2005). According to Oke and Aje (2012), curriculum vitae of management staff, possession of quality assurance certificate, experience of technical personnel, project (business) management organization. past performance and quality are hugely required when assessing contractors on management capability. Health and Safety are about the minimization of construction costs by managing accidents via the selection of safe contractors by the client (Oke & Aje, 2012). According to Edyta (2010), the construction industry record is weak in the area of occupational health, safety, and rehabilitation (OHS & R). Edyta (2010) further stated that improvement in this area (OHS & R) is toward minimizing the rate of accidents, curbing lost time as a result of industrial conflict and improving the productivity of the industry. Several factors that are checked while prequalifying contractors on Health and Safety are accident book, company safety policy, level of adherence to health and safety regulation, safety record available, and provision of health and safety regulation.

Organizational reputation is the identity and qualifications of contractor officers, managers and key personnel in the organization (Eady, 2007). According to Ajayi (2010), past failure in completed projects is the major sub-criteria used to assess contractor's organisation reputation and contractors are majorly assessed on this basis which requires the contractors to list all the uncompleted projects, usually being held in default of the contract. It could also be a statement identifying any liens, default notifications, or claims by or against the contractor in regards to any project executed in the past five years (Eady, 2007). The summary of criteria for prequalification is shown in Table 1.

Table 1: Criteria for Prequalification

Criteria	Sub-criteria
Financial Capability	Financial Strength
	Banking arrangement and bonding
	Credit Rating System
	Company Audited Account
	Current fixed asset
	Income Statement
Technical Capability	Past Experience on Similar Work
	Plant and Equipment owned
	Quality of Personnel
	Ability of Contractor
	Curriculum Vitae of Technical Staff
	Method Statement and Outline program
	Types of Past Project Completed
	Size of Past Project Completed
	The complexity of Work Executed
Management Capability	Past Performance and Quality
	Project (business) Management Organization
	Experience of Technical Personnel
	Management Knowledge
	Possession of Quality Assurance Certificate
	Curriculum Vitae of Management Staff
	Quality Assurance Policy of the Company
	Experience of Geographical Location of the Place
Health and Safety	Safety Record Available
	Experience Modification Rating (EMR)
	Accident Book
	Company Safety Policy
	Provision of Health and Safety Regulation
	Level of Adherence to Health and Safety Regulation
Organisation Reputation	Past Failure in Completed Project
	Number of Years in Construction
	Percentage of Previous Work Completed on Schedule
	Evidence of Incorporation/Business Name Registration
	Evidence of Tax/VAT Clearance
	Registration with State/Federal Ministry
	Certificate of Work already Completed
	Past Client Relationship

3. METHODOLOGY

This research aimed to evaluate the impact of contractor's prequalification criteria on construction project execution time performance. To achieve this, the study collected data from the professionals that are into construction projects such as Quantity Surveyors, Builders, Architects and Engineers who are registered with their professional institutions and based in Ondo State. A well-structured questionnaire was used to collect data. A total of 189 questionnaires were distributed using the Digee bird statistics sample calculator at a 10% confidence interval and 95% confidence level. The data collected were analysed using descriptive and inferential statistics. Frequency distribution percentages, Mean scores, and regression were used for the analyses. Also, factor analysis was used to reduce the number of variables. Factors with Eigen value ≥ 1.0 were retained and used as the basis of regrouping but the factors with Eigen value less than 1 are termed as insignificant.

