Post-project Reviews in Construction: A means to achieving improved projects performance

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Abstract

Stakeholders accepted that post-project reviews are useful, but many organisations find it difficult to conduct it in a consistent way. However, it takes time to review lessons learnt on construction projects to prevent future negative occurrences. Sharing of the knowledge gained in the process will promote better sustainable construction practices within the industry. The purpose of this study is to assess the post-project review (PPR) systems used by selected stakeholders on construction projects in Abuja, Nigeria. The research adopted the quantitative approach with a well-structured questionnaire administered to 168 participants. The study established that the knowledge management technique is the post-project review system currently practised towards capturing project knowledge and experiences. Ego and pride of team members towards participating in the process was found to be a major obstacle inhibiting the process despite the acceptance from participants that it facilitates collective learning, prevents knowledge loss and reduces reoccurring errors. Due to the limited participation of stakeholders in post-project review process, project performance has not been able to meet the performance criteria of time, budget and scope set. The study recommended the consideration of other available post-project review approaches or techniques to capturing project knowledge and experiences by stakeholders, and the expansion of the role of the prime consultant on projects to accommodate initiating and leading the facilitating of post-project reviews in line with global best practices. The findings from this research will be invaluable to all construction stakeholders' to fully understand the significance of PPRs in enhancing sustainable construction.

Keywords

Barriers, Drivers, Construction, Nigeria, post-project review, sustainable construction

1. Introduction

von Zedtwitz (2002) considered post-project reviews as one of the opportunities project stakeholders have to methodically improve performance in successive projects. It was however argued, that only one out of five research and development projects experience a post-project review. In fact, Anbari, Carayannis and Voetsch (2008) stated that post-project reviews – if at all conducted– are not in consistent manner and this underscored von Zedtwitz (2002) who asserted that post-project reviews are often constrained by interest and capacity by the stakeholders as well as nonexistence of time to undertake the process. Hence, inability of the stakeholders to transfer knowledge or conduct projects post mortem exhibits significant impact on succeeding projects performance. Failure or poor performance of projects are not limited to the construction industry, other industries experience or suffer same feat. For example, Lyytinen and Robey (1999) and Nash (2000) reported that poor performance of Information Technology (IT) project is often attributed to organizations' failure to learn from their own past experiences. Christian (2002) provided some data to show that the performance of IT projects is dismal with about 33% considered to be a failure by not yielding anticipated value for money to stakeholders; above 70% of all IT projects are challenged, with only 16% of projects are delivered on schedule and within budget.

In other to improve performance, there is the need to continually learn from the past, and to learn from the past one must have documented history of knowledge (von Zedtwitz, 2002). Post-project reviews remain one of the most widely adopted approaches most especially in the construction industry to capture and transfer knowledge among participants on a project. It could be described as a process used to evaluate projects after completion to thoroughly examine and identify errors or mistakes that make projects fail or under-perform, so that lessons learned and knowledge gathered is made beneficial to future projects (Jimoh *et al*., 2016). It should be emphasised that breakthroughs are also documented where they improve the performance of

projects. Anbari *et al*. (2008) identified post-project review as a means to improving learning by developing historical data base obtained by profile of customers, the work environment, and needs of the staffs involved on the project and the organization as a whole. Anbari *et al*. (2008) attributed the benefits of the post-project review process to linking effectiveness in achieving set goals, proper utilization of resources, and transfer of project experience and knowledge to future projects.

While the transfer of project knowledge to key decision makers in organizations by conducting post-audits and after-action reviews on projects in the Nigerian construction industry was brought to fore by Alabi (2011) and Dada and Akpadiaha (2012), the awareness of post-project review by professionals in the Nigerian construction industry was identified by Jimoh *et al*. (2016) where the importance, benefits and barriers of post-project review process were equally and extensively discussed. However, the rate of occurrence of project failure and project under-performance coupled with the poor level of awareness of the post-project review process especially by professionals and key stakeholders in the Nigerian construction industry are the motivating reasons for this research as the study aims to carry out an assessment of the barriers and drivers of post-project review systems used on construction projects by selected stakeholders in Abuja, Nigeria. To achieve this, the following questions were answered;

i. What are the prevalent post-project review systems / techniques used by stakeholders?
ii. What are the drivers that determine the success of post-project review systems used by stakeholders in Abuja, Nigeria?
iii. What are the barriers inhibiting the use of the prevalent post-project review systems?

