INFLUENCE OF CONSTRUCTION INTERFACE MANAGEMENT PRACTICE ON PROJECT PERFORMANCE IN NIGERIA

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Abstract
To curb community influences on construction project performance at the delivery stage, a number of interface management practices (IMP) are increasingly adopted. This study determined the impact of these practices on project time performance. The objectives were to determine the effectiveness of identified IMP, their level of use, and impacts on timely project delivery. The study adopted a mixed research approach involving semi-structured interview and questionnaire survey conducted in South-South and South-East, Nigeria. Data obtained from 127 stakeholders in 66 project cases were analysed using percentages and canonical correlation analysis. The results indicated that five out of 13 interface management practices validated were prevalently used in the study area, four of which are effective to achieve timely project delivery. The result also established a significant positive correlation between these practices and project time performance. The study concludes that early community involvement, use of community liaison person, communication management, and stakeholder management are important community-project organisation interface management practices with significant impacts on project time performance. The study recommends practices of hybrid application of one or more methods for optimal result based on varying levels of performance.

Keywords: Community, Interface, Interface management, Project organisations, Project performance.

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INTRODUCTION

Expanding literatures have recognised the interdependency between construction project and the environment. The link however creates an interface that project organisation must manage effectively to achieve project performance. However, construction interface management related research has received limited interests in construction management literatures. Rather, existing studies focused on intra-project interface management (Bridge, 2007). The importance of interface's congruence between project organisation and project environment to timely project delivery has gained a frontline attention in stakeholder management research. Rawlinson and Cheung (2008) and Teo and Loosemore (2012) observed that most project interfaces are challenged by unfavourable responses from the stakeholders at the community level. The consequences of such response to the resultant interface harmony are widespread; and cut across project organisations and the construction industry generally (Close & Loosemore, 2013). However, bad image and poor project performance are dominant than other consequences (Teo & Loosemore, 2012). The common evidence is disruption of progress and late design changes (Close & Loosemore, 2013). External opposition are also prevalent including legal challenge and stoppage of project and construction resource flow (DITR, 2006; Ekung, Effiong & Ibanga, 2016). Loosemore (2000) further affirmed that problems resulting from poor interface management are more prominent than a significant construction mishap.

The term construction interface explains the tie between construction stakeholders (Shokri *et al*., 2014). According to Caglar and Connolly (2007), interface management seeks to identify early in the project, critical issues that may impact schedule and cost. It is identified as 'an effective tool in proactive avoidance or mitigation of any project issue towards enhancing the delivery of projects' (Nooteboom, 2004 in Shokri et al. 2014). Interface management practices also describe the processes and procedures employ in effectively engaging stakeholders in the project environment. When the adopted approach is ineffective, project objectives are constraint (Shokri et al. 2012). Prominent constraints in project objectives include conflicts and overall performance failings (Siao et al. (2009).

Interface management and its impact on project performance have not been given adequate attention in developing countries. Improvement is therefore needed to benefit the construction sector in these places. In the absence of standard management practice, a number of bespoke approaches are increasingly adopted. Studies that explore their effectiveness in delivering project objectives are limited. The aim of the study was to determine the effectiveness of adopted practices in delivering project objectives. These practices vary with project organisation and environment, but vastly adopted practices include use of liaison person, top management engagement, and early stakeholder management, among others. To achieve its aim, the study explored the effect

of interface management practice on project performance. The goal of the study is clearly important as the knowledge of the effectiveness of these practices will ensure effective construction project interface management towards timely project delivery. The effectiveness was hypothesised on practice's ability to identify the relevant interface actors and engage them satisfactorily. The focus of the study is on interfaces between project organisations (firms) and community stakeholders in the project environment.

REVIEW OF RELATED LITERATURES

Interface Management Practices in Construction

The boundary of interface management is better observed in construction supply chain relationships. Interface is the component of the project and its links with internal and external organisations (Alawi, 2015). However, internal or intra-organisation interface issues have gained increased research attention than external interface notably in sub-Saharan Africa. Interfacing seeks to institute safe domains with the constituent parts. Current attempt to define the term interface management is summarised by three variables: communication, coordination and responsibility (Siao *et al.*, 2009). Thinking also exists that supports steps, organisation and resolution tailored towards ameliorating impact created by interface issues. The objective of interfacing generally seeks to facilitate and agree arrangements with relevant stakeholders (Caglar & Connolly, 2007). The arrangement may be in respect of roles and responsibilities, schedule for providing interfaces information and identification of relevant interface using organised procedure (Shokri *et al*., 2014). The process is also directed at analysing potential impacts on time and cost through vibrant, precise, and reliable exchange with internal and external organisations (Shokri *et al*., 2012). Interface procedure is therefore a tool that links two different organisations towards achieving set objectives (Caglar and Connolly, 2007). The process is essential to facilitating information exchange needed by others in managing project deliverables. It is therefore a suitable tool for both intra and inter-project interface management. Despite the increasing significance of the need for harmonious project organisation-project environment interface in the literature, the steps involved in interface management vary across industry domain. Shokri *et al.* (2014) described five steps in the context of oil and gas construction projects. Caglar and Connolly (2007) generated iterative framework comprising seven steps also for oil and gas projects. However, the generic steps comprise of identification, communication, transferring, monitoring the status, and closing.