To measure for time performance indications on construction projects. The respondents were to provide the project location, type of project, initial project duration, and final project duration on any completed project they have been involved in for the last five (5) years. Percentage time performance indication was calculated using the difference between the final contract period and the initial contract period, divided by the initial contract period, multiplied by a hundred

$$\text{Time performance} = \frac{Final\ contract\ period\ -intial\ contract\ period}{initial\ contract\ period} \text{ x } 100$$

4. RESULTS AND DISCUSSIONS

4.1 Demographic Characteristics of the Respondents

From the analysis, 49.2% of the respondents work in contracting firms, 38.1% work in consultancy firms, and 12.7% work in public construction firms. The result also shows that 34.9% of the respondents are quantity surveyors, 25.9% are Civil Engineers, 25.9% are Architects, 13.2% are Builders. Furthermore, 62.3% of the respondents have been involved in construction for over 5 years and 50.8% have been involved in more than 3 numbers of prequalification over the last five years. From the analysis, the respondents have adequate exposure and experience in the contractors' selection process. Hence, the data provided can be relied upon for the purpose of analysis.

4.2 Factor Analysis

The analysis was run to reduce the 37 variables to the important factors. The analysis results showed in Table 2 that the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy was 0.899, larger than 0.5, suggesting that the sample was appropriate for factor analysis. The associated significance level of the Bartlett Test of Sphericity was 0.000, suggesting that the correlation matrix of the population was not an identity matrix. The number of components was determined and the eigenvalues of each component were known by running an initial analysis as shown in Table 3, eight components had Eigen values (12.799, 2.772, 2.182, 2.019, 1.535, 1.435, 1.224 and 1.062) above Kaiser's criterion of 1 with a cumulative variance of 67.643%. In Figure 1 the scree plot also indicated the eight components that were above the eigenvalues of 1 as the point of inflexions, in which components 1, 2, 3, 4, 5, 6 formed the perfect inflexions. Varimax rotation was used and Table 4 showed the factor loadings after rotation. The rotation was sorted by size and suppressed the small coefficients to 0.4 which is above the minimum value of 0.3. After the rotation, eight components were formed but seven components were derived from the eight components due to the non-convergence of the eighth component. Each component was named in relation to the variables that clustered on it. Component 1 represented Health/Safety practices (H/Sp); component 2, Management capability (Mc); component 3, Personnel capability (Pc); component 4,

Organisation reputation (Or); component 5, Financial capability; component 6, Work experience and capability (Wec) and component 7, Technical capability (Tc) as shown in Table 5.

Table 2: KMO and Bartlett's Test

			Remarks
KMO measure of sampling adequacy		0.899	Good KMO
Barlett's test of sphericity	Approx. Chi-Sqare	4217.630	Not Identity matrix
	Df	666	
	Sig.	0.000	

