

Project Quality Management Performance: An Insight to Sustainable Development Initiatives in Oil and Gas Host Communities

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Abstract

A fundamental principle of project quality management is that quality is planned into project and not inspected through project. In the context of host communities in developing countries with mineral exploration activities construction projects and contracts generally is a key provider of employment in both short, medium and long term and particularly for the locals, therefore the incorporation of quality management systems in project life cycle is paramount for sustainable development. Ensuring project quality plays an important role in socio-economic development of people as it provides the most basic infrastructure that promotes economic activities. Quality management systems (QMS) has significant value relating to project quality and cost reduction and a comprehensive quality management culture can promote project success, mutual beneficial relationship and organisational sustainability. This study provides empirical findings emanating from local vendor(s) understanding, compliance and implementation of quality management systems in a multinational oil company (MNOC) community assisted projects. The study utilised SPSS version 22 for the statistical data analysis and Goodness-of-fit-test interrogated the assumption that contractors are not complying with quality management systems in project execution. The study found *inter alia* that 65% of the vendors are registered as closed corporation (sole proprietorship), 15% were limited liability companies, while 20% belong to other category such as subcontractors. Furthermore, 98% of the 222 respondent are yet to develop a quality manual and a conceptual nominated vendor system (NVS) project quality model was developed to improve the contract award and project management status quo, with emphasis on the need for integration of quality management systems in project life cycle for the oil and gas host communities.

Keywords: sustainable development, host communities, niger delta, nominated vendor system model, project quality management, quality management systems

1. Introduction

Most project participants have adopted different management practices for project execution targeted exclusively towards completion and commissioning without developing, managing and implementing quality management systems (QMS) (Othman, 2011, pp. 31-54; Ahmed, Aoieon, Tang, & Zheng, 2005, pp. 149-161; Xiao & Proverb, 2002, pp. 672-687) from the project initiation phase that will guide the development of clients' objectives towards improved service quality, faster project execution and innovations (Andrew & Lau-Tang, 2009, pp. 410-425; Low & Teo, 2004, pp. 8-15) and the quality management practices are designed to meet clients' views of quality, as well as, complying with specifications (Tang, Poon, Ahmed, & Wong, 2003; Tang, Ahmed, Aoieong, & Poon, 2005). Construction projects and contracts generally is a key provider of employment in both short, medium and long term and particularly in oil and gas host communities, therefore the incorporation of quality management systems in project life cycle is paramount for sustainable development.

Multinational oil companies (MNOC) has supported a number of community projects and entrepreneurship programs of various scale and design in their respective host communities in the Niger Delta of Nigeria; However, *inter alia* memorandum of understanding (MOU) and agreements has severely been neglected in most instances by some of the companies which has resulted in community protest leading to shutting down of oil and gas production facilities. In Egi host communities in Rivers State Niger Delta as contained in an agreement between Total Exploration and Production Nigeria (TEPNG) and Egi oil and gas landlord families, the host communities refers to communities such as Obagi, Ogbogu, Oboburu, Akabuka, Obite, Erema, Obiyebe, Akabta and Egita all in Ogba/Egbama/Ndoni Local Government Area of Rivers State (TEPNG & Landlords, 2012). However unlike in the past, this current agreement, implementation and monitoring structures has brought

relative peace in Egi Kingdom; it is also noteworthy that socio-economic engagement between the host communities and TEPNG including their vendors has also been sporadic and characterised by gross neglect for community project quality by some local vendors; thus contractors are not held accountable for poor quality projects by their respective communities including deviation from specifications; and this has led to unaccounted community funds, project failure and over budgeting in projects as in the case of Obite community where a community guest house project has been funded annually by TEPNG, yet remained uncompleted year-on-year, partly due to deviations from the original specification and insufficient knowledge of project quality management structures by some of the contractors, this trends can be linked to *inter alia* nomination of contractor(s) (Figure 1) which are mostly awarded on the grounds that vendors are indigenous or in the community leadership. These processes particular in Obite community that host the Liquefied Natural Gas (LNG) plant remains unabated, entrenched and normalised. Thus, leaving the entire Obite community in project quagmire and resource platykurtosis. In this paper the author developed a nominated vendor system (NVS) project quality model presented in (figure 2) and findings were based on the level of compliance to quality standards and project specifications from a quality management perspective; and recommendations were proffered on improving project quality in host communities in the area under research.