The concept was introduced in construction to address challenges posed by fragmented practices in traditional project organisations (Shokri *et al*., 2014). The application of interface management in construction is however reactive, as processes are initiated when problems occur (Shokri *et al.* 2014; Siao & Lin, 2012; Siao *et al.* 2011; Caglar & Connolly, 2007; Chen et al. 2007; & Kelly & Berger, 2006). Project interfaces in construction include: time; geographic; technical; social; personal; system; static; and dynamic (Chen *et al.,* 2008). However, current literatures persistently emphasises the technical perspective; with less prominence on the social context (Lin, 2012). The increasing emphasis on the technical impediment has discouraged interest on social interaction with project external environment (Blood, 2013). The existing literature is also non-emphatic about what management practices that can be employed to ensure a harmonious exchange interface. Evidence abound empirically that project organisations adopt various bespoke approaches in Nigeria (Ekung & Lashinde, 2016). It is therefore important to document these practices to enhance knowledge sharing and transfer to other project domain. Siao *et al.* (2009) found tailored approaches appropriate as there is no standardised management procedure. Prevalent procedures in the literature include stakeholder management, risk management, communication management, supply chain partnering and integrated project delivery (White & Marasini, 2014). However, many of these practices (notably partnering and supply chain) are alien to certain norms in the construction industry in many developing countries based on prevailing procurement practices. As a result, a framework of ad-hoc practices that could form documented evidence of interface management techniques in developing countries is desirable.

The Community

The term community is 'a social unit that shares common values and interests and normally lives in close proximity to each other' (Barzilai, 2003). Community is a stakeholder group in the project environment. Stakeholder is a comprehensive term use to explain persons or group of people with vested interest in the outcome of construction projects (Olander, 2007). The stakeholder groups are either internal or external (Winch, 2002); primary and secondary (Newcombe, 2003), and upstream, downstream, external, and project stakeholder groups (Walker *et al*., 2008). The external stakeholder is broadly used in the literature to identify stakes outside the project organisation (Aaltonen & Kujala, 2010) including the community. The community stakeholder group has continued to witness abysmal research interest in related literatures, and more importantly their impact on project performance is insignificantly documented (Ekung, 2013). The effectiveness of community and project organisation relationship is noted to influence quality performance (White & Marasini, 2014). Inadequate attention

to the needs and expectation of the stakeholders also inhibits quality outcome (Heravitorbati, *et al*., 2011). Given these widespread implications, the study seeking to examine community-project organisation interface management practice is timely towards maximising project performance.

Project Performance

Project performance evaluates the extent in which determined project objectives are realised. This implies that every construction project endeavour is defined by known objectives (Idoro, 2012). The traditional performance measurement criteria are still prevalent: cost; time; quality; and safety in the construction industry today (Idoro, 2012). However, in view to embed community stakeholders within project management theory, attributes of community influence are increasingly adopted as performance measurement criteria (Ling *et al*., 2009). By this thinking, project performance is evaluated based on how well community negative impact is extenuated. This view is embedded in Kerner's organisational perspective to project performance measurement. According to Kerner (2001), project performance can be assessed using completion with little or no distortion to main work flow of the organisation. Similarly, Ling *et al.* (2009) validated operational performance indicators for determining project success. In Ling's *et al*. view, human factors and the external environment criteria are essential project performance criteria. Since performance is linked to the work flow, relaxed environment for workflow is important. The organisational workflow is predicated on the level of co-operation of the community. The level of cooperation is measured by the frequency of protest, disturbance, frequency of work stoppage, resource flow, and strike (Ekung *et al*. 2013). The absence of these indicators implies strong cooperative tie and a flowing project time performance as shown (Figure 1). Based on the inconclusive nature of existing literatures on interface management practices; this study aggregates and documents ad-hoc practices employed by project organisations in the context of developing country (Nigeria).

In Figure 1, project environment (community) reaction towards the relationship interface when not engaged properly is negative. This is exhibited as influences that impact project time. Project time performance factors in this study are the influences that impact timely delivery including, protest, disturbance, stoppage of work, resource flow and strike. Accordingly, a project is said to perform on time when these influences are decimated. To ensure the inhibitors of timely delivery are curbed, project organisations respond using certain management inputs (practices). This study focuses on exploring the impact of applicable management practices on project time performance. To advance knowledge on the effectiveness of interface management practices, this study validated developing practices' through hypothesis test. The hypothesis states that there is no significant correlation between interface management practice and project time performance. The hypothesis was validated using the critical p-value > 0.05.