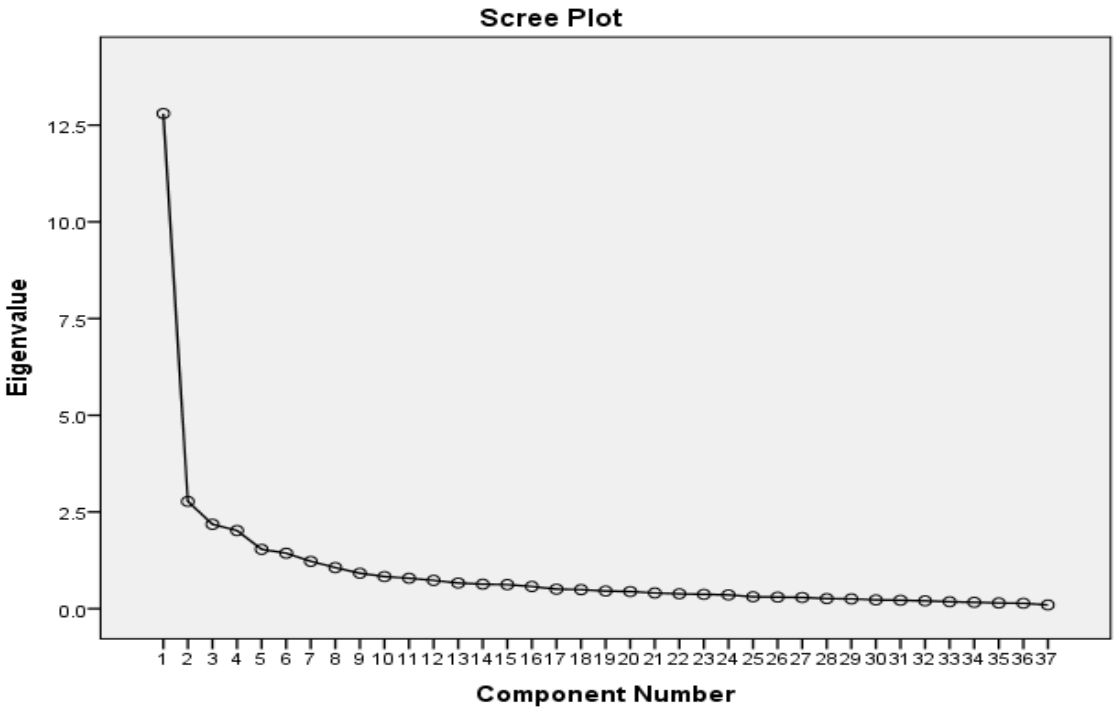

Figure 1: Scree Plot analysis of survey data

Table 3: Principal component analysis (Total Variance Explained)

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	12.799	34.592	34.592	12.799	34.592	34.592
2	2.772	7.492	42.084	2.772	7.492	42.084
3	2.182	5.897	47.981	2.182	5.897	47.981
4	2.019	5.458	53.439	2.019	5.458	53.439
5	1.535	4.148	57.587	1.535	4.148	57.587
6	1.435	3.877	61.464	1.435	3.877	61.464
7	1.224	3.307	64.772	1.224	3.307	64.772
8	1.062	2.871	67.643	1.062	2.871	67.643
9	0.917	2.478	70.12			
10	0.829	2.242	72.362			
11	0.788	2.131	74.493			
12	0.731	1.977	76.47			
13	0.664	1.794	78.264			
14	0.633	1.711	79.975			
15	0.622	1.681	81.656			
16	0.574	1.552	83.208			
17	0.505	1.365	84.574			
18	0.492	1.331	85.904			
19	0.458	1.238	87.143			
20	0.443	1.198	88.34			
21	0.407	1.1	89.44			
22	0.385	1.042	90.482			
23	0.37	1	91.482			
24	0.357	0.966	92.448			
25	0.309	0.834	93.282			
26	0.3	0.81	94.092			
27	0.291	0.786	94.877			
28	0.261	0.705	95.583			
29	0.253	0.685	96.267			
30	0.228	0.617	96.885			
31	0.218	0.59	97.475			
32	0.203	0.548	98.023			
33	0.18	0.487	98.511			
34	0.166	0.45	98.96			
35	0.148	0.401	99.361			
36	0.14	0.377	99.739			
37	0.097	0.261	100			

Table 4: Principal Component Analysis after Varimax Rotation

	Components							
	1	2	3	4	5	6	7	8
Provision of Health and Safety Regulation	**0.817**							
Level of Adherence to Health and Safety Regulation	**0.793**							
Company Safety Policy	**0.786**							
Safety Record Available	**0.768**							
Experience Modification Rating (EMR)	**0.724**							
Accident Book	**0.664**							
Quality Assurance Policy of the Company	0.516	**0.51**						
Method Statement and Outline program	0.493							
Curriculum Vitae of Management Staff		**0.751**						
Project (business) Management Organization		**0.654**						
Possession of Quality Assurance Certificate	0.455	**0.554**						
Experience of Geographical Location of the Place		**0.529**						
Management Knowledge	0.454	**0.517**						
Past Client Relationship		0.486						
Quality of Personnel		0.475	**0.436**					
Experience of Technical Personnel		0.45	**0.424**					
Types of Past Project Completed			0.761					
Size of Past Project Completed			0.753					
Ability of Contractor			**0.672**					
The complexity of Work Executed			0.658					
Evidence of Tax/VAT Clearance				**0.855**				
Evidence of Incorporation/Business Name Registration				**0.79**				
Registration with State/Federal Ministry				**0.756**				
Certificate of Work already Completed		0.473		**0.585**				
Current fixed asset					**0.791**			
Income Statement					**0.756**			
Credit Rating System					**0.697**			
Company Audited Account					**0.662**			
Past Failure in Completed Project						**0.738**		
Percentage of Previous Work Completed on Schedule						**0.637**		
Number of Years in Construction						**0.589**		
Curriculum Vitae of Technical Staff						-0.437		
Plant and Equipment owned							**0.825**	
Past Experience on Similar Work							**0.6**	
Past Performance and Quality							**0.522**	
Banking arrangement and bonding								0.863
Financial strength							0.4	0.44

