

Involvement of Quantity Surveyors in Oil and Gas Projects in Nigeria

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Abstract: Oil and gas projects worldwide are highly capital intensive. In Nigeria, these projects are executed at very high cost. Their execution hence requires the involvement of Quantity Surveyors whose role is the provision of value for money through effective project cost control and management. However, the general belief among Engineering consultants in Nigeria is that Quantity Surveyors are more relevant in the cost management of building rather than engineering projects. This notion has affected the participation of Quantity Surveyors in oil and gas projects in Nigeria. This study hence assessed the involvement of Quantity Surveyors in oil and gas projects in Nigeria, the influence factors and the services provide. Data on involvement and influence factors were collected from 25 out of 65 established Quantity Surveying firms, while data on the services rendered were collected from 16 out of the 31 oil and gas companies operating in Nigeria. The data were analysed using Mean Score, Standard Deviation and ANOVA. Findings from the study indicated that the involvement of Quantity Surveyors in oil and gas projects in the study area was very low mainly due to professional rivalry and expatriate domination. Moreover, they are used more for pre-contract than for post-contract services.

Keywords: Involvement, Nigeria, Oil and Gas, Projects, Quantity Surveyors

I. Introduction

The Nigerian economy has witnessed dramatic transformation since the discovery and exploitation of oil fields in 1956 [1]. The oil and gas industry plays a dominant role in the Nigerian economy accounting for more than 95% of her export earnings, as well as contributing not less than 13.8% to her gross domestic product GDP [2]. The sector is capital intensive comprising three major sub-sectors: the upstream, midstream and the downstream [3]. The upstream sector is characterised by the exploration and exploitation of oil fields, the midstream sector comprise the production and storage of petroleum products while the downstream sector involves transportation, distribution and marketing services among others [4].

The Construction Design and Management Regulations [5] defined construction projects to

include building, civil engineering and industrial engineering works. This implies that oil and gas projects, which are largely industrial process facilities, fall under the category of construction projects. By nature, oil and gas projects are high capital projects which require the involvement of Quantity Surveyors to enhance their value for money. [6] opined that the Quantity Surveyor is a financial expert in all matters of cost of construction projects whose aim is to achieve value for money from the inception of a project to completion. However, [7] opined that quantity surveying is more related to building than engineering construction projects. This notion has greatly affected the involvement of Quantity Surveyors in oil and gas projects in Nigeria. However, [8] observed that Quantity Surveying firms need to improve in the area of non-building service delivery. Similarly, [4] noted that the services of Quantity Surveyors have not been maximised in civil and heavy engineering projects like oil and gas, in Nigeria.

In fact, the author claimed that there are only scanty records of the participation of Quantity Surveyors in oil and gas projects in Nigeria. Some of the reasons adduced to be responsible for this include external threats from other professionals, lack of publicity and ignorance of global best practices.

[9] attributed the high cost of procuring civil and heavy engineering projects in Nigeria to the low involvement of Quantity Surveyors. However, [4] observed that the high capital intensity of most oil and gas projects makes it imperative for Quantity Surveyors to be thoroughly trained and given the chance to handle these projects. The foregoing necessitated an enquiry into the involvement of Quantity Surveyors, the influencing factors and the services they provide in oil and gas projects in Lagos State, Nigeria. Lagos State was selected for the study because most of the well established Quantity Surveying firms and oil and gas companies in Nigeria either have their head or branch offices in the State. This afforded access to robust data upon which meaningful findings could be based to enhance the involvement of Quantity Surveyors in oil and gas projects in the study area.

Involvement of quantity surveyors in oil and gas projects

A number of authors have documented the involvement of Quantity Surveyors in oil and gas projects in the construction literature. These include [10], [11], [9], [12] and [4]. [10] was an opinion paper on the required competencies of Quantity Surveyors for effective participation in the oil and gas industry. The author reported that to enhance the participation of Nigerians in the industry, the Nigerian Oil and Gas Industry Content Development (NOGICD) Act was

enacted in 2010. However, the author opined that domination by expatriates is the major challenge inhibiting the participation of Quantity Surveyors in the industry. To participate effectively in the industry, [10] noted that Quantity Surveyors need to understand the overall project life cycle and the activities performed at each stage of the life cycle. This is because one cannot cost, schedule or procure what one does not know or understand.

