
SKILLS REQUIREMENTS FOR QUANTITY SURVEYORS' COMPETENCIES IN COST MANAGEMENT OF MECHANICAL AND ELECTRICAL SERVICES

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ABSTRACT

Skills are abilities that are being possessed by a person to perform well in a specified job. This can be acquired or developed through training or experience in the field. The study is aimed at assessing skills needed by Quantity surveyors (Qs) in cost management of Mechanical and Electrical (M&E) services so that competency level can be improved. The quantitative research method was adopted for this study and the questionnaires were sent to experts in M&E services in the study area. Snowballing and purposive sampling techniques were used in selecting those experts. Bar chart, Mean Item Score, Gap analysis, Spearman correlation, Kruskal Wallis test was used in analyzing the retrieved data. The most important rated skills are Quantification, Valuation, Numerical, Critical thinking, and Documentation. Qs perform better in generic skills to technical skills where numerical, documentation and communication were rated highest. Gap analysis revealed that the possessed level of skills is less compare to the expected except in communication and computer skills. The findings revealed that there is a moderate relationship between the importance and performance of Qs in those skills. The results showed that there were ten out of eighteen skills with no significant difference while the other eight has a significant difference in the opinions of professionals. The study concluded that skills are very important to improve the competency level of any profession, especially in M&E services. It is therefore recommended that Qs should not shun continuous training like symposium, workshops and seminars to keep themselves abreast of how well to manage M&E services and also to further improve themselves in less performed skills. These had a wide gap between the importance and the performance rating.

Keywords: Cost management, Competencies, Skills, Training, Mechanical and Electrical services

1. INTRODUCTION

Cost Management is a management activity that deals with forecasting, planning, control, cost monitoring, analysis and evaluation of the contractors' work and it is used to control project cost (Zhen, 2008). The establishment of a realistic budget estimate is crucial and critical to effective cost management of construction projects. It is important to manage cost in the interest of project stakeholders (Towey, 2012); and the principal activity of Quantity surveyors (QS) at the early stage of a building project is to establish the probable cost of such building and advice the client on cost and quality criteria (Ashworth, et al., 2013). However, the QS in Nigeria is constantly and continuously confronted with challenges and opportunities, and one of the challenges is as a result of the lack of basic skills and competencies (Dada and Jagboro, 2012).

Skills can be defined as proficiency or ability acquired or developed through training or experience while competence can be described as an action, behavior or outcomes which a person should be able to demonstrate or ability to transfer skills and knowledge to new situations within a given occupational area (Dada and Jagboro, 2012). Competence is a cluster of related knowledge, attitudes, skills and other personal characteristics that affects a major part of one job (PMI, 2002). Quantity surveyors survive by the uniqueness of their knowledge and mastery of the techniques that has been acquired over time and use in the organization. The closer a quantity surveyor is to an

organization in learning determines the frontier of knowledge and greater its chance of survival in the construction industry (Dada and Jagboro, 2012). The ability of any profession to meet changing client needs or satisfaction depends on the knowledge base of the profession (Babalola, 2009).

Although M&E is part of buildings, it would be out of place to assume that all QS have the required skills and knowledge to provide expert advice and manage M&E services like other aspects of building construction. Ashworth (2013) opined that most Quantity surveyors practice considers M&E services as a specialized duty which is been delegated to the Consultant service engineer. This is due to the low level of competencies of quantity surveyors in costing and management of M&E services which has led to project cost overrun. However, Clients are becoming increasingly becoming uncomfortable with the inability of QS to provide a conclusive and accurate estimate for the buildings arising from the lump sum approach to price M&E services (Babalola, 2012). It is now common to hear M&E Quantity surveyors as a specialist in that area which is not supposed to be. Conventionally, the quantity surveyors based on their expertise are to possess the knowledge and skills in the measurement and cost management of M&E services like building elements (Olarenwaju and Anahve, 2015).

