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THE IMPACT OF PROJECT CONTRIBUTORY FACTORS ON THE COST PERFORMANCE OF BUILDING PROJECTS

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Construction projects are complex and vast in nature with a large number of available procurement options, participants, directions, technologies and external factors which are generally deduced as contributory factors and can influence the attainment of project objectives. These demands and pressures for the attainment of project objectives from the client have led to the consideration of the most appropriate contributory factors for a given project, being seen as an important issue in construction project performance. In view of this, the research explored the impact of project contributory factors on building project cost performance based on the attacked level of perception on the extent to which contributory factors(NPRC/PRC) impact on cost performance of building projects . To achieve this goal, the research identify projects contributory factors that impact on the cost performance of building projects and to determine the extent to which contributory factors (NPRC/ PRC) impact on the cost performance of building projects. The aim was achieved by administering 120 questionnaires to professionals in State Universal Basic Education Board (SUBEB) and Government Agencies who have handled SUBEB building projects across the twenty three local government areas in Kaduna State. The obtained data were statistically analysed using descriptive statistics. The results revealed that for non-procurement related factors, client financial stature and project size and complexities are the most popular contributory factors impacting building cost performance. The research further ascertained that for procurement related contributory factors project procurement method used and project responsibilities, contractual obligations to people and organizations are the most popular contributory factors that impact building construction cost performance. The study concluded that NPRC and PRC do exist and can impact cost performance at varying extent. The findings necessitate NPRC and PRC appropriateness by the construction professionals involved in building construction to ensure better cost performance.

Key words: building projects, cost performance, impact, project contributory factors

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INTRODUCTION

The need to achieve project performance remains a prominent issue in construction project construction because project performance deals with the key performance indicators (KPIs) that is projects defined objectives which must be achieved. Moreover, there are numerous resources and factors which need to be efficiently considered due to the complex nature of construction projects (Soewin and Chinda, 2018; Mohmoud, 2020). Olubunmi and Ayo (2013), Idoro (2012) and Babatunde, et al. (2010) all stressed that, achieving project goals for a given project, is necessary not only to judge whether the appropriate procurement and other contributory factors are considered. The basic issue is how the adopted procurement and other project contributory factors enhances or inhibits on project performance indicators (PIs), such as cost, time, client satisfaction, quality among others in order to increase the chances of fulfilling project performance objectives and successful completion of a construction project (Omran at el., 2013).

Construction project success is often evaluated for performance dimensions cost inclusive. Cost is one of the most significant dimensions of construction project performance and the driving force of project success (Oladirin, 2013). Rahman et al. (2012) affirmed that the completion of any project within the estimated cost is the basic criteria for the success of any construction project regardless of size and complexity of project. In recent time due to the abnormal increase in the cost of projects, cost of construction projects has received the attention of most stakeholders. This is because cost is among the major considerations from inception throughout the construction project life cycle. It is however obvious from previous studies that achieving cost performance of any construction project, cost dimension performance is related to numerous project contributory factors impacting on the performance.

Project contributory factors that impact project performance are grouped into procurement and non-procurement related contributory factors Dissanayaka and Kumaraswamy (2012). CIOB (2010) supported that, procurement attributes are contributory absolutely crucial to the performance dimensions. These are the basis for the various processes that bring about the construction of project that meet the client needs known as procurement related contributory factors which contains function attributes as incorporating principal procurement sub-systems and possible choices that are there in. The procurement related contributory factors include: work package, functional grouping, payment modalities, selection methodologies and contract conditions Erikson and Westerberg (2012). Ogunsami (2013) also mentioned that other factors of client characteristics, project requirements, external environment, and contractor characteristics among others are contributory factors known as non-procurement related contributory factors are also essential in procurement process and project execution at the end impacting project performance.