[11] reviewed the costing of oil and gas projects for efficient management and sustainability. The paper observed that Quantity Surveyors do not show much interest in the cost management of operations in oil and gas projects compared to Cost Engineers in the developed countries. The author claimed that there was no clear evidence of project cost management practice in the Nigerian oil and gas industry. The paper opined that if the QS's expertise in cost estimating, cost planning, cost control and management are properly harnessed in the execution of oil and gas projects, the incidence of high cost and cost overruns would be mitigated which could lead to the socio-economic enhancement of citizens.

[9] blamed the high cost of civil and heavy engineering projects in Nigeria on the non-involvement of Quantity Surveyors and the use of the Bill of Engineering Measurement and Evaluation (BEME) by Engineers for procuring engineering projects. The paper recommended the establishment of the Directorate of Budget and Economic Planning to be headed by Quantity Surveyors in the three tiers (Local State and Federal) of government in Nigeria. [9] added that the domineering attitude of Engineers and their use of BEME, a document that is not globally recognised, as a procurement

document restricts the involvement of Quantity Surveyors in engineering projects in Nigeria.

[12] assessed the participation of Quantity Surveyors in oil and gas projects in Nigeria with a view to ascertaining the level of involvement, the services rendered and the factors influencing their involvement. The paper observed that the services QSs provide in oil and gas projects have shifted from downstream to upstream. The paper reported that the participation of Quantity Surveyors in oil and gas projects in Lagos State, Nigeria was on the average due to inadequate skill and professional rivalry. The paper also concluded that the QSs operate more as a cost engineer and total cost manager in oil and gas projects instead of performing the traditional core functions. [12] identified three prevalent factors preventing Quantity Surveyors from being involved in oil and gas projects in Nigeria. These are inadequate technical knowledge or skills, deficient educational curriculum of tertiary institutions, and inter-professional rivalries.

[4] investigated the dilemma of civil and heavy engineering project delivery when QSs are not used. The paper claimed that the benefits of QSs have not been maximised in engineering projects in Nigeria despite the fact that they are the cost experts in the construction industry. However, the paper is of the opinion that QSs, by their training and experience, can deliver value for money to clients on all project types. The paper concluded that heavy engineering projects executed in Nigeria overrun their costs because QSs are not adequately involved. The factors responsible for this are identified to include the external threats from other professionals, especially engineers who hold the notion that Quantity Surveyors are not skilled enough to handle engineering projects. The

others are lack of publicity and ignorance of global best practices. The paper recommended the creation of a Directorate of Budget and Economic Planning at all levels of government to be headed by QSs.

Other studies like [13], [14] and [8] appear to be tangential to the subject matter under investigation. Opawole et al. (2012) reviewed the correlation of QSs' education in Nigeria to the skills required for the administration of civil and heavy engineering projects. The paper opined that Quantity Surveyors are fully appreciated in building engineering construction but have a low level of appreciation for other engineering projects probably because of the young age of the profession in Nigeria. [14] investigated the Nigerian QS in an emerging market and reported that QSs are up to date in the duties required from them in emerging markets. [8] studied the trend in Nigerian Quantity Surveying consulting practices. The paper concluded that QSs need to improve on their services in non-building sectors as well as on the use of computer software packages.