Research studies have attempted to examine Quantity surveyors' professional practice in South Africa and gave relative importance of skills and competencies required for quantity surveying services (Nkado and Meyer, 2001). The results of the study showed that technically oriented competencies were rated highest. The rating that was below average proficiency levels was marketing, advanced financial management, project management, and leadership. The findings were not holistic in view because it was examined from the perspective of quantity surveyors only. Yogeshwaran, Perera, and Ariyachandra (2018) examined the competencies expected of graduate surveyors in the Sri Lanka construction industry. The study was limited to graduate quantity surveyors which exclude the non-graduate and were majorly on the construction industry. These competencies revealed in the study cannot be used to judge or foretell the competencies needed in cost management of Mechanical and Electrical services

In Nigeria, previous studies have attempted to explore on skills and competencies of Quantity surveyors in procurement management (Oke, Ogunsemi and Adeyelu, 2017); value management (Oke and Ogunsemi, 2009 and 2013); Construction industry (Dada & Jagboro, 2012); Civil engineering projects (Opawole et al., 2012). These studies suffered a lot of limitations because this cannot be used to rate or address skills for mechanical and electrical services. This study addresses the existing gap through a holistic review of the skills needed in the cost management of mechanical and electrical services. This will be significant to researchers, mechanical, electrical engineers, quantity surveyors, Clients which will give more insight to the required skills in the cost management of mechanical and electrical services. Considering the foregoing, it is pertinent to evaluate the skills required and performance of QSs in the cost management of Mechanical and Electrical services in view of enhancing their performance level.

2. THE CONCEPT OF SKILL AND COMPETENCE

Skill can be defined as proficiency or ability acquired or developed through training or experience (Dada and Jagboro (2012). It was stated that a QS should possess skills in the fields of management, documentation, analysis, appraisal, quantification, synthesis, communication, construction cost and price forecasting, procurement advice and contract administration (Badu and Amoah 2004). These skills are essential for QSs if competence would be gained and there will be survival in a maturing industry.

Competency defined as a set of skills that an individual has to possess to satisfactorily perform a specified job (Shafiei and Said, 2008). Quantity surveying practitioners have to constantly face challenges and new opportunities and are therefore required to have distinct competencies to excel in their field. As these competencies have been defined in a multiplicity of perspectives need to be identified (Nkado and Meyer, 2001). Although these have been listed by the professional bodies regulating the profession, the levels of competencies that have to be achieved by graduate QSs have so far not been defined. At present, these are ascertained through the core competencies outlined by the governing professional bodies (Perera et al., 2011).

2.1 Types of skills required in mechanical and electrical services

According to Zubaidah et. al, (2006) we have two types of skills which are technical and non-technical skills. Non-technical skills refer to general skills that are not specific to any particular job position or workplace environment but can be used widely in all jobs and tasks assigned (Kruger, 2006). These skills cannot be obtained in a short time but can be controlled with extensive use and experience (Mohd. Sahandri and Saifuddin Kumar, 2009).

However, non-technical skills also called by some other names are “*generic skills*” or “*soft skills*” (Davis and Woodward, 2006).

Generic skills are skills, qualities, and traits that a person has to master to be successful in their studies and attributes that harmonize with the field of specialization of employees for work performance (Quah Chun Hoo et al, 2009). These are useful across a diversity of jobs and life contexts (Kearns, 2001; National Centre for Vocational Education Research, 2003). Pumphery (2001) explains that generic skills are skills that can boost individual productivity in all fields. However, employers feel less satisfied in terms of non-technical skills such as motivational skills, communication, interpersonal, critical thinking, problem solving and entrepreneurial skills.

Technical skills are basic knowledge of any work in any industry. The ability of a graduate to apply the technical skills acquired in higher education institutions to the real working environment is very important (MD Nasir, Ali, Nordin, Noordin, 2011). Technical skills are easy to use and also easy to learn. This is different from the non-technical skills that are difficult to implement excellently. This is because non-technical skills can only be mastered by experience and frequent use in the workplace (Ruhizan dan Ramlee, 2009). Although technical skills are basic to a job, we cannot forget that non-technical skills are a perfect complement to graduate in the industry.