In the construction industry, project performance has gained significant interest recently among both practitioners and academics. This can be seen in several efforts made by researchers to develop project performance based model for

construction project execution by Dissanayaka (1998). Cost models and validation of the model by several other researchers such as Dissanayaka and Kumaraswamy(1999), Enshassi et al (2009), Saraf (2013), Owolabi et al (2014), (Hassan, 2015). As part of effort to ensure efficient construction cost performance by this model, there is general overview by researches such as Dissanayaka and Kumaraswamy (2012), Mathonsi and Thawal (2012) that procurement related factors and non-procurement related factors must be considered on cost performance of construction projects. These factors only become useful basis for modeling and assessing cost performance of construction projects when the extent of impact of both procurement related factors and non-procurement related factors are considered on cost performance.

In Nigeria, studies such as Babalola et al. (2015), Olubunmi and Ayo (2013), Ahmadu et al, (2013), Ogunsanmi (2013), Ishaya and Adogbo (2013) have examined and ranked the factors that are responsible for the performance of construction projects. However following the present Nigerian government's decision to transform sectors of the Nigerian economy, educational, commercial, health care and other several categories of building construction are anticipated to be on the increase. It will thus be useful if factors impacting construction cost can be assess across the different Universal Basic Educational building projects, in order to provide a basis for developing cost performance models that can be used for these projects. This study is therefore aimed at assessing the extent of impact of project contributory factors on cost performance of Universal Basic Educational building projects.

Factors impacting cost performance of construction projects

From literature, it was observed that there is no consensus on the identification of plethora of factors which impact construction cost performance of building projects, basically because researches have widely viewed the subject from diverse perspective to define or determine the performance of construction projects. Amongst several research works which have been conducted to identify project contributory factors (procurement and non-procurement related factors) on project performance dimensions include:

The study conducted by Omran et al (2012) to investigate project performance in Sudan construction industry: A case study. The result found out that project availability of time, the size and complexity of projects, the type of project and duration of project, communication among project participants and overall managerial action, adequacy of design and specification, consultants commitment to ensure construction work according to specification, consultant cooperation to solve problems, consultants involvement to monitor the project progress, client ability to brief the project objectives, the size of client's organization and client's ability to make decision, client's interference during construction, the economic environment, political, social, skillful workers, quality control of materials, enough supply of materials, procurement method, tendering method, project team leader experience, planning effort, budget progress monitoring. The result of a similar study by Saraf (2013) of India construction projects which was aimed to investigate factors affecting performance of construction project. The survey findings indicate that the most important factors affecting project performance are: improper planning, improper designing, site management, decision making, methods,

shortage of labor and technical personnel, quality and shortage of materials, construction mistakes and defective work and productivity.

Eriksson and Vennstrom (2012) carried out a similar study to investigate the Effects of procurement on project performance. The result found that Cooperative procurement procedures of joint specification, limited bid invitation, soft evaluation parameters, joint sub-contractor selection, incentives, collaborative tools, contractor self-control and collaboration on project all have various effects on project performance. these factors according to Erickson and Westerberg (2012) shows how various procurement precedence the different procurement related factors at the design, bid invitation, bid evaluation and sub – contracting selection stages, compensation factors that can have various influences on project performance affect different aspects of project performance.

Nyangwara and Datche (2015) in Kenya supported that the most important factors agreed by the owners, consultants and contractors were: average delay because of closures and materials shortage; availability of resources as planned through project duration; leadership skills for project manager; escalation of material prices; availability of personals with high experience and qualification; and quality of equipment and raw materials in project. It was concluded that projects were delayed and the actual cost of projects was more than the estimated cost because of coastal region of Kenya political conditions and delayed payments which results to unavailability of materials.

Study by Mathonsi and Thawal (2012) also carried out a similar study in South Africa. The result revealed factors such as internal factors (project and client characteristics) and external factors (market competition, information technology, regulatory environment, natural causes and globalization) influence of the project life cycle, expedited project delivery; time, quality and price certainty. Dissanayaka and Kumaraswamy (2012) concluded that significant factors through quantitative models developed that, time over- run levels were mainly governed by non-procurement related factors(project characteristics and client/client representative characteristics while cost over- run levels were significantly influence by both procurement and non- procurement related factors (contractual payment modalities and project characteristics and client/client representative characteristic).