Table 5: Factors loading for contractor selection criteria and the generated names after Varimax rotation

	Components						
	H/Sp	Mc	Pc	Or	Fc	Wec	Tc
Provision of Health and Safety Regulation	0.817						
Level of Adherence to Health and Safety Regulation	0.793						
Company Safety Policy	0.786						
Safety Record Available	0.768						
Experience Modification Rating (EMR)	0.724						
Accident Book	0.664						
Quality Assurance Policy of the Company		0.51					
Method Statement and Outline program							
Curriculum Vitae of Management Staff		0.751					
Project (business) Management Organization		0.654					
Possession of Quality Assurance Certificate		0.554					
Experience of Geographical Location of the Place		0.529					
Management Knowledge		0.517					
Past Client Relationship							
Quality of Personnel			0.436				
Experience of Technical Personnel			0.424				
Types of Past Project Completed							
Size of Past Project Completed							
Ability of Contractor			0.672				
The complexity of Work Executed							
Evidence of Tax/VAT Clearance				0.855			
Evidence of Incorporation/Business Name Registration				0.79			
Registration with State/Federal Ministry				0.756			
Certificate of Work already Completed				0.585			
Current fixed asset					0.791		
Income Statement					0.756		
Credit Rating System					0.697		
Company Audited Account					0.662		
Past Failure in Completed Project						0.738	
Percentage of Previous Work Completed on Schedule						0.637	
Number of Years in Construction						0.589	
Curriculum Vitae of Technical Staff							
Plant and Equipment owned							0.825
Past Experience on Similar Work							0.6
Past Performance and Quality							0.522
Banking arrangement and bonding							
Financial strength							

H/Sp= Health/Safety practices; Mc= Management capability; Pc= Personnel capability; Or= Organisation reputation; Fc= Financial capability; Wec= Work experience and capability; Tc= Technical capability

4.3 Frequency of use of Contractors' Prequalification Criteria

The result of the frequency of use of contractors' prequalification criteria is shown in Table 6. Overall, personnel capability tops the list of the seven criteria with a mean score of 4.50. Other criteria that are mostly used by the clients or clients' representatives for prequalifying contractors are technical capability, Organisation reputation and work experience and capacity with mean scores 4.47, 4.32 and 4.07 respectively. The four criteria indicate a high level of usage as their mean scores are above 4.0. This study agrees with Ajayi and Ogunsanmi (2012) where the top 2 prequalification criteria in terms of the level of usage were personnel capability and technical capability. This is a strong indication that the decision-makers take personnel capability (the ability of contractors, quality of personnel and experience of technical personnel), technical capability (experience on similar work, past performance and quality, and plant and equipment owned), organisation reputation (evidence of incorporation/business name registration, evidence of tax/VAT clearance, certificate of work already completed and registration with state/federal ministry) and work experience and capacity (number of years in construction, percentage of previous work completed on schedule and past failure in completed project) into high consideration when determining the best contractor that can satisfactorily execute a construction project.

Table 6 also showed that the fifth-ranked criteria were management capability (mean= 3.88). The criteria under this group include management knowledge, project (business) management organisation, quality assurance policy of the company, curriculum vitae of management staff, possession of quality assurance certificate and experience of geographical location. The preferred sub-criteria under this group are management knowledge and project (business) management organisation because they were both ranked above 4.0. This infers that management capability is one of the inevitable criteria used by decision-makers in selecting a suitable contractor.