Quality management systems (QMS) has significant value relating to good project quality and cost reduction (Hiyassat, 2000, pp. 275-280; Holm, 2000, pp. 527-540) and a comprehensive quality management culture can promote project success, mutual beneficial relationship and organisational sustainability (Ogwueleka, 2011, pp. 343-349). Quality management principles and tools are critical requirements in project management practice (Hoxley, 2000, pp. 599-605; KimWanSiu, Bridge, & Skitmore, 2001, pp. 719-726) to comprehensively accommodate the variability in project execution, and may result in frequent variation requisition (Aiyetan, 2014, pp. 755-769) when it is not institutionalised. In the context of this study, the author defines nominated vendor system (NVS) *as a contract awarding system in host community agreement-based projects that provide a concise project quality management model for stakeholders in contract award and project management*. While the NVS may be a partial solution to growing trends of project failure and scope variations in host communities, it serves as a conceptual framework for project donors and promotes stakeholders taking responsibility for the execution of projects in their respective domain.

The model thus acknowledges the paramount need for beneficiaries of the contract nomination award process to establish an integrated quality management systems as a core foundation for project quality and sustainable development. A project completion should however not warrant the issuance of a job completion certificate and subsequent commissioning of the project by donors, thus the fact that a project is seen as completed onsite, does not necessarily constitute a quality project. It is a continuous process that should have started and end with the project. In the light of this, the study accessed the understanding, development and implementation of project quality management systems (PQMS) in the execution of community projects in some host communities in Niger Delta, Nigeria; because regardless of the clamour for resource control, marginalisation and consequent insecurity in the Niger Delta oil and gas sector; there are also significant infrastructural and human capital development in the region and Nigeria in general, but adherence to quality management principles is conspicuously lacking in most instances that results in project failure and specification variations. The word vendors and contractors are interchangeably used in this study.

1.1 Host Communities Project Award Status Quo

The oil and gas host communities in Egi kingdom has MOU and agreement with TEPENG (TEPNG & Landlords, 2012) that made provision for “Development envelope” also known as envelope money (Table 1), which is an amount of money allocated for the purpose of socio-economic and infrastructural development of host families and communities; in distributing the envelope money, projects are nominated by the communities and the names of companies or person(s) to execute the project are also nominated. Thereafter, TEPNG will share the job among the nominees within the allocated budget for each community. The challenge with this procedure is that:

- 1) The process does not promote competitive tendering that allow TEPNG to select preferred bidders based on competence.
- 2) It does not provide a platform to access *constructability* which is referred to as a project management technique that involves the integration of construction knowledge and experience in planning, procurement, engineering management and field operations in project execution (Connor & Tucker, 1986, pp. 281-290; Pocock, Kuennen, Gambatese, & Rauschkolb, 2006, pp. 373-383; IPENZ, 2008; Saghatforoush et al., 2009, pp. 518-532; Radosavljevic & Bennett, 2012) that entails optimisation of different project constraints in meeting the

primary objectives (Trigunarsyah, 2004, pp. 567-580; Arditi, Elhassan, & Toklu, 2002, pp. 117-126; Jergeas & Vander-Put, 2001, pp. 281-290).

3) The nomination process does not also promote adherence to statutory project quality and specification, and consequently quality and reliability may be compromised.

This study is about improving project quality and quality management systems in oil and gas host communities in Egi kingdom; other issues such as constructability, tendering processes, and adherence to statutory regulations are not within the ambit of this research; therefore are excluded. In the light of the aforementioned project award status, the author investigated the following research questions:

- 1) What is the level of quality management awareness of local vendors in Egi host communities?
- 2) How does vendors in Egi host communities implement project quality management systems in community projects? and
- 3) To what extent does local vendors in Egi host communities comply with quality standards?