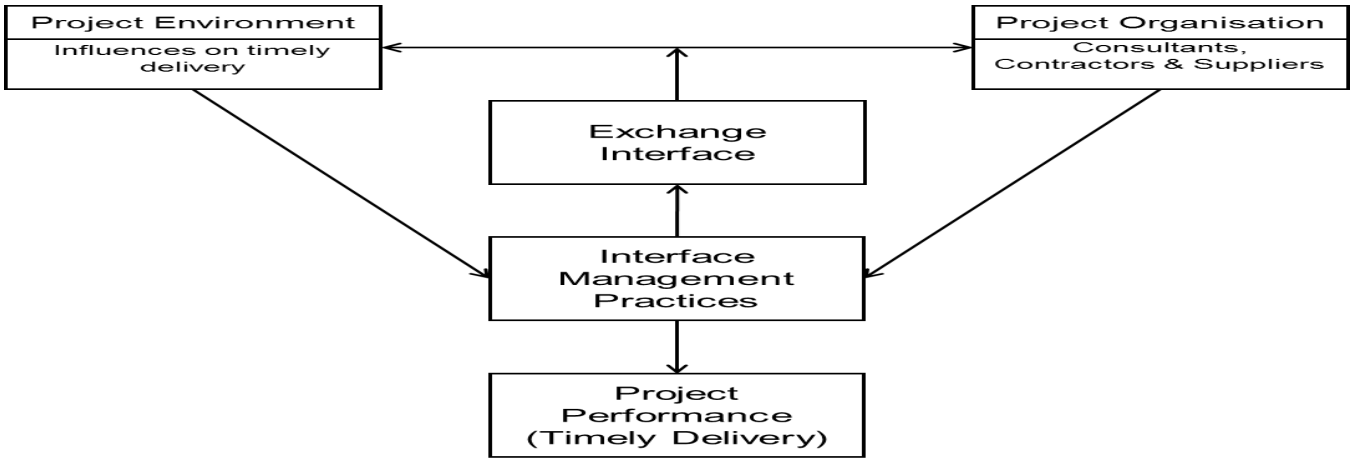


Figure 1: Conceptual Framework of the Study (Author's Mapping)

RESEARCH METHODOLOGY

Positivist data collection using mixed approach was employed in the study. The study utilised semi-structured interview and questionnaire survey to obtain relevant data. The sample frame is traditionally procured projects and their participants. Projects selected for the study were screened to satisfy the condition of dispersed location in order to convey various arrays of community (interface) characteristics. The study was conducted in two regions in South-East and South-East, Nigeria with focus on Imo and Akwa Ibom states respectively. These

regions are raven with community agitation arising from social emancipation pursuit for a sovereign state. The study's interest therefore is to examine how project organisations manage the eschewing interface problems to deliver on project objectives. Sixty six projects with 127 project participants were studied. The sample was determined after a preliminary inquiry, filtering and confirmation to have met the desired characteristics. Archives of projects executed in 2011 to 2015 under the states' public work authorities were examined. The participating firms were contacted; 156 key participants were identified but 29 have left their various organisations.

Ten interviews were conducted on personnel comprising project/construction managers and Directors. The interview focused on documenting the practices employed by their organisation for interface management. The generated practices were developed into questionnaire; administered on built environment professionals reached through self-administration. The respondents were required to give their perceptions about two measurements criteria. The first involved evaluation of the effectiveness of management practices in extenuating community negative influences on project time performance. The second determined the extent in which the practices promote construction project interface management efficiency. The value judgement was scaled using a 5-point Likert scale with 5=very high and 1=very low.

Scale validity and internal coherency of the study's constructs were conducted using Lee Cronbach's test (Bhattacherjee, 2012). After inter-correlation application, Cronbach' alpha of 0.81 was obtained. The calculated Alpha value is greater than 0.60 benchmark established by the literature (Pallant, 2010). This indicates that the scale is adequate, and that, the abstract concept adapted to measure interface management practices is suitable to address related problems in construction. Data analyses involved transcribing and grounded theory, mean item score and canonical correlation analysis. Mean item score was used to determine the degree of effectiveness of tools, level of use, and extent to which the tools optimises project time performance. The effectiveness of a practice is benchmarked at mean score 3.00 (Adewuji, Idoro & Ikpo, 2014). Canonical correlation was used to test the study's hypothesis. Canonical correlation analysis explored the correlational effect between multiple X and multiple Y (Garson, 2015). The canonical test statistic was used to determine the effect of thirteen management practices on five indicators of cooperation on time performance in the project studied. To satisfy canonical correlation criteria, the variables were presumed homogenous and normal (Bordens & Abbott, 2011).