2. Review

2.1. Post-Project Reviews in Construction

According to Anbari *et al*. (2008) and Jimoh *et al.* (2016), there has been an established belief that post-project reviews are advantageous. In spite of these huge benefits, studies on post-project review process has not received required attention until recently (Kululanga and Kuotcha 2008), particularly in Nigeria and this can hinder the ability of organizations from establishing an organized method to decipher knowledge from post-project reviews at any

stage of the construction process (von Zedtwitz, 2002). However, Anbari (1985) suggested that project appraisal needs to be employed at various stages of the project life cycle, most importantly during the close-out phase to measure the performance of the project in terms of its initial and revised objectives. Different attempts have been made to specify how post-project reviews could be conducted (Collier *et al*., 1996). For instance, Cleland (1985) underlined that post-project reviews could be conducted for three purposes: as a pre-project appraisal to select the project that best fits the overall business strategy of an organization; as a continuing appraisal of the project during its life cycle; or as a post-project reviews for the evaluation of the success and effectiveness of the completed project, with the intention to develop outline of lessons learned from the experiences on the completed project that can assist in guiding the management of projects in the foreseeable future. Collier *et al*. (1996) reiterated that irrespective of the method used in achieving or profiling lessons learned, organizational commitment is required to make post-project reviews a consistent activity since its main objective is to use the approach to improve the performance of future project management methods and practices. This assertion was emphasized by Huemann and Anbari (2007) who upheld that a post-project review is an orderly review concerning the advantage of management and technical processes, and performance criteria set by the stakeholders which assists in identifying the root causes of success or failure of projects by highlighting the improvement opportunities.

Post-project reviews offer stakeholders an important prospect to relate how the project objectives were achieved, effectiveness in applying the resources allotted to the project, and transfer of the unusual lesson learned in executing the project to other projects, which is crucial to the overall performance improvement of current and future projects, project management processes, and the organization as a whole (Anbari *et al*., 2008).

2.2 Post-Project Review as a Process for Organization Learning

This approach of Post – project review involves the capture and learning of knowledge at the organizational level. Roth and Kleiner (1998), Branis and Christopolous (2005) and Sowards (2005) are among the few researchers that identified the concept of learning histories which are applied to projects in order to improve organization learning capabilities. A learning history

highlights reporting and capturing "significant results". Significant results are a link to the performance effects of learning. When something is achieved by an organization that exceeds or meets expectation, enhances results in business, carry out successful change in policy, alter patterns of behavior and so on – that is evidence of significant change in performance.
According to Roth and Kleiner (1998), the learning history process is a technique which demands the review of an organization shift by a conscious effort towards the improvement of competence of the participants in a change process to appraise their programme and its progress with the benefit of creating materials that should aid in disseminating knowledge to other participants. These process components of learning will ultimately generate a reaction or a reply cycle at the organizational level.

2.3 Post-Project Review as a Collective Learning Technique

The Post – project review through the collective learning technique is a specifically focused and targeted approach of conducting post – project reviews which links key stakeholders within the project (Oluikpe *et al*., 2005).

According to Carrillo (2005) the use of this approach was recommended for the construction industry identifying it as an extremely desirable action or activity that does not occur. The researcher recognized the significance of sound project management where explicit knowledge in the form of specifications, drawings, standard contracts and so on is documented. It was equally pointed out that there was a necessity to capture experience and knowledge on methods and tools used and emphasized the significance of lessons learned to profile specific problems, describe successful and unsuccessful solutions, relevant people to contact and so on.

2.4 Obstacles to Post-project Reviews

Conducting post-project reviews come with numerous benefits, Carrillo (2005) and Oluikpe *et al.* (2005) identified some of these to include improvement in project performance and success, provides utilizable knowledge, facilitates collective learning, prevents knowledge loss and minimizes repeated errors. However, there are equally barriers to the process, von Zedtwitz (2002) highlighted some barriers to learning from post – project review which was grouped into four main categories; Psychological barriers; team based short comings; epistemological constraints; and managerial

problems. In the same vein, Busby (1999), Carrillo (2005), and Jimoh *et al*. (2016) summed up the drawbacks experienced with the implementation of post-project reviews and these barriers are presented in Table 1.