According to the Australian Institute of Quantity Surveyors (AIQS, 1998); Oke and Ogunsemi (2009) and Dada and Jagboro (2012) there are basic abilities of competent quantity surveyors needed to enhance competency standards. Also, the Canadian Supply Chain Sector Council (CSCS, 2014) listed the various skills required in managing M&E services. These skills and abilities are essential to properly carry out the responsibilities involved in the cost management of M&E services. The skills include:

1. Analytical skills: This refers to the ability to utilize numerical estimation, apply scheduling, financial math, budgeting and accounting math, measurement math, data analysis math, etc. (CSCS, 2014)
2. Communication skills: This refers to the ability to provide concise and clear direction and instructions to staff and other departments, use diverse communications media and tools to transmit messages and information professionally to clients, staff, colleagues, other managers, and senior management for better outcomes in organization (Sony and Mekoth, 2016; Dean and East 2019). It also includes the ability to conduct interviews for potential members of staff during the process of recruitment; and make presentations and conduct staff meetings (CSCS, 2014).
3. Critical thinking skills: This refers to the ability to identify the underlying issues of a situation by breaking it down into smaller parts and considering how these affect and relate to each other. It also involves identifying the effect, causes and possible solutions in a situation. Furthermore, it is the ability to employ techniques and thorough logic to identify solutions that are realistic (Concordia University, 2011). Also, it is the ability to objectively examine the information and give a logical judgment. It is a skill required by most industries including the construction industry. It aids the planning and organization of tasks, decision making, solving of problems, etc. (CSCS, 2014; Doyle, 2018).
4. Interpersonal skills: This refers to the ability a person requires to interact and communicate effectively. It encompasses good communications skills (verbal and non-verbal), the ability to understand body language, and the ability to understand and manage personal and others' emotions (Shukla, 2016; Satya, 2017).
5. Leadership skills: This refers to the ability to influence others through positive relationships and personal interactions. It also refers to the ability to network, empathize, interpret social circumstances and make others develop a feeling of comfort and confidence (Andrew, Kyle, & Ittersum, 2016).
6. Team building skills: Team building skills involve the ability to bring several people together who possess complementary skills and are dedicated to a common goal and see themselves liable for the attainment of that goal. It also connotes the ability to coordinate and assist each member of the team to fulfill its role (Eclipse Research Consultants, 2004).
7. Negotiation skills: This refers to the ability to discuss with another party or parties who have conflicting interests in a situation to arrive at an agreement that is mutually acceptable (Mbadi, 2015).
8. Project management skills: This refers to the ability to supervise and monitor all aspects of project development, ascertaining those proposals are achievable, and managing the process through which a project is fully completed. It is also the ability to understand and utilize the execution plan of a project, determine the minimum project duration, and examine the cost and quality performance of a project concerning set objectives. Furthermore, it includes the ability to take proactive measures that will improve future project delivery process (CSCS, 2014).
9. Documentation skills: The ability to prepare written information in a format which conveys meaning (Mohd Shafiei and Said, 2008)
10. Computer literacy skills: The ability to understand and apply basic computer skills relevant to the area of practice.

It is also the ability to understand the use and relevance of information technology, basic and specialist software and internet (Nkado and Meyer 2001; Mohd Shafiei and Said, 2008).

11. Quantification/measurement skills: The ability to quantify and enumerate (Mohd Shafiei and Said, 2008). This is the ability to understand and apply the standard method of measurement to the area of practice for building elements and elements (PAQS, 2001)