RESULTS ANALYSIS AND DISCUSSION

Characteristics of Respondents

Fifty (50) valid questionnaires were retrieved from 127 administered. The response rate in the study is significant high (39.3%), largely due to specific project context studied. The interview personnel, respondents and project characteristics are presented in Figure I, II and III. Figure I depicts that half of the interviewee population were project managers in the respective projects; and construction managers and directors were averagely 25% each. Figure III indicates the projects consist of 18 health care facilities and 32 road projects. Both design-bid-build and direct labour procurement strategies were used to procure greater proportion the projects. Design-bid-build characteristically separates design, bidding and construction. In the direct labour category, individuals and not firms are appointed to execute the projects as 'Resource persons'. Both foreign and indigenous contracting firms were engaged in projects execution but indigenous firms dominate the sample. Within this category, 30% are national contractors and 70% local firms. Builders, project managers' architects, engineers and quantity surveyors participated in the study. Quantity surveyors and construction managers constitute 50% of the study sample. Over 80% have first and higher degrees; and higher national diploma holders constitute 20% of the study sample. Seventy percent (70%) of the sample respondents are registered (70%) and 30% others are probationers. Probationers refer to trained professionals awaiting registration. The respondents with years of experience approximated to 8 years and above are 75% and below 5 years 20%. Generally, the attributes of the sample respondents notably years of experience and education provide requisite yardstick for validating their perception on the subject of the study and based on stated data, this is adequate.

Interface Management Practices: Interviewees' Perspective

The interviewees validated 13 interface management practices. Some of the practices were framed using grounded theory that captures the interviewee's opinion. Grounded theory describes a process of classifying and categorising test data segments into a set of concept (Bhattacherjee, 2012). In response to 'what management practice do your organisation adopt in interface management'? The following framings were obtained:

> 'we deal cooperatively with them; my company create a channel of communication with them using mainly the liaison persons; we engage NGO(s); our human resource department takes charge; it is strictly top management affairs; the company retains their personnel from project to project; we involve other stakeholders in negotiation; we simply ensure that the community is consulted early in

the project; this is a normal risk management activity where contingencies are included; and we partner local suppliers and contractors at the community'.

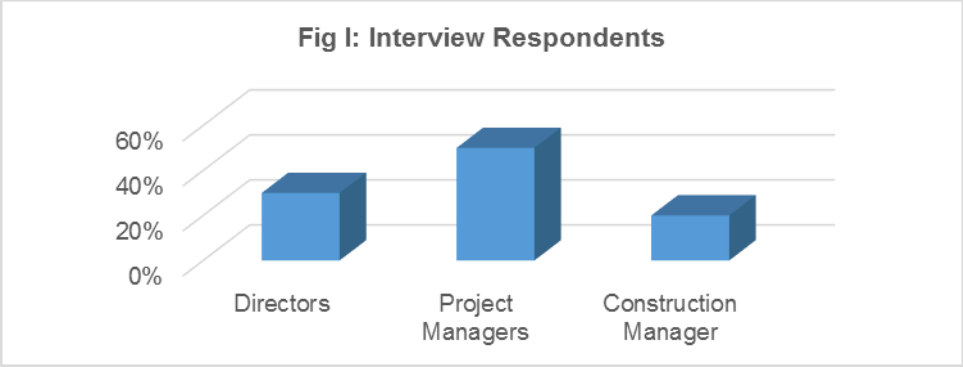
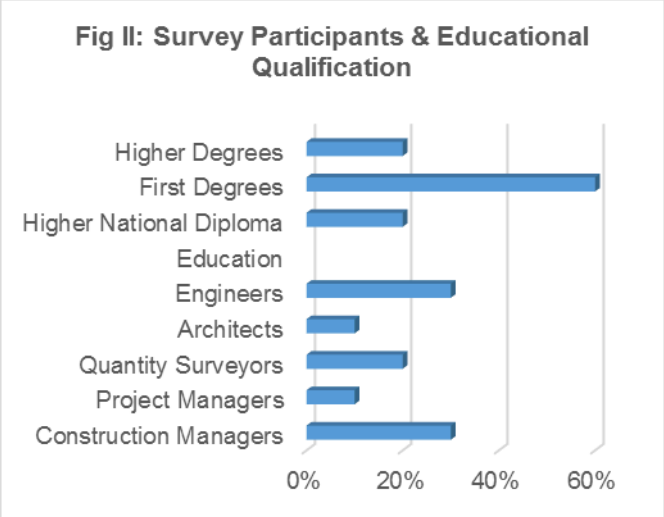


Figure I: Interview Respondents (Author Field Data)



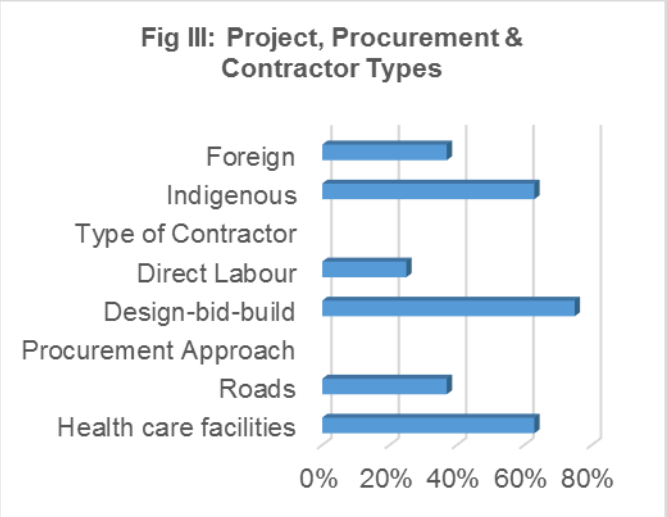


Figure II: Educational Qualification (Author Field Data) Figure III: Project Characteristics (Author Field Data)