Table 1: Obstacles to Post-project Review Systems

Literature Source (Author/Year)	Identified factors
von Zedtwitz (2002)	Time constraints, Budget restrictions, Inability to reflect, Reluctance to blame, Poor internal communications, Manpower intensive, High cost due to company overhead, Poor organization structure.
Busby (1999)	Time consuming, involves looking back at projects, Lack of organization awareness, Poor data maintenance, Poor social relationships, Count on experience.
Carrillo (2005)	Ego and pride of team members, Poor management system, Ambiguous objectives, Fast track project nature, Lack of resources to act on review outcome, Lack of data.
Enshassi *et al*. (2014)	Overload projects and the need to close the project and move on to the other without evaluation; Lack of the organization awareness about evaluation; Cost evaluation; Objectives are ambiguous; Time consuming.
Jimoh *et al.* (2016)	Time and budget restriction; Poor organizational culture; Lack of management support; Expensive in terms of company overhead; Lack of maintenance of data during project progress.

Source: Researcher's Summary (2017)

2.4 Construction Stakeholder's Performance and Post - Project Reviews

The complexity in designs and involvement of multiple participants in the delivery of construction projects has become a fundamental issue for

governments, communities, private clients and organisations thereby making it necessary to involve the right construction professionals to execute these projects. Therefore, it could be inferred that the level of success of a construction project will be determined by the performance of the respective parties involved. These parties known as stakeholders on a project are individuals or group of individuals/organizations that have some aspect of rights or possession in the project and can contribute to it; or will incur or justifiably perceive they will incur a direct benefit or loss as a result of either the works during the project or the outcome of the project (Molwus, 2014). Successful construction project performance is achieved when stakeholders meet their requirement and continual participation. The importance of stakeholders in relation to construction project performance was highlighted by Cooke-Davies (2002). However, the spate of project failure and poor project delivery due to performance of stakeholders coupled with the lack of awareness of the post-project review process as a learning tool in the Nigerian construction industry necessitated a research in this direction. In fact, Enshassi, Arain and El-Rayyes (2014) contended that it is very imperative to appraise construction projects to recognize if the projects succeed or fail. In a related development, Carrillo (2005) asserted that most stakeholders and organizations in the construction industries around the world consider post-project review process as the 'Holy Grail' to enhancing project performance and foster project team learning and development. Post-project reviews are carried out to ascertain the effectiveness and efficiency of a project using performance indicators. It is undertaken to evaluate the effectiveness and efficiency of the project delivery process against key performance indicators which include quality of the briefing / contract documents; the effectiveness of communications; the performance of the project teams; project quality issues; health and safety issues; variations; claims and disputes and collaborative practices.

3. Methodology

The stratified sampling technique was adopted for this study as it is a process of dividing members of a population into homogenous sub-groups before sampling. A total of 119 Architectural firms, 62 Quantity Surveying firms, 9 Services firms as consultants, and 15 large construction firms (based National Bureau of Statistics [2013] classification – 200 and above employees) were identified from the Architects Registration Council of Nigeria (ARCON), the

Nigerian Institute of Quantity Surveyors (NIQS), the Council of Registered Engineers of Nigeria (COREN) and the Federation of Construction Industry (FOCI) respectively. The simple random probability sampling technique was used to give the respondents in the consultants sub-group an equal chance of being selected. The data were collected through self-administration of well-structured questionnaires. The questionnaire was structured in accordance to the review of existing literature.