3. RESEARCH METHODS

A pilot study was conducted with experts that were purposively selected which are known professionals in the study area. These experts includes two (2) Quantity surveyors, one (1) mechanical engineer and two (2) electrical engineers which makes 5 experts altogether. This was conducted to improve the research instruments and test the comprehensiveness of the questionnaire before the larger survey. According to Dada (2012), pretesting research instruments helps to know whether raised questions are appropriate or in rhetorics. The sampling techniques used are snowballing and purposive sampling techniques. The snowballing techniques was used because sampling frame is difficult to establish and the techniques was based on the premise that unknown respondents are known through known respondents. Atkinson and Flint (2001) noted that Snowballing is an answer to hidden/concealed respondents. After the pilot survey, the specialized professionals in turn direct to known professionals who work in M&E engineering firms and some in consultancy firms that engage in M&E services. The purposive sampling was based on the judgment of the researcher in distributing the questionnaires individually. In the process of getting those professionals, 168 professionals were identified in some specific areas of Lagos state and given questionnaires. 144 questionnaires were retrieved back but 122 questionnaires were suitable for analysis. This connotes a response rate of 73 percent which makes more than the normal response rate of 20-30 percent for questionnaire surveys. Professionals involved in the study are 68 quantity surveyors, 24 Mechanical Engineers and 30 Electrical engineers. There was disparity between the Quantity surveyors and other professionals because most of the unreturned questionnaires falls among the mechanical and electrical engineers.

The questionnaire was designed in different sections, respondents' demographic information was retrieved in the first section which includes their years of experience, profession, number of projects engaged, academic qualification and number of M&E projects handled. The other part that is concerned skills required in the cost management of M&E services were collected from the respondents. Five-point Likert Scale was used as basis for ranking the level of significance and performance of skills in which 5 represents Very high, 4 indicates High, 3 indicates Average, 2 connotes Low and 1 represents Very low. The data collection was conducted within three months which was through self-administering to respondents or online survey. Mean Item Score, Bar chart, Standard deviation, Gap analysis, Spearman correlation and Kruskal Wallis test were used in analyzing the retrieved data. The Background information of professionals were analyzed through Bar chart, average of the responses of professionals were analyzed by Mean Item Score (MIS). Variability or disparity in the responses of professionals was revealed by standard deviation. Gap analysis was used to compare the current or actual state and the expected or desired state. Spearman correlation test was used to examine the relationship between the importance and performance skills. Kruskal Wallis test was used to know the differences in the opinions of professionals. Cronbach's alpha test was used in this research to test the reliability and validity of items in the questionnaire. Alpha (α) can be interpreted as a correlation coefficient which ranges from 0 to 1. The Cronbach's alpha was computed to test the reliability of the 5-point Likert scale for this study. For the importance of skills, the reliability test was 0.857 and the performance of skills was 0.946 which means that the degree of reliability of the instrument is more perfect (Moser and Kalton, 1999). Therefore, it can be deduced that the instruments employed for this research are significantly reliable.

4. FINDINGS AND DISCUSSIONS

From figure 1, the quantity surveyors represent more than half of the population, mechanical engineers connote 19.7% and electrical engineers represent 24.6% of the profession of the respondents. 26.2% represents those that work consulting firms and 73.8 percent work in the contracting firm. The sex of respondents of the male is 92 which is 75.4% of the population while the rest percent represent the female of the respondents. Also, 21.3% of the population have HND, 57.4% of the respondents have B.Sc/B. Tech while the remaining percent holds M.Sc/M.Tech in their various profession.