Level of Use of Interface Management Practices

Figure IV presents the overall level of use of interface management practices in support of flowing project performance. The level of use of these practices was examined together with the number of projects involved. Creating communication channel using the liaison person is most popular (3.39; 1st). The practice was adopted in 18 projects. The reason for the popularity of this practice is predicated on the inability to engage the entire community in negotiation. Early community involvement in the project is also popular (3.41; 2nd). How early in the project, the community are involved in traditional procurement framework require further probe. Interface communication management is the 3rd popularly used interface management practice. Others include stakeholder management (4th); top management involvement (5th); maintaining key personnel in the organisation (6th); and risk management approach (7th). The least used practice is integrated project management (11th), partnering the supply chain (12th), and cooperative dealings (13th).

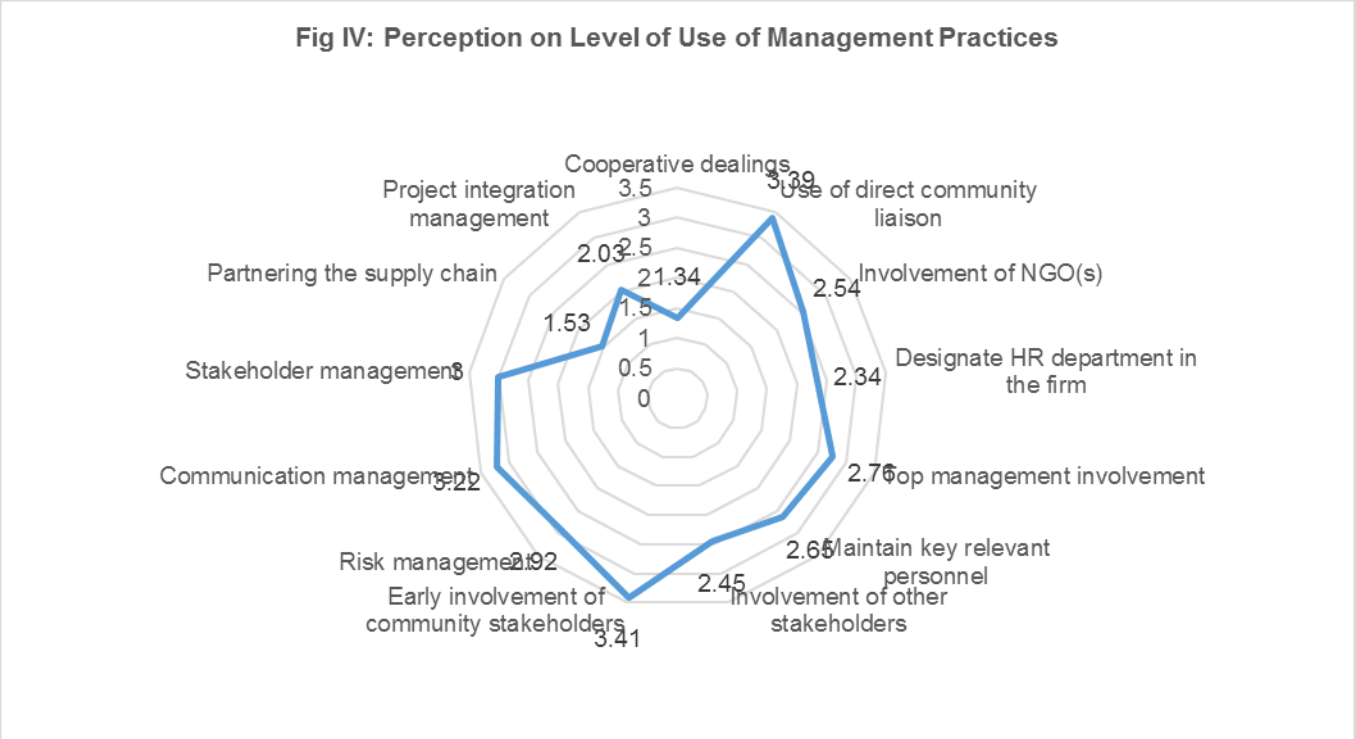


Figure IV: Level of Use of Interface Management Practices

Degree of Effectiveness of Interface Management Practices

However, the level of use of interface management practice does not translate to its degree of effectiveness except early involvement of the community (Figure V). Early involvement of the community is the most effective interface management practice and was rated first. The practice of involving 'other stakeholder' was rated second. In this approach, influential community figures mainly politicians are used in managing project interface. The use of liaison person is the 3rd most effective approach. This involves the appointment of community approved individual as 'community liaison officer' (CLO). This practice is very popular among contractors in road projects. Top management involvement is also effective but 4th in the hierarchy of effectiveness. The involvement of non-governmental organisations [NGO] is the fifth most popular management practice. The application of this approach is common in projects sponsored by multi-national agencies. Many organisations retain their key personnel (6th) from project to project and designate interface management roles to them. The perception which viewed interface management as risk management issue