In Nigeria, Odediran and Windapo (2013) conducted a study on a systematic review of factors influencing the cost performance of building projects. The study highlighted fifteen (15) significant factors which include: additional works, material price fluctuation, variation order, project planning, monitoring and design accuracy. Cost estimated method. Others include design and construction errors, financial/cost planning, labour cost and requirements, poor site conditions, poor financial/ cost control and monitoring, poor materials and equipment procurement strategies, market conditions/ indices and contract documentation and administration.

The study conducted by Ogunsami (2013b) on the Effects of procurement related factors on construction project performance in Nigeria, shows that variation order factors strongly affect project performance causing time, cost overruns. Rashid et al. (2006) also conducted a similar study to investigate the Effect of procurement

systems on the performance of construction projects. The result shows that the different procurement systems allocation of responsibilities, activities sequencing, process and procedure and organizational approach have invariably affected the project performance.

RESEARCH METHODS

The research adopted a conceptual framework of the independent dominant variables and dependent variable that shows the relationship of the extent of impact of Procurement Related Contributory Factors (PRC) and Procurement Related Contributory Factors (NPRC) on cost performance of building projects is proposed. The research evaluation of NPRC and PRC extent of impact on cost performance will be analyzed conclusively. The target population of the study comprised of two categories, first category are State Universal Basic Education Board (SUBEB) construction professionals in SUBEB and Government Agencies who have handled SUBEB building projects across the twenty three Local Government Areas (LGAs) in Kaduna State. The second category is completed building projects undertaken in the LGAs by SUBEB, Kaduna State.

SUBEB sponsored projects within the last few years (2014 -2018) in lower basic schools of learning of the 23 LGAs in Kaduna State. Preliminary investigations shows that SUBEB is active in these schools. Hence schools where SUBEB is not active are not included in the study. One hundred and twenty of such projects were identified from the twenty three LGAs and constitute the research population. Purposive sampling selection of well reputable and experienced construction professionals and completed building projects were made within the study area. The research adopted a quantitative, survey approach and primary data were collected by means of 120 questionnaires based on the 120 focal projects arcos LGAs of interest, 105 returned, 7 dropped and 98 valid for analysis. The questionnaires were administered to the informants (Quantity surveyors, Architects, Engineers, builders) in State Universal Basic Education Board (SUBEB) and Government Agencies who have handled SUBEB building projects across the twenty three Local Government Areas (LGAs) in Kaduna State.

A questionnaire on a 5 point Likert scale: where 1 stands for very low impact and 5 signifies very high impact was employed to establish the perception of the respondents on the extent to which 59 projects contributory factors of the 2 major NPRC and PRC factors with thirty nine (39) NPRC sub factors and PRC twenty (20) sub factors respectively.

The use of tables was employed in this research for data presentation. Mean score was used to analyzed the various project contributory factors (NPRC and PRC) likely to impact on building projects cost performance. The analysis was done using Statistical Package for Social Sciences (SPSS) version 25 software. The data sourced from the response of the respondents were analyzed and mean score were obtained using arithmetic mean and ranking method of the statistical analysis. The results were ranked and conclusions were deduced.

Further analysis was conducted to provide insight into the Conformity test of mean responds of extent to which NPRC factors impact on cost and time of the focal

projects using one sampled t- test. This is to test the mean responds of extent to which the NPRC and PRC factors impact on cost and time of the construction projects using mid-point as test score (2.5). Hypothesis: Ho: there is no significant differences between the mean responses of NPRC factors on cost of construction projects and mid-point and H1: there is significant differences between the mean responses of NPRC factors on cost of construction projects and mid-point. Level of significances: α= 5% = 0.05. Decision criteria: reject Ho, if probability value (p value) is < 0.05 as shown in table 3 and table 5 below.