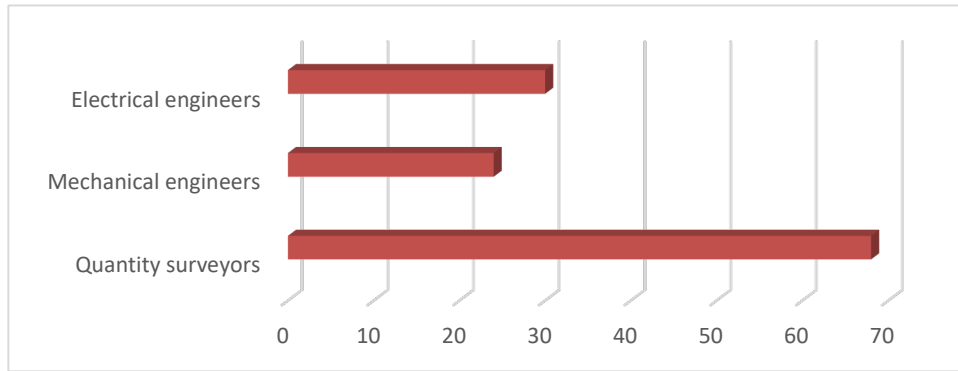


Figure1. Profession of the respondents

In figure 2, the number of M&E projects handled by each profession 21.3% have handled 1-5 number of M&E projects. 6-10 M&E projects were 27.9%, 6.6% of the population belongs to 11-15 numbers of executed projects while those above 20 numbers are 39.3%. In terms of year of experience, those with a range of 1-5 years were 37.7%, 6-10 years' experience was 54.1%, 6.6% represent those within 11-15 years and those above 20 represent 1.6%. Furthermore, 72.1 percent connotes that is a member of their various affiliation, corporate was 19.7 percent and 8.2% belong to associates. Lastly, based on the findings above this can be affirmed that the data provided by the respondents are reliable

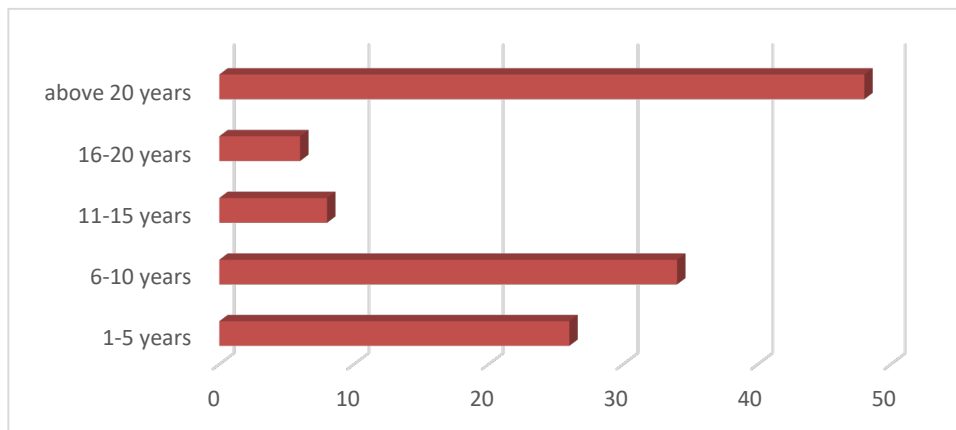


Figure 2. Number of M&E projects handled

Eighteen skills were identified from the literature review which was assessed. The importance of the skills required in the cost management of mechanical and electrical services was ranked based on the mean item scores and standard deviation. According to Field (2005), when two or more skills are having the same mean the lowest standard deviation is rated first before the next higher standard deviation. Table 1 revealed that measurement skills with a mean of 4.66 and standard deviation (SD) of 0.629 were rated first followed by valuation skills of 4.64 mean with SD of 0.578. Numerical skills were ranked third with mean 4.57 and standard deviation of 0.644 next to critical thinking skills of mean value 4.41 and SD of 0.588, the fifth-ranked variable was documentation skills of 4.41 mean value and standard deviation of 0.616. The least ranked skills have a mean value of 3.52 and a standard deviation of 1.074. The standard deviation of 1.074 means there is a high disparity in the responses of professionals' opinions in installation skills.

Table 1. Importance of the Skills for Cost Management of M&E.