is common but less effective (12th). In this practice, provisions are made in the tender for community liaison. However, stakeholder management, integrated project practice, partnering the supply chain and cooperative dealings are less effective. The reasons are traceable to lack of diffused application of these tools in the research environment. The result is therefore attributed to the low knowledge of the tools.

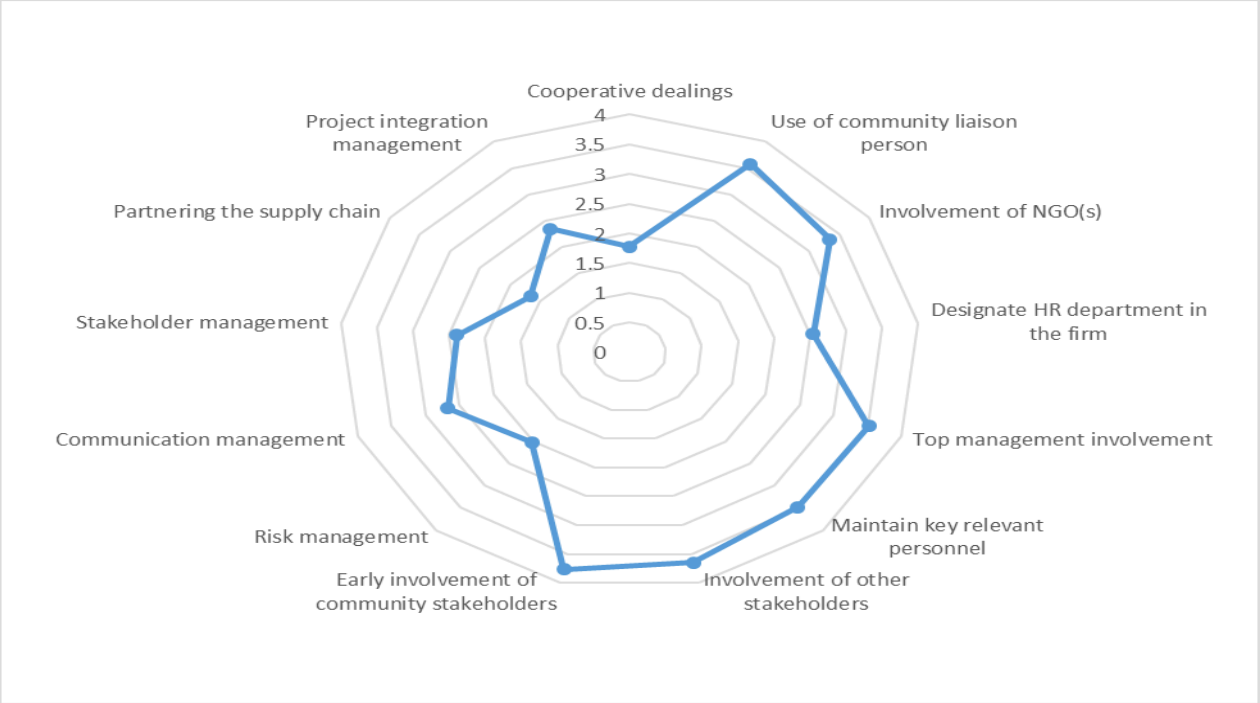


Figure V: Effectiveness of Interface Management Practices

Effectiveness of Interface Management Practices in Mitigating Community Influences

Table I presents results pertaining to respondents' perception of each practice's effectiveness in curbing negative community influences on time performance. The effectiveness of five most frequently used management practices (see Figure IV); and five roots generated by the hypothesis test (Table II) are presented. Each practice is evaluated against five indicators of cooperation that could impact time performance. Different practices obtained varying rating depending on aspect of community influence they most effective. The use of community liaison person is effective in decimating strike, stoppage of work, general disturbance, protest and opposition and is adequate to promote resource flow. Early community involvement support project time performance by extenuating protest, opposition, disturbance, and strike but cannot decimate strike. The implication portrays that strike related factors could be exogenous to project community interface failures. Effective communication management is effective in curbing all indicators of co-operation except disturbance. Sometimes, what the community need from project organisation is just information. The amount of information to disclose at a given time is determined by the firm. The quantum of information is regulated by opportunistic characteristics of the traditional procurement practice. Stakeholder management can eliminate all inhibitors of cooperation that impacts time performance. Stakeholder management advocates early community engagement, identifying them, mapping their interests and satisfying their needs. Top management involvement is ineffective and cannot guarantee total cooperation except decimating strike. However, the community can influence decision relating to workers' welfare notable craftsmen and unskilled labour.