Table 1. Envelope money for Egi host communities

S/No	Host communities	Development Envelope in (million) Nigeria Naira per year				
		2012	2013	2014	2015	2016
1	Obagi	N98.75m	N100m	N100m	N100m	N100m
2	Ogbogu	N98.75m	N100m	N100m	N100m	N100m
3	Oboburu	N68.75m	N70m	N70m	N70m	N70m
4	Akabuka	N68.75m	N70m	N70m	N70m	N70m
5	Obite	N68.75m	N70m	N70m	N70m	N70m
6	Erema	N30m	N32m	N32m	N32m	N32m
7	Obiyebe	N23m	N25m	N25m	N25m	N25m
8	Akabta	N7.50m	N8m	N8m	N8m	N8m
9	Egita	N12m	N15m	N15m	N15m	N15m
Total amount per year combined		N476.25m	N490m	N490m	N490m	N490m

Source: (TEPENG & Landlords, 2012).

In order to address the stated questions, research objectives were provided that seeks:

- 1) To establish the level of awareness of local vendors, with regards to project quality management systems;
- 2) To find out whether or not the vendors are implementing quality management systems in project execution; and
- 3) To also determine compliance level of quality standards by local vendors in Egi host communities.

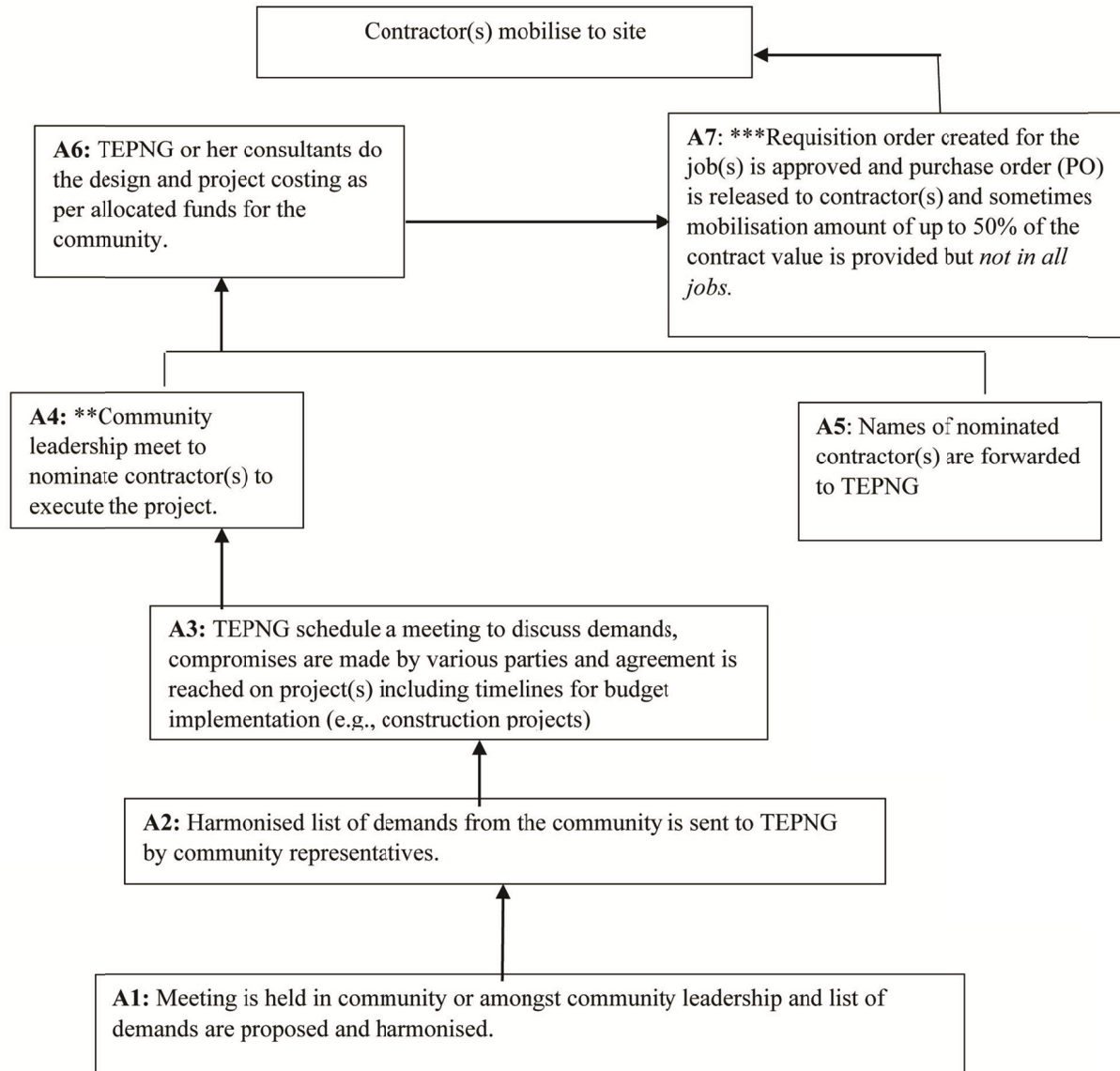


Figure 1. Nomination of contractors' and contract award procedures in oil and gas host communities

Source: Author's field survey 2015.

Note. ** The community leadership in this context are usually made up of the traditional rulers, chiefs, members of the Community Development Committee (CDC), although these structures varies from each communities. Depending on the community structure sometimes any person deemed as elite either by virtue of class (with political or economic resources) including the level of academic prowess and influence in the society could become part of the community leadership, and in some cases the youth associations leaders and the women group leaders also forms part of the leadership that decides project(s). The list of contract(s) that often originates amongst these community leaders are thereafter sent to the company and the project amount allocated to the community for the year are distributed in various Purchase Order (PO) accordingly. *** It is important to note that the procedures presented in figure 1 does not in any way represent TEPNG's contract award processes, it only highlight the processes followed when contractors are "nominated by the host communities".

2. Research Hypothesis

Within the scope of this study, the following hypothesis were formulated to guide the research:

Hypothesis

H₀: There are compliance of quality management systems in project execution among contractors in Egi host communities.