Skills	Mech.	Elect.	QS	O/R Mean	SD	Rank
Measurement/Quantification skills	4.67	4.20	4.85	4.66	0.629	1
Valuation skills	4.67	4.33	4.76	4.64	0.578	2
Numerical skills	4.75	4.33	4.62	4.57	0.644	3
Critical thinking skills	4.50	4.33	4.41	4.41	0.588	4
Documentation skills	4.42	4.33	4.44	4.41	0.616	5
Financial skills	4.25	4.07	4.44	4.31	0.696	6
Analytical skills	4.42	4.27	4.24	4.28	0.710	7
Knowledge of M&E Services Engineering	4.08	4.00	4.47	4.28	0.733	8
Communication Skills	4.58	4.20	4.18	4.26	0.681	9
Negotiation skills	4.08	4.13	4.38	4.26	0.705	10
Team working skills	4.41	4.07	4.26	4.24	0.699	11
Managerial Skills	4.50	3.87	4.24	4.20	0.749	12
Leadership Skills	4.50	4.13	4.06	4.16	0.583	13
Price forecasting skills	3.58	4.00	4.24	4.05	0.693	14
Interpersonal Skills	4.50	4.13	3.85	4.05	0.884	15
Procurement skills	3.92	3.73	4.09	3.97	0.730	16
Computer skills	4.08	3.80	3.97	3.95	0.717	17
Installation/Assemblage skills	3.50	2.87	3.82	3.52	1.074	18

Note: QS (Quantity Surveyors), Mech. (Mechanical engineers), Elect. (Electrical Engineers) O/R Mean (Overall Mean)

Table 2 shows the performance of quantity surveyors in the required skills. The performance of QS in the skills required was ranked based on the mean item score. The table revealed that numerical skills were ranked first of mean value 4.47 and SD of 0.648 and the next was documentation skills with a mean value of 4.33 and SD of 0.790. Communication skills were ranked third with a mean value of 4.31 and SD of 0.696. The fourth-ranked skills were financial management skills of the mean value of 4.28 with SD of 0.733. Valuation skills were ranked fifth having a mean value of 4.19 and SD of 0.813 and QS performed least in knowledge in M&E services and installation/assemblage skills having a mean value of 3.61, 3.00 and SD of 1.005, 1.111 respectively. There was also a high disparity in the opinions of professionals in the least performed skills.

Table 2. Performance of QSs in Required Skills in Cost Management of M&E

Skills	Mech.	Elect.	QS	O/R Mean	Std. Deviation	Rank
Numerical skills	4.25	4.13	4.71	4.47	0.648	1
Documentation skills	4.08	4.00	4.56	4.33	0.790	2
Communication Skills	4.00	4.33	4.41	4.31	0.696	3
Financial management skills	4.00	4.00	4.50	4.28	0.733	4
Valuation skills	3.83	3.93	4.44	4.19	0.813	5
Negotiation skills	4.08	3.67	4.44	4.18	0.764	6
Team working skills	4.00	4.00	4.32	4.18	0.764	6
Measurement/quantification skills	3.58	3.87	4.53	4.18	0.847	8
Managerial Skills	3.83	4.00	4.21	4.08	0.640	9
Computer skills	3.83	4.07	4.18	4.08	0.714	10
Interpersonal Skills	4.00	3.83	4.09	4.01	0.846	11
Leadership Skills	3.75	3.80	4.12	3.97	0.682	12
Critical thinking skills	3.67	3.87	4.12	3.97	0.816	13
Procurement skills	3.75	3.73	3.94	3.85	0.749	14
Analytical	3.50	3.67	3.91	3.77	0.783	15
Price forecasting skills	3.08	3.47	4.09	3.74	0.929	16
Knowledge of M&E Services Engineering	2.92	3.27	4.00	3.61	1.005	17
Installation/Assemblage skills	2.67	2.60	3.29	3.00	1.111	18

Note: QS (Quantity Surveyors), Mech. (Mechanical engineers), Elect. (Electrical Engineers) O/R Mean (Overall Mean)

Table 3 showed the importance and performance mean of skills required in the cost management of M&E services. The gap values were ranked from the biggest to the smallest and the table revealed the mean gap between the importance and performance of QS in skills required. The three most ranked largest gap is knowledge of M&E services engineering having a gap value of 0.67. The next ranked gap value is installation/assemblage skills of 0.52 followed by analytical skills having a gap value of 0.51. The fourth and fifth-ranked gap values are measurement and valuation skills with gap values of 0.48 and 0.45 respectively. This implies that the performance of QS in these skills is lower than expected and there is a need to improve on that. The last two (2) ranked skills which are communication and computer skills with gap values of -0.05 and -0.13 respectively shows that QS performs more than what is expected. This implies the possessed level of Quantity surveyors in communication and computer skills is beyond the expected level.