A total of one hundred and forty-two (142) respondents were identified. Based on Krecjcie and Morgan (1970) table, a sample size of 127 was determined from a population of 190 consultants, all the 15 large construction firms formed part of the survey. Therefore, one hundred and twenty-seven (127) of these representing consultants comprising of Architecture firms, Quantity Surveying firms, Services firms, while fifteen (15) of these respondents represented large construction companies. A total of one hundred and one (101) respondents completed and returned the questionnaires. Table 2 shows the average rate of response from the respondents with ninety-three (93) representing the consultants and eight (8) representing the large construction companies. This translated to a response rate of 71.1%. The questionnaire was rated on a five-point Likert type scale ranging from strongly disagree (1) to strongly agree (5). The data was analysed using Mean Item Score**.**

Table 2: Response rate

Respondents	Large Contractors	Consultants	Total
No of questionnaire administered	15	127	142
No of questionnaire returned	8	93	101
Rate of response	53.33%	73.2%	71.1%

4. Data Analysis and Discussion

Figure 1 shows that out of the 101 returned questionnaires showed that 79% of the respondents have practised in the industry between 5 – 10 years while 21% have been practising in the industry for well above 10 years.

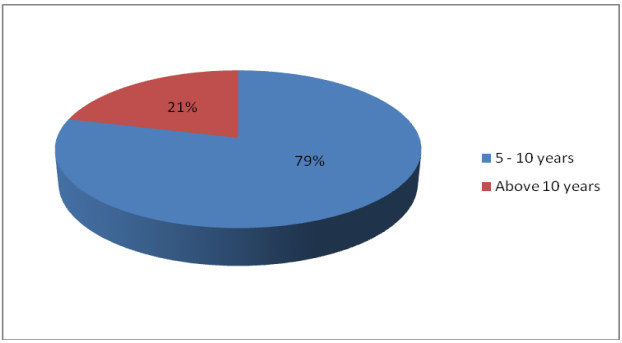

Figure 1: Years of Practice Experience in the Construction Industry

Figure 2 shows the response on respondents' involvement in any project that has conformed to initial time, and within initial scope given their years of experience in the construction industry. 85% of the respondents indicated 'no' while 5% of the respondents indicated 'yes'. 10% responded 'never' and do not believe it is possible to have such a building project. Findings from the study revealed that 85% of the stakeholders have not been involved in any project that has been completed within initial budget, initial time and within scope in the past 5 years, thereby failing to meet the primary triple constraint of performance measurement criteria as proposed by Anbari *et al.* (2008) for initiating a post-project review process.

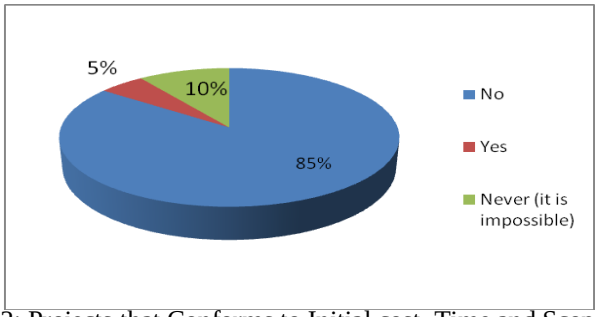

Figure 2: Projects that Conforms to Initial cost, Time and Scope

4.1 Level of participation in post-project review process

Respondents were asked to indicate their level of participation in any such post-project review given their level of professional experience in the industry. Table 3 shows that 8 respondents from contractor's organizations are involved in post-project review process almost on every project while 10.90% and 6.25% representing 6 respondents and 2 respondents from the Architectural and Quantity surveying firms indicating participating a lot in a post-project review process on every project. 60%, 28.13%, and 33.33% of the respondents from the consultants indicated that they have only participated in post-project review process few times. 29.09%, 65.62%, and 66.66% stated that they have never participated in any post-project review process on any project.

Table 3 Level of participation in post-project review process.

Frequency of participation in PPR process	Consultants			Contractors
	Architects	Quantity Surveyors	Services Engineers	
A lot (Almost on every project)	10.90% (6)	6.25% (2)		100% (8)
Only a few times	60% (33)	28.13% (9)	33.33% (2)	
None (Never participated in any project)	29.09% (16)	65.62% (21)	66.66% (4)	
Total	100%	100%	100%	100%

4.2 Post-project review techniques

In Table 4, respondents were asked on the post-project review techniques used on projects to capture knowledge, lessons learned and experiences with the intent for these knowledges to be passed on to other projects. Eight respondents representing one hundred percent (100%) of large construction companies indicated that knowledge and lessons learned are documented in

writing and the procedural manual are made accessible for participants for future projects. In a related development, 16.36% and 9.38% representing 12

Table 4: Post-project review techniques / systems used on projects.