H_a: There are non-compliance of quality management systems in project execution among contractors in Egi host communities.

3. Literature Review

3.1 Introduction

In recent past, quality management has gradually appeared in the construction reliability and project management literature but remains insufficient, as the word “quality” seem to be more dominant in the production of goods; and the service sector. The studies of (Hoxley, 2000, pp. 527-540; Love, Smith, Treloar, & Li, 2000, pp. 191-201; Tabish & Kumar, 2011, pp. 809-823) remain significant based on the background of the research problem earlier stated, and they respectively investigated whether quality management systems was a determining factor when evaluating project tenders; while (KimWanSiu, Bridge, & Skitmore, 2001) assessed the service quality of building maintenance providers from a maintenance service perspective.

The definition of quality as stated by Hellard (1995) from the construction project perspective justifies the rationale of this study. According to Hellard (1995), *Until total quality of the end project, the building or structure, is delivered to its owner/sponsor (meaning functional and aesthetic requirements fulfilled within approved cost and time) the whole quality movement, quality inspection (QI), quality control (QC), quality assurance (QA), Total Quality Management (TQM), or whatever, means nothing and adds no real value to the construction industry's purpose.* Quality can be achieved based on the completeness of quality in project and product life cycle with zero defects (Crosby, 1994), though Crosby seems to be referring to the production sector; however, quality management principles and tools are also critical requirements in modern project management practice (Asford, 2000; Barber et al., 2000, pp. 479-492; Joaquin, Hernandez, & Aspinwall, 2008, pp. 1013-1028) this is aimed at integrating concisely the variability in projects relative to the dynamics of various stakeholders' interest (Gray & Larson, 2000) as the lack thereof tantamount frequent specification variations (Aiyetan, 2014, pp. 755-769) and rework is thus accepted as an inevitable characteristics of the project processes. With regards to the objectives of this study, literature dealing with project management dynamics and identification, including quality management systems implementation in project life cycle, were further researched and presented.