From the above review of extant literature, there seems to be paucity of empirical studies on the involvement of QSs in oil and gas projects in construction literature. The few available ones either seem to be limited in scope, methodology or both. For instance, [12] is limited in methodology. The study sampled QSs from only 30 oil and gas companies and 15 QSs from Quantity Surveying firms as respondents as against a sample of 25 and 55 QSs, respectively in this study. Regarding the level of involvement of QSs, the paper did not indicate the results on the basis of the three sub-sectors of the oil and gas industry, namely downstream, midstream and upstream as done in this paper. Similarly, some of the

recommendations of the paper contain new materials which did not come from the results. For instance, the establishment of regulatory bodies to enforce professional roles in oil and gas projects and the publication of books and journals were not investigated and can certainly not be from the results of that study. Consequently, this study became necessary.

longitudinal survey. The first set of data were collected from a random sample of 40 out of **Duties of Quantity Surveyors in the Oil and Gas Sector**

Regarding the duties Quantity Surveyors perform in the oil and gas sector, there is a paucity of publications available in construction literature including [15], [10], [11] and [12]. These duties are summarized in Table 1 below

Table 1: Summary of Services provided by QSFs in the Oil and Gas Sector

S/No.	Services provided by QSFs in the Oil and Gas Sector	Author(s)
1	Cost Estimation	Ajator, 2014; Hanid et al., 2007; Odesanya et al., 2017
2	Cost Engineering	Hanid et al., 2007; Odesanya et al., 2017; Onyeador 2011
3	Contract Management	Onyeador 2011
4	Asset and Facility Management	Hanid et al., 2007; Odesanya et al., 2017
5	Procurement Planning Management	Hanid et al., 2007; Odesanya et al., 2017; Onyeador 2011
6	Cost Planning Management	Ajator, 2014; Hanid et al., 2007; Odesanya et al., 2017; Onyeador 2011
7	Budget Management	Odesanya et al., 2017
8	Value Management	Hanid et al., 2007
9	Assessment Management	Odesanya et al., 2017
10	Investment Feasibility Management	Odesanya et al., 2017
11	Project Management	Hanid et al., 2007; Odesanya et al., 2017
12	Resource Management	Odesanya et al., 2017
13	Arbitration	Hanid et al., 2007; Odesanya et al., 2017
14	Technical Auditing	Odesanya et al., 2017
15	Supply and Distribution Management	Odesanya et al., 2017
16	Health Safety and Environment (HSE)	Hanid et al., 2007; Odesanya et al., 2017

It is pertinent to note that from the list of scanty publications above, only two are empirical, namely [15] and [12]. Moreover, none of them was based on data from the three client types in the oil and gas sector of Nigeria (National, International and operator companies), hence, this study.

II. Materials and Methods

Data for this study were obtained via a

the 65 well-established QS firms (established through a pilot survey) in Lagos State, Nigeria. All the QS firms were not considered because the oil and gas sector requires specialised QS services, beyond the traditional ones, which only well-established firms can provide. Lagos State was selected because of the presence of majority of QS practicing firms. Structured questionnaires were used to collect primary data from the sampled firms on their level of involvement in oil and gas projects and the

influence factors. Respondents were required to provide the frequency of the involvement of their firms in the upstream, midstream and downstream stages of oil and gas projects on a likert-like scale of '1' to '5', '1' for very low involvement and '5' for very high involvement. Secondly, respondents were also required to tick one from a likert-like scale of '1' to '5' ('1' for very low influence and '5' for very high influence) on the eight factors, synthesised from literature review, which influenced the involvement of their firms in oil and gas projects. Data collected were analysed using mean score.

Regarding the second set of data on services provided by QS firms, structured questionnaires were used to elicit data from a random sample of 16 out of a sampling frame of 31 oil and gas companies operating in Nigeria. Data were collected from five representatives each from the companies giving a sample size and sampling frame of 80 and 155, respectively. Respondents were required to tick their option from the 16 services on Table 1 (provided by Qs to oil and gas companies) synthesized from literature, based on a likert-like scale of '1' to '5' ('very low' to 'very high'). Data collected were analysed using mean score, standard deviation and ANOVA.

III. Results and Discussion

A. Profiles of respondents

Table 2 presents the profiles of respondents for quantity surveying firms. The Table shows that 98% and 72% of the respondents have the requisite academic and professional qualifications, respectively. Their average year of experience is eight years and none of them has handled less than nine projects.