Project knowledge and experience transfer	Consultants			Contractors
	Architects	Quantity Surveyors	Services Engineers	
Knowledge is put in manual writing and made accessible to participants of future projects	16.36% (12)	9.38% (3)		100% (8)
Knowledge and experience are shared by individual participant moving to a new project	78.18% (43)	90.62% (29)	100% (6)	
Visualization and analysis of project success factors of stakeholders pre and post project (cognitive mapping of project)	-	-N/A	-	-
Collective meeting of major stakeholders involved in projects at post-	-	-	-	-

project phase				
Total	100%	100%	100%	100%

and 3 respondents from Architecture and Quantity Surveying firms indicated that knowledge is documented in writing which is updated and made available for participants moving to new projects. 78.18%, 90.62%, and 100% being respondents from the consultants indicated that project knowledge and experience is carried on to another project and shared by the individual participant. These post-project review techniques / systems were highlighted by Oluikpe *et al*. (2005) and Carrillo (2005) as internal learning process within an organization, and could be described as individual tacit knowledge management and group explicit knowledge management (Jordan & Jones, 1997; Al-Ghassani *et al*., 2002). Eluifoo (2017) stated that the post-project review process encompasses knowledge management and is contemporary to organizational learning. Such a process could begin from individuals, groups and finally through the entire organization.

4.3 Success Factors of Post-Project Review Process

Respondents were requested to indicate the critical success factors of their post-project review process using a five-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree. Table 5 shows that the factor, 'availability of data and documents related to the project' ranked first with a standard deviation (SD) = 0.306 and a mean score of (M) = 4.920. 'the actual perception of the firm/organization of importance of post-project review' ranked second (SD = 0.286, M = 4.910); 'the neutrality of the evaluator' ranked third (SD = 0.412, M = 4.901); 'the clarity of its objectives' and 'involve all parties in the evaluation process' ranked fourth and fifth respectively (SD = 0.416, M = 4.871) (SD = 0.526, M = 4.623). The least ranked factor 'an ambiguous evaluation plan' ranked eleventh (SD = 1.088, M = 2.930); 'enough budget for the evaluation' ranked tenth (SD = 0.894, M = 3.613); 'the evaluator efficiency' ranked ninth (SD = 0.669, M = 4.247); 'using appropriate tools to collate data' and 'interim assessments' ranked eight and seventh respectively (SD = 0.656, M = 4.297) and (SD = 0.740, M = 4.435). Ranked sixth was 'the accurate determination of indicators' with SD = 0.657, and M = 4.524. This relates to studies carried

out by Carrillo (2005), von Zedtwitz (2002), and Busby (1999) as they highlighted the need for project history data and documents to be referenced and participants should not see the process as being biased. The clarity and purpose of the post-project review process should be spelt out so participants do not see it as a waste of time. The least ranked factors were 'having enough budget for the evaluation' and the 'nature of the evaluation plan'.

Table 5: Success Factors of Post-Project Review Process

Post-project review process success factors	Respondents (N)	Mean (M)	Standard deviation (SD)	Rank
Availability of data and documents related to the project	101	4.920	0.306	1
The actual perception of the firm / organization of importance of PPR	101	4.910	0.286	2
The neutrality of the evaluator	101	4.901	0.412	3
The clarity of its objectives	101	4.871	0.416	4
Involve all parties in the evaluation process	101	4.623	0.526	5
The accurate determination of indicators	101	4.524	0.657	6
Interim assessments	101	4.435	0.740	7
Using appropriate tools to collate data	101	4.297	0.656	8
The evaluator efficiency	101	4.247	0.669	9
Enough budget for evaluation	101	3.613	0.894	10
An ambiguous evaluation plan	101	2.930	1.088	11

