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MANAGING DESIGN MODIFICATIONS IN NIGERIAN BUILDING PROJECTS: VOICES FROM THE FIELD

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Abstract: Design change is the common factor inhibiting professionals to effectively control projects cost and duration in construction which need to found a lasting solution. The study objective were to assess the effectiveness of mitigating measures agai nst design change as inhibiting factor of cost and time control. Study uses descriptive and explorative des ign through survey method. Judgmental sampling used to administer 127 questionnaires to professionals in Bauchi and Gombe States, Nigeria. Data analyses using mean, frequency and spearman correlation. The hypothesis formulated revealed no significant differences among the respondents' perceptions. The major findings shows the top effective mitigating measures against design change as; Ensuring the time and cost implication of a design change is always determined and agreed before going ahead with the change whenever possible (MS=3.8451). Moreover, Study conclude that, professionals agreed and acknowledge that the developed mitigating measures against design change are all-effective and can be used in Nigerian practice. Therefore, study recommends the adaptation and implementations of the mitigating measures in practice to curtail the issues of design change in building projects.

Keywords: Cost, Time, design change, Projects, Professionals and Nigeria

1.0 INTRODUCTION

The perspective of cost and duration as success determinant in the construction projects considered as twin imperatives of projects sponsor and also important in assessing the success or viability of a construction projects (Aiyetan et al, 2012; Ogunsemi & Jagboron 2006; Oloo et al, 2014 & Odeh & Battaineh 2002). However, despite the efforts made with the available techniques to control these variables still many projects deviate from it estimated cost and duration. These resulted to issues which is frequent and almost associated with nearly all projects in the construction industry and its the most serious problems the Nigeria construction industry faced (Ogunsemi & Jagboron, 2006; Oloo et al, 2014; Azhar et al, 2008). Furthermore, many factors make the budgeted cost and duration to be significant problems apparently affecting the execution of projects mainly in terms of finishing projects behind the scheduled time and estimated cost (Azhar et al, 2008). Moreover, Olawale and Sun (2010) conducted a study and revealed out the top inhibiting factors of cost and time control and subsequently developed mitigating measures against those factor but not progress into investigating their effectiveness for the implementation in practice during projects control process. In Nigeria, review of previous studies has shown no evidence of study centered on assessing the effectiveness of mitigating measures against inhibiting factors of cost and time control in Nigerian practice, despite the proven importance of these twins' variables and the needs for integrating the implementation of these measures into projects control process. Therefore, the main objective of

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the study is to assess the effectiveness of mitigation measures against design change of building construction projects in Nigeria. A null hypothese formulated for this study which state that, there is no significant variation among the respondents on the effectiveness of mitigating measures for design change in building projects. The results of these hypotheses will provide the extents of agreement and the level of variation on the respondent perceptions.

2.0 LITERETURE REVIEW

2.1 DESIGN CHANGE

There are many factors that inhibit professionals to effectively control projects cost and duration in building projects. Many attempts made by previous researchers to identify those factors and its resulted to overlapping and related factors almost globally as assert by (Olawale & Sun, 2010 & Samuel & Akpokodje 2015). In trying to harmonize outcomes, Olawale and Sun (2010) carried out a comparative study and cames up with more than sixty factors from global perspectives and sorted out twenty overlapping and related factors. The outcome of the study revealed the top five factors inhibiting time and cost control in construction practice as design changes, risks and uncertainties; inaccurate evaluation of project time/duration; complexity of works and; non-performance of subcontractors. In addition, mitigation measures for those factors were developed base on each factor. Another contribution Salim and Ashish (2015) opined that, time and cost overruns of any project are mainly due to; Inaccurate estimate of time duration, Faulty design and Land acquisition problem. In addition, Abdulkadir et al, (2015) carried out a comparative study in Nigerian practice using identified significant factors of cost and time overrun by (Olawale & Sun, 2010) in UK practice. The major finding revealed the top inhibiting factors of cost and time control as Design changes, Lack of proper training and experience of project manager, Inaccurate evaluation of projects time/duration, Project fraud and corruption, Nonperformance of subcontractors and Financing and payment for completed works. Moreover, the result found some similarities with the result in UK practice as compared with Nigerian practice.For the purpose of this study and base on the reviewed of (Olawale & Sun, 2010; Salim & Ashish, 2015; Abdulkadir et al, 2015 & Samuel & Akpokodje 2015), the study considered only design change among the inhibiting factors of cost and time control. Furthermore, Olawale and Sun (2010) assert that design change is the widely known factor inhibiting professionals to control both cost and time in building projects. In addition Design change is not only affecting the ability of professionals to effectively control projects but found to be among the top major causes of variation order from client perspectives' as asserted by (Abdulkadir, Lawan & Gidado, 2014).