RESULTS AND DISCUSSIONS

Table 1: Respondents and projects profile

	Category	Frequency	Percentage
i	Years of working experience		
	1- 5years	8	19.5
	6-10years	10	24.4
	11-15years	16	39.0
	16-above	7	17.1
	Total	41	100.0
ii	Respondents position in the organization		
	Senior management level	8	19.5
	Middle management level	22	53.7
	Lower management level	11	26.8
	Total	41	100.0
iii	Project executed within the research scope		
	1- 10	13	13.27
	11-20	17	17.35
	21- 30	22	22.45
	31- 40	30	30.61
	>40	16	16.32
	Total	98	100.0

Source: Field Survey, 2018

Table 1 (i - iii) above shows that 41 professionals that responded to the questionnaire are from the meddle management level representing 53,7% with 11 – 15 years of working experience(39%) and have executed 31 – 40 number of projects, representing 30.61% of the 98 projects used within the research scope.

For the purpose of this research, the perception on extent to which NPRC and PRC contributory factors impact cost performance of building projects were measured using a five Likert-type scale. Fifty nine (59) indicators of the two major groups (NPRC and PRC) were presented to construction professionals in the form of statement items. Given their experience on the focal projects, the respondents were requested to rate the extent of perception to which they agree with the statements. Table 2 and 3 shows the mean score for each of the fifty nine indicators of NPRC and PRC and their ranks.

Table 2: Summary of extent to which NPRC factors impact on cost performance of building projects

NPRC factors	Mean score	Std Dev.	Rank
Client financial stature	4.50	.707	1
Project size and complexities	4.47	.613	2
Project team collaborations	4.45	1.006	3
Project cost/ duration	4.35	.775	4
Client project budget/action plan	4.29	.760	5
Design team experience	4.20	1.031	6
Availability of skilled workers in the locality	4.22	1.021	7
Adequacy of design and specifications	4.14	1.055	8
Client rational/ need assessment	4.06	1.024	9
Accuracy of design details to contractor	4.02	1.065	10
Contractor's experience	3.98	.718	11
Quality control of materials	3.96	.903	12
Client's ability to brief the project objectives	3.94	1.003	13
Political considerations/interferences	3.93	1.372	14
Contractor involvement in decision making	3.92	1.012	15
Consultant's commitment to ensure construction work according to specifications	3.86	1.035	16
Project site condition difficulties	3.84	.960	17
Nature of Project	3.78	1.099	18
Overall project team common goals and strategies	3.80	1.015	19
Availability/ enough supply of quality materials in the locality	3.80	1.218	20
Consultant's involvement to monitor the project progress	3.73	1.215	21
Contractor's involvement/ control of subcontractors	3.69	1.078	22
Economic activity levels	3.61	.970	23
Strength of contractor workforce	3.43	1.055	24
Contractor information flow	3.43	1.149	25
Client's ability to make decision	3.39	1.448	26
Client in-house capability	3.39	1.090	27
Material/labour site management difficulties	3.36	1.188	28
Client's experience	3.24	1.540	29
Client overall project management	3.24	1.500	30
Contractor financial status	3.12	.987	31
physical climate and force majure	3.07	1.379	32
Design team leadership skills	2.98	1.457	33
Consultant cooperation to solve problem	2.38	1.162	34
Changes in designs	2.31	1.134	35
Mistakes/delays in design documents	2.31	1.134	36
Material/ labour rate approval	2.29	1.377	37
Social and cultural conditions in the area	2.19	1.164	38
Project team feedback capabilities	2.10	1.540	39

Table 2 Revealed that 39 non procurement related factors were considered. 33 non procurement related factors are impactful on project cost performance. The topmost of non-procurement related factors is client financial stature (Mean Scores =4.50). The second factors of non-procurement related are project size complexities (Mean Scores = 4.47). The third factor is project team collaboration (Mean Scores = 4.45). The three least mean scores of non-procurement related factors are feedback capabilities (Mean Score= 2.10); social and cultural condition in the area (Mean Scores: 2.19) material rate approvals (Mean Scores: 2.29) the lowest factors are dropped because these factors doesn't contribute to the

performance of the buildings/construction in these areas in terms of cost. This was however obvious because the cost of the SUBEB buildings depend on the financial stature of the client (SUBEB/ UBEC sponsored).