Similarly, all the respondents for the oil and gas companies on Table 3 also have requisite academic and professional qualifications with a

Table 2: General Information on Respondents (Quantity Surveying Firms)

Category	Frequency	% of Total	Cumulative %
Academic Qualification			
HND	1	4.00	4.00
BSc/B.Tech.	16	64.00	68.00
MSc/M.Tech.	7	28.00	96.00
Others	1	4.00	100
Total	25	100.00	
Professional Qualification			
MNIQS	8	32	32
FNIS	1	4	36
NIQS	5	20	56
Probationer			
Others	4	16	72
Unspecified	7	28	100
Total	25	100.00	
Years of Experience			
0-5	10	40.00	40.00
5-10	9	36.00	76.00
10-15	3	12.00	88.00
15-20	2	8.00	96.00
20 and above	1	4.00	100
Total	25	100.00	
Projects handled			
1-5	8	32	32.00
6-10	7	28	60.00
11-15	5	20	80.00
16-20	1	4	84.00
>20	1	4	88.00
Unspecified	3	12	100.00
Total	22	100.00	

Mean = 8 years of experience

Mean = 9 projects handled

mean year of experience of not less than 10. The profiles of the respondents suggest that the data they provided for this study can be relied upon to generalise the findings of this study for the study area.

B. Involvement of quantity surveyors in oil and gas projects

Table 4 shows the involvement of Quantity Surveyors in the three stages of oil and gas projects. The Table indicates that QSs are most

Table 3: Profile of Respondents (Oil and Gas Companies)

Category	Frequency (f)	Percentage (%)
Designation		
Project Engineer	17	31.3
Operation Manager	15	27.1
Civil/Structural Engineer	10	18.8
Process Engineer	6	10.4
Production Engineer	7	12.5
Total	55	100.0
Academic Qualification		
OND	2	4.3
HND	8	14.9
BSc/B.Tech.	27	48.9
MSc/M.Tech.	16	29.8
PhD	1	2.1
Total	55	100.0
Professional Qualification		
NAPE	13	22.9
NICE	8	14.3
NSE	11	20.0
COREN	6	11.4
SPE	17	31.4
Total	55	100.0
Years of Experience		
0-5	13	23.9
5-10	17	30.4
10-15	14	26.1
15-20	8	15.2
25-30	2	4.3
Total	55	100.0
Mean = 10 years		

involved in the downstream stage of oil and gas projects with a mean score (MS) of 1.32, followed by midstream (MS = 1.16). They are however least involved in the upstream stage (MS = 1.12). On aggregate, QSs' involvement in oil and gas projects in the study area is very low with a mean score (MS) of 1.2 on a 5- point likert scale.

The above results from this study totally agree with [13], [13], [4] and [8]. [13] reported that QSs are not fully appreciated in engineering projects in Nigeria. [11] also reported that QSs do not show much interest in costing oil and gas projects in Nigeria. Similarly, [4] posited that the services of QSs have not been maximised in the oil and gas sector of Nigeria while [8] was of the opinion that QSs in Nigeria need to

Table 4: Stages at which Quantity Surveyors are involved in Oil and gas Projects

Project Stage	Mean Score	Rank
Downstream	1.32	1
Midstream	1.16	2
Upstream	1.12	3
Aggregate	1.20	
Likert mean value = 2.5		

improve on their services in the non-building sectors. Probably, the low involvement of QSs in oil and gas projects in Nigeria can be due to the dominance of the sector by expatriates as alluded to by [10]. Another reason could be the inhibiting attitudes of Engineers observed by [9] who always want to design and also manage the cost of engineering facilities in Nigeria. However, the findings disagree in part with [12] who concluded that QS services in oil and gas has shifted from downstream to upstream. This study found that QSs are more involved in the downstream stage than the upstream. Moreover, [12] reported that the involvement of QSs was on the average while this study found that their involvement is very low with aggregate mean score of 1.20

C. Factors influencing the involvement of quantity surveyors in oil and gas projects

Table 5 presents the factors influencing the involvement of QSs in oil and gas projects in Nigeria. The Table shows that inter-professional rivalry and expatriate domination of the industry, in that order, with mean scores (MS) of 2.6 and 2.52, respectively, were the top factors which influenced the involvement of QSs in oil and gas projects in Nigeria. These two factors had a moderate influence (with mean score of 3.0, approximately on a likert-like scale of 5.0) on QS involvement in oil and gas projects in the study area. Similarly, the other six factors had a low influence on QS involvement with an approximate mean score (MS) of 2.0 each. The lowest two factors on the Table are young age of the profession and inadequate technical skill/knowledge with a mean score (MS) of 1.80, respectively.