The next criteria that are used for contractors' selection process are health and safety practices (mean= 3.82). The least of the criteria is the financial capability (mean= 3.67). This may be a result of the slight difficulty encountered in sourcing capital from the finance sector.

Table 6: Frequency of use of Contractors' Prequalification Criteria

Prequalification Criteria N=189	Mean	Rank	Group Mean
Health/Safety Practices			**3.82**
Provision of Health and Safety Regulation	4.03	1	
Safety Record Available	3.97	2	
Company Safety Policy	3.94	3	
Level of Adherence to Health and Safety Regulation	3.92	4	
Experience Modification Rating (EMR)	3.67	5	
Accident Book	3.37	6	
Management Capability			**3.88**
Management Knowledge	4.11	1	
Project (business) Management Organisation	4.02	2	
Quality Assurance Policy of the Company	3.89	3	
Curriculum Vitae of management Staff	3.89	3	
Possession Of Quality Assurance Certificate	3.77	5	
Experience of Geographical Location of the Place	3.58	6	
Personnel Capability			**4.50**
Ability of Contractor	4.59	1	
Quality of Personnel	4.47	2	
Experience of Technical Personnel	4.43	3	

Organisation Reputation			**4.32**
Evidence of Incorporation/Business Name Registration	4.55	1	
Evidence of Tax/VAT Clearance	4.39	2	
Certificate of Work already Completed	4.17	3	
Registration with State/Federal Ministry	4.16	4	
Financial Capability			**3.67**
Company Audited Account	3.88	1	
Income Statement	3.80	2	
Current fixed asset	3.50	3	
Credit Rating System	3.49	4	
Work Experience and Capability			**4.07**
Number of Years in Construction	4.43	1	
Percentage of Previous Work Complete on Schedule	4.09	2	
Past Failure in Completed Project	3.70	3	
Technical Capability			**4.47**
Past Experience on Similar Work	4.75	1	
Past Performance and Quality	4.46	2	
Plant and Equipment owned	4.19	3	

Time Performance of Construction Projects Execution

Table 7 shows the time performance of sampled projects calculated from the initial and final project duration of sampled construction projects. A total of one hundred and eighty-nine (189) construction projects were provided by respondents for this study. Five out of 189 construction projects were rejected because the information provided on project duration was incomplete. Thus 184 construction projects were used for the analyses to calculate the percentage (%) time performance. 17.9% of the sampled construction projects were categorized as very good, 19.6% were good, 13.6% were categorized as satisfactory. 11.4% and 37.5% were categorized as poor and very poor projects respectively in terms of time

Table 7: Percentage of Time Performance on Construction Projects

Performance variable	% of time performance	No of projects	% of projects
Time	<0% (Very good	33	17.9
	0-5% (Good)	36	19.6
	6-10% (Satisfactory)	25	13.6
	11-19% (Poor)	21	11.4
	>20% (Very poor)	69	37.5
	Total	184	100

Relationship between Contractor Prequalification Criteria (CPC) and Construction Projects Execution Time Performance

The seven Contractors Prequalification Criteria (CPC) selected through factor analysis were used to determine the contractors' time performance. The joint contribution of the predictors to changes in construction time performance stood at 50.4% with the indication of a strong relationship (R=0.710) between the predictors and the dependent variables. According to Field (2009) and Ajayi et al. (2016), the

effect is small when the value of $R^2$is 0.001, a medium effect when the value is 0.09 and a large effect when the value is 0.25, hence the R^2 value in this study is of a high effect. The F ratio was 25.580 and the p-value was 0.000 at a 95% confidence level. It shows how well the relationship can predict the dependent variable. Thus the alternative hypothesis (H1) that states "there is a significant relationship between contractors' prequalification criteria (CPC) and construction project execution time performance is accepted. The results of significance probability of each independent variable show that Management capability (Mc), Personnel capability (Pc), Financial capability (Fc) and Work experience and capability (Wec) are less than 0.05, indicating that these independent variables are statistically significant at 95% confidence interval. When there is multicollinearity among the independent variables, the result may be skewed. To counter this, the popularly used measure [i.e., Variance Inflation Factor (VIF) value below 10] was used to check the nature of multicollinearity among the predicting variables (Jin, Han, Hyun & Cha, 2016). The result showed that there is no multicollinearity among the predicting variables.