3.2 Project Management Dynamics and Identification

The project management by nature is dynamic and varies significantly between projects (Gray & Larson, 2000) thus requires the participation of interdisciplinary team to achieve the project objective (Gido & Clement, 2003). Infrastructural construction activities would involve time, conceptualising, designing, managing, funding, organising and coordinating project requirements, which must be harmonised in the most efficient manner that will facilitate the completion of projects on schedule, and within estimated budget (Love, 2002, pp. 138-146); in accordance to the quality requirement and performance. Project identification usually require an understanding of client expectations, objectives of project and the project specifications (White & Fortune, 2002, pp. 1-11; Wirick, 2009; Zhang, 2005, pp. 3-14) thereafter contractors must work to meet these expectations; thus must consider the strategic and operational alignment of projects (Larson, 1995, pp. 30-35; Li, Cheng, Love, & Irani, 2001, pp. 171-179). Strategic alignment implies that the potential project will contribute more than competing alternatives to the organisation's strategic objectives such as market leadership through product or service differentiation (Milosevic & Srivannaboon, 2006; Lam, Chua, Loh, & Jaselskis, 1999, pp. 351-359; Larson, 1995, pp. 30-35); Operational alignment on the other hand means that customer needs and wants, remains the principal priority throughout the project life cycle (Kerzner, 2013). It further implies that salient issues such as trade-offs of scope, cost and schedule should be openly discussed and resolved by stakeholders (Jugdev & Muller, 2005, pp. 19-31). Therefore any failure to actualise the strategic and operational alignment will most times result in project risk increase and decline in project quality (Cooke-Davies, Crawford, & Lechler, 2009, pp. 110-123).

3.3 Quality Management Systems Implementation in Project Life Cycle

Quality management when considering project management is the process that ensures that all project activities necessary to design, plan and implement a project are effective (Kloppenborg & Petrick, 2004, pp. 63-68; Thorpe & Sunner, 2005; Holt & Rowe, 2000, pp. 541-553) and project efficiency with regards to the objective and performance of the project was articulated (Husin, Adnan, & Jusoff, 2008, pp. 41-47). Project quality management (PQM) is not an isolated, independent process (Jha & Iyer, 2006, pp. 1155-1170) that occurs at the end of an activity to measure the level of quality of the output (Ogwueleka, 2011; Leonard, 2008, pp. 101-110). Quality management seeks to prevent and avoid than measuring and fixing poor quality outputs (Ogwueleka & Mendie, 2014, pp. 826-843) and must be an integral part of every project management processes from the moment the project is initiated to the final stages involving project completion and commissioning (PMI, 2000; PMBOK, 2012; Tang, Qiang, Duffield, Young, & Lu, 2009, pp. 129-141). All these studies provide greater insight into specific applications and benefits of quality management standards in project management, thus

significantly resonate into theoretical findings that were harnessed in this study. The entire literature review serves to advance the debate about integrating quality management in nominated vendor systems (NVS) in oil and gas host community projects.

4. Research Methodology

This study was conducted in Rivers State, Nigeria, on the grounds that the local vendors are either based in Egi Kingdom or have their offices located in Rivers state. Data for the study were collected through interviews and distribution of two hundred and twenty-two (222) questionnaire which were administered by means of random sampling comprising contractors of various categories in the area under research. The choice of the respondents was on the basis that they were involved throughout the various stages of contracts and registered as contractors with TEPNG, therefore are most suitable to providing insight into quality management of contract execution in Egi host communities in Rivers State. The first section of the questionnaire consisted of demographics of the respondents, including company registration profile (Table 2), and Figure 3 provided the types of companies; quality standards and statutory certification of the companies was presented in (Table 3); while (Table 4) gave an insight on types of contracts executed. The second section focused on the primary objectives of the study; project quality management statements that have direct impact on project quality and reliability were extrapolated from ISO 9001 family of standards and rated based on the level of awareness, implementation and compliance of quality management systems. The data collected were analysed using statistical package for social sciences (SPSS) software version 22 to provide descriptive statistics. The hypothesis were tested using Goodness-of-fit-test and a summarised computation of the test results are shown in (Table 5). A goodness-of-fit-test is a statistical test that usually describes how well response variables fits into various set of observations and assumptions (Yuan, 2005, pp. 115-148; Maydeu & Joe, 2006, pp. 713-732) and the test summarises the discrepancy between observed values and the values expected under a statistical model with known sampling distributions (MacCallum, Browne, & Cai, 2006, pp. 19-35).