2.2 Mitigating Measures against Design Change in Building Projects

In order to curb the issue of design change various means of controlling the occurrences of problems were developed by professionals as mitigation measures in practice nortable among them are (Olawale & Sun, 2010). Base on the outcome of the study using qualitative approach through interview of professionals (Olawale & Sun, 2010) developed eighteen mitigation measures for design change but failed to assess how effective these measures are in practice. Therefore, this study adopted twelve mitigating measures through pilot survey from professionals' perspectives and evaluates their effectiveness in practice and it served as an attempt to extend the works (Olawale & Sun, 2010).

3.0 METHODOLOGY

This study adopted quantitative approach using survey method while utilizing descriptive and explorative design study. The study area is Bauchi and Gombe States in North-eastern part of Nigeria. The population are the building professionals that are either practicing as construction managers (CMPs) in contracting firms or in publics building institutions (PBPs). The study adopted the approach of using published tables of sample size, 127-sample size determined for the study based on the population of 190 professionals identified from professionals' bodies within the study area.Questionnaire used as an instrument in collecting data andjudgmental sampling used in administering the questionnaire to the respondents. The study recorded an overall questionnaire response rate of

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56% which indicate an unbiased and significant value (Usman et al, 2012). Data on the level of effectiveness of mitigation measures against design change measured using the following likert scale, Very ineffective = 1; Ineffective = 2; Moderate = 3; Effective = 4; Very Effective = 5 and the measures ranked in orders of mean scored value. This study accordingly used descriptive statistics in analyzing the data.

4.0 RESULTS AND DISCUSSION

The demographic profiles of the respondents are paramount in judging the responses of the respondents and it have influence on the correctness of the data collected and analyses. Therefore, the study depicts the profile information of the respondent and the results shows that majority of the respondents obtained qualification at postgraduate levels. Whereas, Builders and quantity surveyors constitutes the majorities among the respondents and more than 50% of respondent have years of experience above 5years. In addition, construction managers (CMPs) constitute 56.3% representing 40 respondents and public building professionals (PBPs) with 43.7% representing 31 respondent respectively as shown in Table 1 below;

Table 1 Demographic Information of Respondents

QUALIFICATION OF RESPONDENTS		
	Frequency	Percent %
HND	4	5.6
BSC	19	26.8
PGD	10	14.1
MSC	26	36.6
PHD	12	16.9
Total	71	100.0
PROFESSIONS OF RESPON DENTS		
	Frequency	Percent %
Architects	22	31.0
Builders	30	42.3
Quantity Surveyors	19	26.8
Total	71	100
YEARS OF EXPERIENCE OF RESPONDENTS		
	Frequency	Percent %
OVER 10years	22	31.0
5-10years	25	35.2
1-5 years	24	33.8
Total	71	100
ROLES OF RESPONDENTS		
	Frequency	Percent %
Construction managers	40	56.3
Public building professionals	31	43.7
Total	71	100

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4.1 Effectiveness of Mitigation Measures against Design Change

The study objective aimed at assessing the effectiveness of mitigating measures against design change in construction projects. Referring to Table 2 below the results shows that the mean value assessments were above a score of three in five point Likert scale. This vindicated that, the professionals in the study area generally recognized and admitted the measures as effective in controlling design change in building projects.The top effective mitigation measures as revealed by combine construction professionals within the study area are as follows;

i. Ensuring the time and cost implication of a design change is always determined and agreed before going ahead with the change whenever possible (3.8451)
ii. Ensuring no one makes a design change without the knowledge or authorization of the relevant project party (3.7606)
iii. Having a design manager where possible with responsibility for the management of the design change process and reviewing (3.7183)

This result agree and supports the finding of [Olawale & Sun, 2010] on the mitigation measures of design change and also confirmed the assertion of (Soheil et al in Olawale and Sun, 2010) which indicates that the professional perspectives globally are almost the same in construction projects issues.