Management capability, Personnel capability, Organisation reputation, Financial capability and Work experience and capability were significant variables that have impacts on time performance as shown in Table 8. Their level of significance is less than 0.05. The finding of this study is in support of the study of Singh and Tiong (2006) who discovered that the capacity of contractors to control time depends on robust cash flow in projects and Hatush and Skitmore (1997) which opined that managers play an important role in controlling time.

Table 8: Relationship between CPC and execution time performance of construction projects

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	Collinearity Statistics	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	3.453	0.803		4.299	0.000		
Health/Safety practices (H/Sp)	-0.043	0.169	-0.023	-0.254	0.800	0.342	2.925
Management capability (Mc)	1.282	0.198	0.586	6.489	0.000	0.345	2.897
Personnel capability (Pc)	0.552	0.201	0.195	2.75	0.007	0.558	1.792
Organisation reputation (Or)	0.491	0.138	0.226	3.565	0.000	0.701	1.426
Financial capability (Fc)	1.108	0.116	0.583	9.56	0.000	0.757	1.321
Work experience and capability (Wec)	1.011	0.135	0.517	7.465	0.000	0.586	1.705
Technical capability (Tc)	-0.299	0.186	-0.107	-1.61	0.109	0.635	1.574

Variables are significant at $p < 0.05$.

From the regression analysis in Table 8, it can be seen that the Beta values of the statistically significant variables are positive. This implies that for every 1 unit increase in the predicting variable, the outcome variable is increased by the Beta coefficient value. This invariably means that the greater the Beta value of the predicting variable in Table 8 above, the higher the contribution of the variable to execution time performance of construction projects. The rankings of the prequalification criteria in the pecking order of Beta weight are Management capability (Beta = 0.586), Financial capability (Beta = 0.583), Work experience and capability (0.517), Organisation reputation (Beta = 0.226), and Personnel capability (0.195). Therefore, the hierarchical contribution of contractor prequalification criteria to time performance in construction projects execution are Management capability, Financial capability, Work experience and capability, Organisation reputation, and Personnel capability.

5. CONCLUSION

By researching into the impact of contractor prequalification criteria on time performance in contraction projects, the relationship between the two important concepts was established and the level of contribution of the significant criteria was as well established. It is now clearly evidenced that the selection of contractors using the lowest bidder approach is not adequate to achieve satisfactory time performance during the execution of construction projects. Instead, more emphasis should be placed on Management capability, Financial capability, Work experience and capability, Organisation reputation, and Personnel capability as they have been validated to have an impact on time performance in construction projects execution, but utmost consideration should be placed on Management capability, Financial capability, Work experience and capability due to their high level of contribution to execution time performance of construction projects. Therefore, not engaging contractors with these right criteria is like calling for a project failure. To improve on-time project delivery, and increase overall satisfaction, construction practitioners and clients should ensure that the above-listed criteria are a must to determine contractors' potential performance before contract award. The findings of the study have provided baseline information to the construction clients and consultants in Nigeria on the important and effective contractors' prequalification selection criteria to be adopted to enhance time performance in construction projects execution.

6. REFERENCES

Ajayi, M. O. (2010). Multi- criteria decision making model for contractor selection in instruction projects in Nigeria. *West Africa built Enviroment Reseach (WABER)* (pp. 423-433). Ghana: In Layers, Leirinyer R and Hughes.