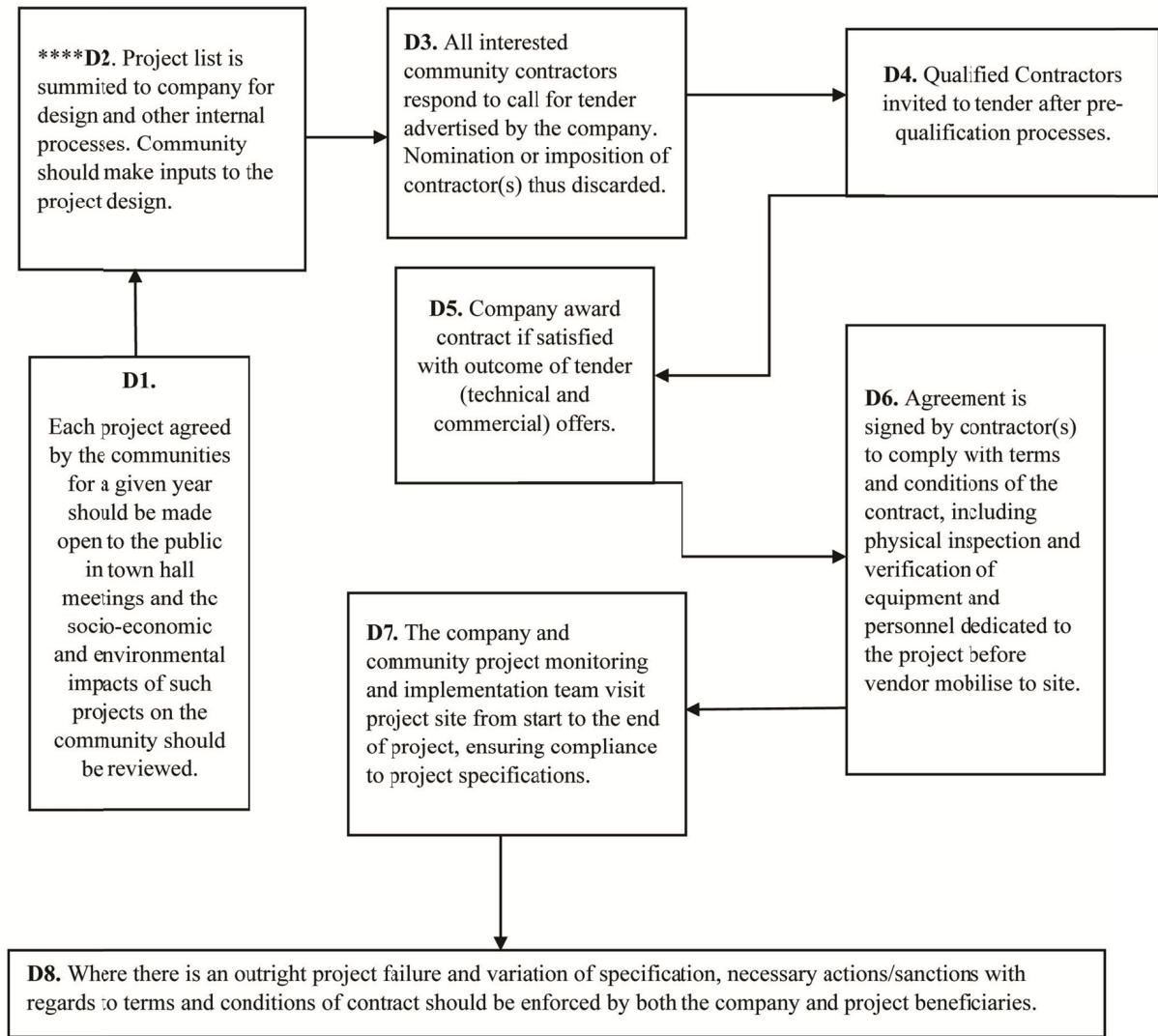


Figure 2. Nominated vendor system (NVS) project quality management model. Source: Author’s conceptual framework

Note. **** The former process (A6 in figure 1) was that community leadership submit list of project and not be involved in the project design and whatever project design the company provides is acceptable, the major interest is who gets tender and wins the contract that are mostly driven by the epistemology of prebendalism. Even in isolated cases where some individual are privy to such project designs, there has not been any known case available to the author where a community ask collectively in a town hall meeting to see or possibly review the project design of their respective communities before sharing the “purchase order” or respond to call for tender. Therefore D8 encourages community participation *inter alia* in making inputs and reviewing of project design before call for tender.