Table 3. One-sample test of NPRC factors impacts on the cost of projects

	Test Value = 2.5					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
NPRC factors impact on construction projects	9.689	38	.000	1.05821	.8371	1.2793

Table 3 shows that since p value =0.000 is < 0.05, we reject Ho and conclude that there is significance differences in the mean responses of NPRC factors impact on the cost of construction projects and mid points. This means the respondents agrees NPRC factors has impacts on the cost of construction projects.

Table 4: Summary of extent to which PRC factors impact on cost performance of building projects.

PRC factors	Mean scores	Std Dev.	Rank
Procurement method type	4.08	.949	1
Project responsibilities and contractual obligations to people and organizations	4.08	.949	2
Participation of many decision makers	4.06	.771	3
Payment arrangement motivations to contractor	3.90	1.223	4
Project work co-ordination	3.80	.930	5
Contract award price and time	3.69	1.277	6
Project structure and elements identification	3.65	.982	7
Contract documents coherent with the existing legal framework.	3.65	1.277	8
Appropriate project processes and procedure	3.53	.933	9
Legal obligations, roles and responsibilities between parties	3.46	1.037	10
Contract conditions type	3.43	1.035	11
Payments in an efficient manner by the client	3.29	1.149	12
Contract documents reduce uncertainties, disputes and interference	3.24	1.370	13
Selection method type	3.19	.960	14
Variation orders	3.06	1.225	15
Amended contract conditions clauses to client's advantage sue for the project.	2.90	1.640	16
Payments in an economic manner by the client	2.78	1.523	17
Early consideration of selection method of the project	2.69	1.395	18
Consideration of a wide range of necessary and sufficient decision criteria	2.53	1.151	19
Type of Payment arrangement	2.37	1.179	20

Table 4 revealed 20 procurement related factors that are considered. Nineteen factors are impactful to the building performance in terms of cost. The project procurement method used and project responsibilities, contractual obligations to people and organizations (Mean Scores = 4.08 each). The second is participation of many decision makers (Mean Score = 4.06). The third factor is payment arrangement motivations to contractor (Mean Score = 3.90). The three lowest procurement related factors are type of payment arrangement (Mean score = 2.37).

The two other factors under procurement related which are less impactful are consideration wide range of decision criteria (mean score = 2.53) and early considerations of selection method of the project (mean score = 2.69). This was obvious from SUBEB organization visit, interviews on building budget and action plans and one can deduced that project payment arrangement, wide range of decision criteria and early considerations of selection method does not really have much impact on SUBEB building construction in terms of cost.

Table 5 One Sample Test of PRC factors impacts on the cost of projects

	Test Value = 2.5					
	T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
PRC factors impact the cost of construction projects	7.475	19	.000	.86900	.6257	1.1123

From Table 5 above the Conformity test of mean responds of extent to which PRC factors impact on cost of the focal projects using one sampled t- test, revealed that p value =0.000 is < 0.05, we reject Ho and conclude that there is significance differences in the mean responses of PRC factors impact on the cost of construction projects and mid points. This means the respondents agrees PRC factors has impacts on the cost of construction project.