Ajayi, M. O., Ogunsanmi, O., & Idoro, G. (2016). Contractor Prequalification Criteria (CPC) and Project Tiime Performance in Nigeria. *Lagos Journal of Enviromental Studies, 8*(1), 24-34.

Ajayi, O. M., & Ogunsanmi, O. E. (2012). Decision makers' perceptions on contractor prequalification criteria. *Interdisciplinary Journal of Contemporary Research in Business, 4*(6), 174-203.

Aje, I. (2012). The impact of contractors' prequalification on project delivery in Nigeria. *Engineering, Construction and Architectural Management, 19*(2), 159-172.

Al-Rehaid, K., & Kartman, N. (2005). Design-Build prequalification and tendering approach for public projects. *International Journal of Project Management, 23*, 309-320.

Chan, A. P., & Chan, A. P. (2004). Key performance indicators for measuring construction success. *International Journal of Benchmarking, 11*(12), 203-221.

Chan, D., & Kumaraswamy, M. (2002). A comparative study of causes of time delays in Hong Kong construction projects. *International Journal of Project Management, 15*(1), 55-63.

Digee Bird Statistic Sample Size Calculator. (1982). *The Survey System*. Retrieved from Creative Research Systems: http://www.surveysystem.com/sscalc.htm

Eady N, S. (2007). *Contractor prequalification program.* OLR Research Report 2007-R-0596, Administrative, bridges, construction industries, contracts, Government purchasing, highways, transportation department.

Edyta, P. (2010). Construction contractor prequalification from polish clients' perspective. *Journal of Civil Engineering and Management, 16*(1), 57-64.

Field, A. (2009). *Discovering statistics using SPSS.* London: Sage Publication Ltd.

Hatush, Z., & Skimore, M. (1997). Assessment and evaluation of contractor data against client goals using pert approach. *Construction Management and Economics, 15*(5), 327-340.

Jerome, E. S. (2005). *Improving Contractor Safety Performance.* Retrieved January 9, 2019, from Safety: www.jspear.com

Jin, R., Han, S., Hyun, C., & Cha, Y. (2016). Application of Cased-Based Reasoning for Estimating Preliminary Duration of Building Projects. *Journal of Construction Engineering Management, 142*(2), 1-8.

Leong, T. K., Saman, Z. M., Ariff, M. S., & Tan, C. S. (2014). Using Project Performance to Measure Effectiveness of Quality Management System Maintenance and Practices in Construction Industry. *Scientific World Journal, 4*(3), 1-9.

Lim, C. S., & Mohamed, Z. (2000). An exploratory study into recurring construction problems. *International Journal of Project Management, 18*(4), 267-273.

Mangitung, D. M. (2010). Typical contractor prequalification characteristics of public procurement practices in Indonesia. *The construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors* (pp. 1-27). Dauphine Universite, Paris: COBRA. Retrieved January 8, 2019, from www.rics.org/cobra

Odeh, A. M., & Battaineh, H. T. (2002). Causes of construction delay: traditional contracts. *International Journal of Project Management, 20*(1), 67-73.

Oke, A. E., & Aje, I. O. (2012). An Evaluation of Contractors' prequalification Requirement in Nigeria. *Journal of the Nigerian Institute of Quantity Surveyor, 1*(1), 1-16.

Russell, J. S., & Skibniewski, M. J. (1990). Qualities contractors' prequalification model. *Journal of Comporting in Civil Engineering, 4*(1), 77-90.

Salter, A., & Torbett, R. (2003). Innovation and performance in engineering design. *Journal of Construction Management and Economics, 21*(6), 573-580.

Singh, D., & Tiong, R. L. (2006). Contractor Selection Criteria: investigation of opinions of Singapore Construction Practitioners. *Journal of Construction Engineering and Management, 132*(9), 998-1008.

Tarawneh, S. (2004). Evaluation of prequalification criteria - client perspective: Jordan case study. *Journal of Applied Science, 4*(3), 354-363.