5. Findings

Table 2. Company registration profile

Company Registration type	Frequency	Percentage
Closed corporation sole proprietor	145	65.32
Limited Liability	33	14.86
Others	44	19.82
Total	222	100

Source: Author’s field survey 2015.

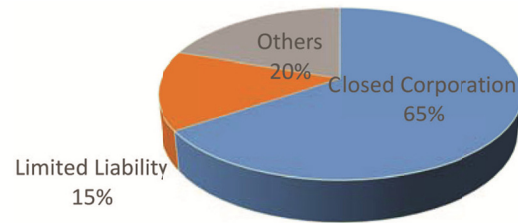


Figure 3. Types of companies in Egi host communities

Source: Author's field survey 2015.

Table 3. Number of times the word quality management appeared in company profile of respondents

Quality word in company profile booklet	Frequency	Percentages
ISO:9000 Quality Management Systems (QMS)	1	0.45
Total Quality Management (TQM)	1	0.45
Others	2	0.90
None	218	98.19
Total	222	100

Source: Author's field survey 2015.

Table 4. Types of contract executed

Projects executed	Contractors	Percentages
Procurement	3	1.35
Maintenance	7	3.15
General contract	212	95.40
Total	222	100

Source: Author's field survey 2015.

Table 5. A summarised computation of contractors' Goodness-of-fit test

Company Type	QMS; Compliance and Implementation (Goodness-of-fit test).		Total
	Yes	No	
Limited Liability	$E_{1,1} = 14(9.51)$	$E_{1,2} = 19(23.49)$	33
Others	$E_{2,1} = 17(12.68)$	$E_{2,2} = 27(31.32)$	44
Closed Corporation	$E_{3,1} = 33(41.80)$	$E_{3,2} = 112(103.19)$	145
Total	64	158	222

Source: Author's field survey 2015.

$$X^2 = 2.12 + 0.86 + 1.47 + 0.59 + 1.85 + 0.75 = 7.64$$

$$X_0^2 = 5.991$$

$$DF = 2; \alpha = 0.05$$

Test hypothesis

H_0 : There are compliance of quality management systems in project execution among contractors in Egi host communities.

H_a : There are non-compliance of quality management systems in project execution among contractors in Egi host communities.

6. Discussion

Since the chi-square test $X^2 = 7.64$ lies in the rejection region, the null hypothesis is therefore rejected; this implies that there is sufficient statistical evidence to accept the alternative hypothesis which states that there are non-compliance of quality management systems in project execution among contractors in Egi host communities. When the project management trends in the area under research were investigated, it became obvious that

integrating quality culture in project management will increase the performance, excellence and competitiveness of contractors; however, the combined leverage of quality and project management is most times under-utilised partly due to inadequate experience in both fields, scheduling challenges and administrative constraints. In the study 145 contractors are registered as closed corporation (sole proprietor), this indicate that most business representing 65% are run by an individual, quality manual and clearly articulated quality policy were not found in the profile reviewed; 33 contractors representing 20% are limited liability companies with directors, however some companies in this set also follow the same trend as the closed corporation with regards to quality manual; while 15% representing other categories are individuals that are doing businesses in the area under research but uses their personal names or executing contracts as sub-contractors. Generally, there is a strong entrepreneurial drive amongst locals in the area under research, as 95% of the local vendor were involved in general contracts, which also implies that they are adjudged to meeting the minimum required competence to execute varying job scope ranging from inter alia mechanical, electrical, and civil engineering projects; which in the author's view could be greatly optimised when the broader spectrum of quality management systems becomes their organisational culture.

7. Conclusion and Recommendations

This study provides empirical findings emanating from local vendor understanding, compliance and implementation of quality management systems in community projects. It also provided an insight for development and identification of best practices in project execution in oil and gas host communities. Such best practice guidelines presented in this paper should eventually lead to project quality framework and operating procedures for infrastructural projects contract awards in host communities. Ensuring project quality plays an important role in economic and social development of people; as it provides the most basic infrastructure that promotes economic activities. Construction projects and contracts generally is a key provider of employment in both short, medium and long term and particularly in oil and gas host communities, therefore the incorporation of quality management systems is paramount for sustainable development. Project success must be accomplished without cost overrun and contractors quality management principles has a significant role to play in the outcome of any project (Boynton & Zmud, 1984, pp. 17-27; Nguyen, Ogunlana, & Lan, 2004, pp. 404-413). Contractors in host communities should appreciate the importance of quality and what it entails in the project life cycle, including the expectations of the project donors. Particularly, outlining what the quality standards of the contracting companies are, with regards to the project specification (Toor & Ogunlana, 2009, pp. 149-167).