Table 5: Factors influencing the Involvement of Quantity Surveyors in Oil and Gas Projects

Factors influencing the involvement of Quantity Surveyors in oil and gas projects	Mean Score	Rank
Inter-professional rivalry	2.60	1
Expatriate domination	2.52	2
The use of Bill of Engineering Measurement and Evaluation (BEME)	2.44	3
Lack of interest/publicity	2.40	4
Ignorance of the services rendered by quantity surveyors	2.38	5
Educational curriculum in tertiary institutions	1.84	6
Young age of the profession in Nigeria	1.80	7
Lack of technical knowledge/skills	1.80	8

The above findings from this study agree in part with previous literature. For instance, [9], [12] and [4] concluded that rivalry from allied Professionals was a major factor which inhibited QSs' involvement in oil and gas projects. This factor also ranks first in this present study. Moreover, [10] reported that domination by expatriates, which is the second highest in this study, was a major challenge to QSs' participation in oil and gas projects. Similarly, the use of BEME by Engineers which ranks third in this study was also reported by [9] to be a major factor influencing the involvement of QSs in oil and gas projects in Nigeria.

However, findings from this study study are partly not aligned with [13], [11], [12] and [4]. [13] reported that QSs had not fully appreciated engineering projects in Nigeria probably mainly because of its young age. This study found that this factor is low (second to the last) in influence. Similarly, [11] and [4] opined that ignorance of the services QSs render was a major factor influencing their exclusion in oil and gas projects. This study however found that this factor is low in influence. This means that the non-involvement of QSs in oil and gas projects is not because of ignorance of their role. [12] concluded that inadequate technical skill/knowledge and deficient curriculum were the top factors inhibiting QSs' involvement in oil and gas projects in Nigeria. Conversely, these factors are found to be at the bottom of the findings from this study.

D. Services rendered by quantity surveyors in oil and gas projects

The duties provided by Quantity Surveyors in oil and gas projects in the study area are presented in Table 6. Overall, the Table shows

that the top eight out of the 16 duties were highly performed by Qs in oil and gas projects in the study area. The performance of the other eight duties was moderate. However, cost estimation is the most performed duty by Qs in oil and gas projects with a mean score (MS) of 4.13. It is followed by cost planning management (MS = 3.72), budget management (MS = 3.70), contract management (MS = 3.65) and cost engineering (MS = 3.63). Similarly, the four duties that are least performed by Qs in oil and gas projects are supply and distribution management (MS = 2.70), technical auditing (MS = 2.80), arbitration (MS = 2.85) and health, safety and environmental management (MS = 2.87).

Regarding the responses of the three groups, the ANOVA test showed that there is a statistically significant difference, at 5% level, in their responses on six services of Qs in the oil and gas sector. These services are contract management, investment feasibility management, project management, resource management, arbitration and technical auditing. This means that the three groups differ in their responses on these six duties. Conversely, there is no statistically significant

difference in the responses of the three groups in the remaining ten services. This means that the three groups are unanimous in their scoring of the ten services. These duties are cost estimation, cost planning management, budget management, and cost engineering, amongst others

Results from this study agree in part with [15] and [12]. [15] reported that supply and distribution management was a potential duty of Qs in Malaysia. This study also found that this duty is the least performed in Nigeria. Similarly, [12] reported that cost estimation, cost engineering and contract management were the top three duties performed by Qs in Nigeria. The present study also affirmed that these duties are also among the top five performed by Qs in for oil and gas companies. Conversely, findings from this study partly disagree with previous studies. For instance, [15] concluded that project management and health, safety and environment were among the top duties performed by Qs in Malaysia as against the findings from this study. Similarly, [12] concluded that resource management was one of the five least duties performed in Nigeria. However, this study found otherwise.