Table 2 Assessment Results on Effectiveness of Mitigation Measures for Design Change

	Construction managers		Public building professionals		Overall	
Variables	Mean	Rank	Mean	Rank	Mean	Rank
Ensuring the cause of a design change is always determined.	3.4839	10	3.5750	10	3.5352	12
Ensuring the time and cost implication of a design change is always determined and agreed.	3.7419	4	3.9250	1	3.8451	1
Notification of stakeholders on cost implication of a design change	3.7097	5	3.7250	4	3.7183	4
Designing the project to a great detail at the outset whenever possible	3.4839	11	3.8000	2	3.6620	6
Allocation of enough resources to cope with a design change	3.5806	8	3.6000	8	3.5915	9
Design changes should be adequately highlighted and updated.	3.5484	9	3.7250	3	3.6479	7
Ensuring prompt resolution to design change queries, issues and authorization requests	3.4194	12	3.6750	5	3.5634	10
Capturing all design change on a register.	3.6452	7	3.5750	9	3.6056	8
Having a design manager where possible with responsibility for the	3.8710	3	3.6000	7	3.7183	3

management of the design change process and reviewing.						
Ensuring no one makes a design change without the knowledge or authorization of the relevant project party	3.9032	2	3.6500	6	3.7606	2
Efficient analysis of the direct and indirect consequence of a design change on other activities.	3.6452	6	3.4750	11	3.5493	11
Ensuring design changes are reasonably timed when possible	4.0323	1	3.3750	12	3.6620	5

4.2 Correlation and Hypothesis Result on Mitigation Measures for Design Change To test the level of agreement between the construction managers and public building professionals' perspectives on the mitigation measures, the spearman's correlation analysis was used and the results vindicates that there was a positive and small correlation (0.191) between construction managers and public building professionals. For the purpose of testing formulated hypothesis on the respondents perception on the effectiveness of mitigating measures for design change. The spearman's correlation at p-values 0.05 significant level was used, the decision rule is that if the p-value is greater than 0.05 shows no significant variation in their perceptions but if p-value is less than or equal to 0.05 there exist a significant variation in the perception of respondents. Referring to Table 3 below with p = 0.447, twotailed which is greater than the specified value .05, therefore the null hypothesis accepted. This shows a consistency agreement and vindicates no evidence in the data to show that the perception of the respondents are different or varies on the levels of effectiveness of the identified mitigating measures for design change.

Table 3 Correlations Results for Design Change Mitigation Measures

			Public building professionals	Construction managers
Spearman's (rho)	Public building professionals	Correlation Coefficient	1.000	.191
		Sig.(2tailed)	.	**.447**
		N	12	12
	Construction managers	Correlation Coefficient	**.191**	1.000
		Sig. (2-tailed)	.447	.
		N	12	12

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5.0 CONCLUSION AND RECOMMENDATIONS

This study used quantitative design method using literature search and questionnaires survey approach in evaluating the professionals' perception on effectiveness of mitigation measures for design change as inhibiting factors of cost and time control. Moreover, all the respondent strongly admitted and recognized that, the twelve mitigating measures against design change are all effective and can be used in Nigeria to curtails or minimize the inhibiting factors of cost and time control of construction projects in Nigeria. Therefore, unless professionals in construction industry adopt these mitigation measures especially employing design manager with full knowledge on implication of design change and no one makes authorization of design change without the approval of relevant parties involved, the stakeholders cannot effectively mitigate design change issue in construction projects. Finally, study recommends that, those mitigating measures developed by (Olawale & Sun, 2010) can be adapted and implemented in Nigeria why because the study found it as effective measures from Nigerian professionals' perspectives. Furthermore, similar studies be carried in the other regions as well as assessing the effectiveness of the mitigation measures of other inhibiting factors in Nigeria.

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