Quality planning: There should be quality manual and a clearly defined quality policy for every vendor seeking to have a competitive advantage. The quality policy of the various vendor can follow the widely recognised quality standards like the ISO 9000 family of standards or Total Quality Management (TQM), or it may have its tailored approach that meet the quest for quality (Terziovski, Samson, & Dow, 1997, pp. 1-18; owell, 1995, pp. 15-37; Oakland, 2003; Kerzner, 2013). The quality policy of companies serves as a guide to the project implementation (Dale, Van Der Wiele, & Van Iwaarden, 2013) and ensures that the management of the project and the output of the project are consistent with the quality framework (Jung & Wang, 2006, pp. 716-22). The planning processes must include that the person responsible for the coordination of the project understands and able to identify the planning requirements, determine how these requirements can be achieved, including the costs and time demands to meet the identified requirements (PMBOK, 2012; Orwig & Brennan, 2000, pp. 351-363).

A fundamental principle of project quality management is that quality is planned into the project, not inspected through (PMBOK, 2012) because planning for quality is considered cost-effective while inspecting work results in rework and rectifying other variations to conform to quality standards increases project cost (Rose, 2005). Every vendor should always bear in mind the cost of achieving the expected level of quality against the cost of non-conformance; as the cost of non-conformance can be more than the cost of quality, which include amongst others, loss of client, rework, and waste of materials. Quality cost usually includes safety measures, training and various processes that are in place to prevent poor quality. As nomination of contractors for projects has been entrenched and normalised in oil and gas host communities under research, the author argues that by integrating project quality management systems in agreements and MOU's as part of a service orientation and commitments, not only will projects quality be improved for sustainable development but the local vendors in Egi kingdom will also be better positioned to competing favourably for projects and services beyond their immediate communities because they would have set a benchmark that other community contractors in Niger Delta would strive to achieve.

Limitations and suggestions for future research: Conducting a field research in location such as the Niger Delta comes with extraordinary challenges. The challenges would *inter alia* be security and suspicion by locals

that the researcher(s) has been sponsored to conduct study, including the unwillingness of the participants to engage in studies that are self-sponsored like this type of study because it is very unusual. Generally, the locals are more interested in participating in survey that are promoted by multinational oil companies (MNO), international donor organisations and the government. The unwillingness of the MNO workers to participate in the study for fear of losing their jobs is understandable, however, it also remains interesting even when findings and recommendation seeks to improve the project quality management status quo of their host communities, thus the study took longer than the author had anticipated due to these challenges. Against these backdrop, future research should look at studying the rational for the outlaw of tender processes and project failure tolerance by host communities, particularly in Obite community that regularly receive funding for a failed guest house project that is situated along Egita Road; and the company's interest in the continues funding of such project is also worth researching for the interest of sustainable development. The quality standards that are used by project donors to evaluate vendors in contract awards in host communities, including criteria for monitoring, evaluation and implementation of agreements and MOU(s) should also be subject of interest for future research. Nonetheless, this study is contextual, therefore the results and findings presented cannot in any way be generalised.

8. Significance of the study

There are currently lack of empirical research that investigated the link between quality management implementation and improvement of project management performance in the Niger Delta oil and gas host communities. Most literature on Niger Delta are concerned with political issues, insecurity, environmental pollution, human rights violation and other similar challenges that make headlines and those that attract international attention. However, in the mist of these challenges that has engulfed the region, the Niger Delta people continue to make giant strides in various endeavours such as entrepreneurship and there are also infrastructural and human capital development projects going on in various oil and gas host communities. This study explored project quality management and identified that some local vendors in the area researched are involved in various community projects but they have to incorporate quality management systems in order to ensure project quality, reliability and sustainable development. This research stands out as it brings a different perspective to project management in the Niger Delta and further proffers a nominated vendor system (NVS) project quality model for policy makers in the implementation of project agreements and MOU's in the oil and gas host communities studied.

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