4.4 Obstacles to Post-Project Reviews

Respondents were requested to indicate the obstacles preventing the use post-project review process using a five-point scale: 1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree. Table 6 below shows that the factor, 'ego and pride of team members' ranked first with a standard deviation (SD) = 0.347 and a mean score of (M) = 4.861; 'lack of management support' ranked second (SD = 0.366, M = 4.841); 'poor organization structure' ranked third (SD = 0.602, M = 4.762); 'poor team internal communication' and 'fast track procurement nature of many construction projects' ranked fourth and fifth respectively (SD = 0.433, M = 4.752) (SD = 0.577, M = 4.742). The least ranked factor 'expensive/high cost due to company overhead' ranked twenty fourth (SD = 0.547, M = 2.613); 'it overloads project as the need to close project and move on to another' ranked twenty third (SD = 0.944, M = 2.782); 'lack of organization awareness about post-project review' ranked twenty second (SD = 0.748, M = 2.802); 'manpower intensive', and 'time and budget restrictions' ranked twenty first and twentieth respectively (SD = 0.424, M = 2.802) and (SD = 0.848, M = 2.980).. Jimoh *et al.,* (2016) and Anbari *et al.* (2008) highlighted these barriers and the need for the right structure and stages from norming to performing. Carrillo (2005) also identified the need to develop the right structure as a culture in organizations to reduce ego and pride of participants.

Table 6: Obstacles to Post-Project Review Process

Factors	Mean (M)	Standard deviation (SD)	Rank
Ego and pride of team members	4.861	0.347	1
Lack of management support	4.841	0.366	2
Poor organization structure	4.762	0.602	3
Poor team internal communication	4.752	0.433	4
Fast track procurement nature of many construction projects	4.742	0.577	5
Political patronage to cover up inefficiencies and corruption	4.514	0.701	6
Reluctance to blame game	4.475	0.794	7
Inability to reflect on past experiences	4.415	0.652	8

Lack of interim reviews	4.376	0.892	9
Lack of expertise / incompetence to carry out reviews	4.376	0.858	10
Lack of maintenance of data during project progress	4.336	0.827	11
It involves looking back at problems	4.326	0.825	12
The beneficiaries are future project	4.267	0.676	13
Lack of resources to act on the outcome of the reviews	4.217	0.729	14
Immaturity of project management systems	3.247	0.817	15
Lack of incentives	3.059	0.967	16
Objectives are ambiguous	3.029	0.805	17
Time consuming	3.000	0.824	18
Time and budget restrictions	2.980	0.848	19
Manpower intensive	2.802	0.424	20
Lack of organization awareness about Post-project reviews	2.802	0.748	21
It overloads project as the need to close project and move on to another	2.782	0.944	22
Expensive / High cost due to company overhead	2.613	0.548	23

5. Conclusion and Recommendations

Findings from the study revealed that despite acknowledging the benefits and advantages of initiating and carrying out post-project reviews on projects, the performance of stakeholders on projects (contractors and consultants) have not really been able to meet the performance criteria of initial time, initial budget and within project scope owing largely to limited participation of stakeholders in post-project review process. Ego and pride of participants, lack of proper documentation, lack of management support, poor internal and external communication amongst project team members, and lack of

structure are amongst the obstacles that inhibit the post-project review process. Construction business is very profitable and at the same time comes with lots of risks, every knowledge gained on a project is an added advantage to the stakeholders involved especially when used on future projects. The study also established that the current post-project review system being used on projects by these stakeholders is the knowledge management techniques where project experience and knowledge are either captured solely by the participant involved on the project and passed on in future projects, or it is captured in a manual and made available for future participants on future projects in an explicit form.

Based on the findings, the following recommendations are made

i. Team members should close ranks and be united in order to build up database that will be useful in future projects. This can be achieved by improving internal communication and also carry out interim reviews so as not be overwhelmed when the project is brought to a closure.
ii. The leadership of organisations should be committed to post-project reviews as the benefits may not be seen immediately and as such, it should be part of strategic plan of construction firms.
iii. The role of prime consultant should be expanded as the initiator of the process as he / she remains the link between major stakeholders involved on a project no matter what phase of the project they are engaged.
iv. Data bank should be established where lessons learnt in projects are warehoused for future use.

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