Discussion of findings

Based on the findings, the levels of thirty three of the identified NPRC were found to fall between moderate impact and very high impact with weighted mean values between 2.98 - 4.50; this means that majority NPRC factors impact building project time performance except Consultant cooperation to solve problem , Changes in designs, Mistakes/delays in design documents , Material/ labour rate approval, Social and cultural conditions in the area and Project team feedback capabilities all with mean scores below 2.38. Nineteen of the identified PRC levels were found to fall between moderate impacts and very high with weighted mean values between 2.53 – 4.08; this also means that all PRC factors impact time performance of building project except type of payment arrangement with mean scores below 2.37.

In addition, the results concerning the impact of NPRC factors on cost performance of building projects shows that, NPRC factors have high impact on cost performance of the focal building projects. The findings from table 2 shows client financial stature, project size / complexities and project team collaborations as the leading NPRC factors that impact on cost performance of the focal building projects. These findings was similar with the study concluded by Babalola and Ojo (2016) in Nigeria that Client's experience whether he is sophisticated or specialized; complexity of project; motivating skill of the project team leader; project team leader experience among others. PRC findings from table 3 in this research shows Procurement method type, Project responsibilities and contractual obligations to people and organizations, Participation of many decision makers and payment

arrangement motivations to contractor. This finding is similar to the study by Rashid et al. (2006) that revealed the different procurement systems allocation of responsibilities, activities sequencing, process and procedure and organizational approach have invariably affected the project performance. This finding was slightly different from Ibrahim et al (2014) that reveals late honoring of payment certificate, too many variations, and technical incompetence were the most severe factors affecting performance.

Further analysis was conducted to provide insight into the Conformity test of mean responds of extent to which NPRC factors impact on cost and time of the focal projects using one sampled t- test. This is to test the mean responds of extent to which the NPRC and PRC factors impact on cost and time of the construction projects using mid-point as test score (2.5). Hypothesis: Ho: there is no significant differences between the mean responses of NPRC factors on cost of construction projects and mid-point and H1: there is significant differences between the mean responses of NPRC factors on cost of construction projects and mid-point. Level of significances: α= 5% = 0.05. Decision criteria: reject Ho, if probability value (p value) is < 0.05 as shown in table 3 and 5 below.

The result from table 3 and table 5 conformity test of mean responds of extent to which NPRC and PRC factors impact on cost of the focal projects using one sampled t- test, revealed that NPRC (p value =0.000 is < 0.05) and PRC (p value =0.000 is < 0.05), we therefore, reject Ho and conclude that there is significance differences in the mean responses of NPRC and PRC factors extent of impact on the cost of SUBEB building construction projects and mid points. This means the respondents agrees PRC factors has impacts on the cost of construction project. This means the respondents agrees that both NPRC and PRC factors have impacts on the cost of construction projects.

CONCLUSION/ RECOMMENDATION

In order to examine the extent of the impact of procurement related contributory factors and non-procurement related factors on the cost performance of building projects. The study affirmed that, project contributory factors do exist and can impact cost performance at varying extent. This is because cost performance of building projects is dependent on a number of project contributory factors (Procurement Related Contributory factors (PRC) and Non-Procurement Related Factors (NPRC) among others, though majority of these factors showed high impact on cost performance of building projects, but the very high impact of NPRC are Client financial stature (mean = 4.50), Project size/complexities (mean = 4.47) and Project team collaborations (mean = 4.45). While the very high impact for PRC are procurement method type (mean =4.08), project responsibilities and contractual obligations to people/ organizations (mean = 4.08) and participation of many decision makers (mean = 4.06). A need for appropriate and adequate consideration of the very high impact identified NPRC and PRC factors should be develop and were recommended as the basis for SUBEB building construction projects in any scenario aimed at effective cost performance. This study therefore calls on SUBEB construction professionals and construction industry professionals in general to the knowledge of impact of NPRC and PRC factors on cost performance of building projects. This study recommended that NPRC and PRC

factors should be taken serious as these factors can be problems militating against effective cost performance of building projects. This is evident in the mean responds conformity one - sample t- test that demonstrated the respondents ' agreements of both NPRC and PRC factors extent of impacts on the cost of building projects at different extent.

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