Test of Hypothesis

The hypothesis test determined whether there is a significant positive correlation between construction project interface management practice and project time performance. The test statistics involved canonical correlation. The result is presented in Table II. The correlation analysis generates Wilk's Lamda value (F (48, 22.74) = 0.003, P = 0.257). The p-value is less than the critical p-value and insufficient variables are therefore generated to validate the null hypothesis. The hypothesis is therefore rejected; and the implication is that, there is a significant positive correlation between construction project interface management practice and project performance at 95% level of significance. The correlation co-efficient and Eigen value support the model adequacy (rejected hypothesis). The highest significance correlation value is 0.861; explained variation of 70.66%, and Eigen value of 10.353. These high values support the appropriateness of the rejected hypothesis. The validated interface management practices and project time performance are therefore positively correlated. The test of significance did not however entirely support the model adequacy. Thirteen interface management practices were tested but only five canonical roots were generated. The generated roots are organisation procedures seen in Table I. All five roots are however significant (F = 0.337, 0.629, 0.861, 0.958 and 0.902 > 0.005). Roots 1 to 5 (use of direct

community liaison, early involvement of the community, communication management, Stakeholder management, and top management involvement) have significant impact on project time performance.

Table I: Effectiveness of Management Practice on Community Level of Cooperation

S/N	Organisational Procedures	Indicators of Cooperation	MIS	Remark
1	Use of direct community liaison	Flow of resources	3.24	Effective
		Protest and opposition	3.18	Effective
		General disturbance	3.00	Effective
		Stoppage of work	3.16	Effective
		Strike	3.00	Effective
2	Early involvement of the community	Flow of resources	3.14	Effective
		Protest and opposition	3.23	Effective
		General disturbance	3.02	Effective
		Stoppage of work	2.85	Non-effective
		Strike	3.00	Effective
3	Communication management	Flow of resources	3.28	Effective
		Protest and opposition	2.98	Effective
		General disturbance	2.09	Non-effective
		Stoppage of work	3.01	Effective
		Strike	3.00	Effective
4	Stakeholder management	Flow of resources	3.34	Effective
		Protest and opposition	3.08	Effective
		General disturbance	3.12	Effective
		Stoppage of work	3.21	Effective
		Strike	3.16	Effective
5	Top management involvement	Flow of resources	2.87	Non-effective
		Protest and opposition	2.54	Non-effective
		General disturbance	2.24	Non-effective
		Stoppage of work	2.08	Non-effective
		Strike	3.20	Non-effective

MIS = Mean Item Score

Table II: Canonical Correlation Analysis Test

Multivariate Tests of Significance					
Test Name	**P -value**	**Appox. F**	**Hypoth. F**	**Error DF**	**Sig. of F**
Wilks	0.003	2.428	48	22.74	0.237
Eigenvalues and Canonical Correlations					
Root No	**Eigen Value**	**Pct.**	**Cum. Pct.**	**Canon. Cor**	**Sq. Cor**
1	10.353	70.659	70.659	0.861	0.741
2	3.661	12.952	83.634	0.808	0.652
3	2.875	9.230	92.865	0.708	0.501
4	1.999	6.000	98.870	0.641	0.410
5	0.326	1.154	100.00	0.321	0.103
Dimension Reduction Analysis					
Roots	**Wilks L.**	**F**	**Hypoth. DF**	**Error DF**	**Sig. of F**
1 to 5	0.003	1.216	48	23.74	0.337
2 to 5	0.024	0.882	35	23.46	0.629
3 to 5	0.126	0.643	24	22.14	0.861
4 to 5	0.367	0.478	15	19.73	0.958
5 to 5	0.850	0.320	8	16.00	0.902

Wilk's L. = Wilk's Lambda; F = F-value; Hypoth DF. = hypothesis Degree of Freedom; Error DF = Error Degree of Freedom; Sig. of F = Significance of F value; Cum. Pct. = Cumulative Percentage; Pct. = Percentage; Canon. Cor. = Canonical Correlation; Sq. Cor. = Square correlation