Table 6: Services Provided by Quantity Surveyors in the Oil and Gas Sector

S/N	Services	Overall			NOCs			IOCs			OCs			ANOVA	
		Mean	SD	R	Mean	SD	R	Mean	SD	R	Mean	SD	R	F	Sig.
1	Cost estimation	4.13	1.29	1	3.64	1.45	1	4.73	0.46	1	4.00	1.50	1	2.948	0.063
2	Cost planning management	3.72	1.29	2	3.50	1.56	3	4.20	0.94	6	3.47	1.28	3	1.591	0.215
3	Budget management	3.70	1.21	3	3.43	1.55	5	4.20	0.68	4	3.47	1.18	2	2.031	0.144
4	Contract management	3.65	1.14	4	3.29	1.20	7	4.33	0.82	3	3.35	1.11	5	4.634	0.015*
5	Cost engineering	3.63	1.32	5	3.36	1.45	6	4.07	1.10	7	3.47	1.37	4	1.253	0.296
6	Procurement planning management	3.59	1.18	6	3.57	1.28	2	3.93	0.88	10	3.29	1.31	7	1.171	0.320
7	Project management	3.54	1.21	7	3.43	1.34	4	4.20	0.77	5	3.06	1.20	9	4.178	0.022*
8	Resource management	3.52	1.39	8	3.21	1.63	9	4.53	0.64	2	2.88	1.22	11	7.954	0.001*
9	Value management	3.39	1.26	9	3.07	1.54	11	3.93	0.80	9	3.18	1.24	8	2.214	0.122
10	Asset and facility management	3.33	1.27	10	3.14	1.40	10	3.53	1.30	13	3.29	1.16	6	0.343	0.712
11	Investment feasibility management	3.28	1.34	11	3.21	1.31	8	4.07	1.10	7	2.65	1.27	12	5.329	0.009*
12	Assessment management	3.13	1.41	12	3.00	1.24	12	3.47	1.46	14	2.94	1.52	10	0.631	0.537
13	Health, safety and environment management	2.87	1.24	13	2.93	1.27	13	3.33	1.29	15	2.41	1.06	13	2.357	0.107
14	Arbitration	2.85	1.38	14	2.57	1.40	16	3.73	1.03	11	2.29	1.31	14	5.714	0.006*
15	Technical auditing	2.80	1.38	15	2.93	1.33	14	3.60	1.35	12	2.00	1.00	16	6.900	0.003*
16	Supply and distribution management	2.70	1.33	16	2.86	1.29	15	3.20	1.52	16	2.12	.99	15	3.034	0.059

*Significant at 5% level

IV. Conclusion

This study assessed the level of involvement, the influence factors and the services provided by Quantity Surveyors in oil and gas projects in Lagos State, Nigeria. The findings established that the level of involvement of quantity surveyors in oil and gas projects is very low in the study area mainly due to professional rivalry and the domination of the industry by expatriates. The least factors which influence QSs' participation are inadequate technical knowledge and the young age of the profession. The five top services provided by QSs in oil and gas projects in the study area are cost estimation, cost planning management, budget management, contract management and cost engineering. The least five services provided are supply and distribution management, technical auditing, arbitration, health, safety and environment and assessment management.

ANOVA established significant differences in the perception of the three groups of respondents (National oil companies, International oil companies and Operator companies) on six services. These services are contract management, investment feasibility management, project management, resource management, arbitration and technical auditing. Although findings from this study may have limited application to other States of the Federation due to variations in experience and exposures of different firms, this study, nevertheless, provides implications for enhancing the participation of QSs in the oil and gas sector. This study recommends improvement in the curriculum of tertiary institutions and skill sets of QSs so as to enhance the involvement of QSs in the oil and gas sector of the Nigerian economy.

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