Discussion of Results

Five interface management practices are prevalent from the results of the study but four have gained widespread application in construction project environment examined. These include use of direct community liaison, early community involvement, communication management, stakeholder management, and top management. These sets of management practices are sub-sets of the generic 13 practices validated from the interview. However, because eight management practices have not gained wide adoption, their effectiveness to extenuate community opposition cannot be determined. The understanding suggests that limited empirical evidences exist to conclude

that, the eight management practices not validated in this study are at best, ineffective. Four other practices, obtained significant correlation with timely project delivery through decimation of protest and opposition, disturbance, stoppage, strike and promotes resource flow. However, top management involvement tends to polarise cooperation during the project's life cycle. The implication strengthens the need for collective engagement with the community at project delivery state. Firm's allocation of interface management role to parties outside the principal actors in the project execution could be counterproductive. Rather, involvement of all parties is advocated. Three of these approaches are well embedded in the construction management literatures including communication management, stakeholder management and top management involvement in the general construction management practice. Communication management when effective strengthens information flow. Extreme information confidentiality and non-disclosure are relevant conflict triggers in the project environment (Teo & Loosemore, 2012). The traditional project organisation is not conditioned to disclose information as may be needed by the community. This could be degraded by the extrinsic position of the community to the project contractual cycle. The firm's obligation to the community is only instrumental based on project impact on the locals and based on ethical responsibility consideration. The importance of communication at this level is generally recognised. Fearne and Fowler (2006) found that inability to integrate communication with adversarial and disjointed relationships in traditional project is responsible for holistic poor supply chain management. White and Marasini (2014) further buttressed that interface communication must be established early and at the onset. The loop of communication must as much as possible, be direct and consistent through the project life cycle (Fryer, 2004).

Two other approaches, the use of community liaison person and early community involvement requires a second look. First, the use of liaison person is not significantly embedded within construction management literatures. Secondly, there is need to determine an aspect of how early to engage the liaison person. The liaison person is a member of the community nominated for appointment by the project organisation as their representative. By this appointment, the liaison person otherwise referred to as the 'community liaison officer' is paid remuneration as other staff in the project organisation. The duty of the liaison person primarily is to ensure that community resources are engaged in the project. As the representative of the community, he also presents the needs and deviants of the community to the firm. The relationship between the firm and the liaison person must be cordial for a flowing time performance. Otherwise, deviant relationship can be exploited to the disadvantage of the firm. Cooke and Williams (2004) agreed that 'good liaison' must be instituted early in the project; and suggested that frequent co-ordination meetings could galvanised the interface. The emerging concern that project managers and other stakeholders must determine is how to ensure that, the liaison person does not abuse his authority. Dimension of adaptation is put forward. By adaptation, the firm may seek to embed the liaison person within the project organisational structure, preferably, at operational level. By so doing, his authority can be checked and the community given a better gesture of participation in the project implementation. Other practices are further discussed in the following sections.

Stakeholder Management: stakeholder management has been discussed in the relevant project management literatures. But emphasis is placed on primary stakeholders, that is, stakes with contractual capacity to the firm. Discussion on the nature and characteristics of community stakeholder is abysmal. To manage project-community interface effectively, the firm must identify, assess needs, map impact, and develop engagement plan (Olander, 2007).

Communication Management: interface management practice in the construction sector tends to focus more on this area. By this view, interface management is seen as a communication activity (Siao *et al*. 20011). The conventional perspective is faced with tracking problems. The problems is linked to the features of construction project notably complexity and non-standard method of production, tailored to meet specified needs. To benefit the community, refinement is required to transform the traditional project organisation to a hybrid type with flexibility.

Early Community Involvement: The context of early involvement is precarious based on the eschewing difficulties associated with defining how early is appropriate. The traditional project procurement practice characteristically engages the firm late in the project production chain. Whilst this practice requires innovation, early involvement is defined by the firm's first contact with the community. White and Marasini (2014) explored this context in traditional projects and found that continuity of project team from one stage to another is a critical parameter for success.

The four practices (early community involvement, use of community liaison person, communication management and stakeholder management practices) can be used interchangeably or in combination for maximum results. This awareness is possible by their significant correlation with project performance.

CONCLUSIONS

Managing construction interface in the project environment remains a front-end issue that determine construction project performance. The firm obligation to the stakeholder in the project environment is linked to the growing

impact of project on the locals and the ecosystem. In response to the community's negative influence on project performance, a number of interface management practices are adopted towards flowing project performance. This study evaluated the effectiveness of these management practices on project performance.

Four interface management practices are effective in support of timely project performance. These include early community involvement, use of community liaison person, communication management, and stakeholder management. The test of hypothesis established a significant positive correlation between these practices and project time performance. The project time performance in this context means interface management practices' is able to stimulate cooperation of community towards decimating delay related factors on the part of the community. Project time delay factors include opposition and protest, strike, general disturbance, stoppage and promotion of resource flow. The five management practices have differing levels of implications which the project manager must explore in decision-making. The study concludes that early community involvement, use of community liaison person, communication management and stakeholder management can improve project organisation and community interface performance. The study however recommends hybrid application of one or more validated interface management methods based on varying levels of performance.

The research targeted a defined problem and systematically documented procedure developed to answer the research question. This provides the depth for validating the study's result. However, decimation of eight variables (roots) in canonical correlation requires further investigations. The authors are of the opinion that increased sample size might generate data for obtaining these roots. The findings also throw-up research problem that requires further attention. It is necessary to explore the design of harmonised framework incorporating the four practices and validating factors influencing construction project interface management.

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