Table 3. Comparison of Means on Skills Required in the Cost Management of M&E

Skills	Importance Mean	Performance mean	Rank	Gap Mean
Knowledge of M&E Services Engineering	4.28	3.61	0.67	1
Installation/Assemblage skills	3.52	3.00	0.52	2
Analytical skills	4.28	3.77	0.51	3
Measurement/quantification skills	4.66	4.18	0.48	4
Valuation skills	4.64	4.19	0.45	5
Critical thinking skills	4.41	3.97	0.44	6
Price forecasting skills	4.05	3.74	0.31	7
Leadership Skills	4.16	3.97	0.19	8
Procurement skills	3.97	3.85	0.12	9
Managerial Skills	4.20	4.08	0.12	9
Numerical skills	4.57	4.47	0.10	11
Negotiation skills	4.26	4.18	0.08	12
Documentation skills	4.41	4.33	0.08	12
Team working skills	4.24	4.18	0.06	14
Interpersonal Skills	4.05	4.01	0.04	15
Financial management skills	4.31	4.28	0.03	16
Communication Skills	4.26	4.31	-0.05	17
Computer skills	3.95	4.08	-0.13	18

The level of relationship was determined by carrying out a correlation test between the importance of skills required and the performance of those skills by QSs. From the result in table 4, it can be observed the correlation coefficient (Rs) was 0.569. This means there is a moderate relationship between the importance of skills and performance of QSs which as a positive relationship (Laerd Statistics, 2017). This means the more the importance of a skill the increase of the performance in a moderate degree. The *p-value* was 0.014 at a significance level of 0.05 which revealed the *p-value* is lesser than the significance level. This means there is a significant relationship between the performance of QSs and the importance of skills required. Therefore, we accept H_a and reject H_o .

H_{o1}: There is no significant relationship between the importance and performance of QSs in skills required for cost management of M&E services

Table 4. Test on Relationship between the Means on Skills Required by QSs

		Importance Mean	Performance Mean
Spearman's rho	Importance Mean	Correlation Coefficient	1.000
		Sig. (2-tailed)	.569*
		N	18
Performance Mean	Performance Mean	Correlation Coefficient	.569*
		Sig. (2-tailed)	.014
		N	18

*. Correlation is significant at the 0.05 level (2-tailed).

Kruskal-Wallis test was carried out to know the difference in the views of the professionals. The result of the test revealed that ten (10) out of eighteen (18) have asymptotic significance values of 0.05 and above in table 5. The null hypothesis which states that there is no significant difference in professionals' perceived performance of QS skills required was accepted while the alternate hypothesis was rejected. The ten skills are Installation skills, Procurement Skills, Interpersonal Skills, Communication Skills, Leadership Skills, Managerial Skills, Analytical skills, Critical thinking skills, Computer Skills, and Team working skills. The remaining eight skills required with a *p-value* less than 0.05 shows that there is a significant difference in the opinions of the professionals which makes the alternate hypothesis accepted while the null hypothesis was rejected. The eight skills include valuation skills, Knowledge of M&E Services Engineering, Measurement/quantification skills, Price forecasting skills, financial management skills, Documentation skills, Negotiation skills, and Numerical skills

Table 5 revealed the gap analysis result on the difference between the opinion of QSs and other professionals on the performance of QSs in the skills required. The following skills have the largest gap values which include Knowledge of M&E Services engineering with 0.90 gap value, Price forecasting skills having gap value of 0.81, Measurement/quantification skills with 0.80, Installation/Assemblage skills with 0.65 and Negotiation skills with 0.56 gap values. The last two skills with lowest gap values are procurement and interpersonal skills having gap value of 0.20 and 0.17 respectively. This implies that other professionals rated the performance of QSs low in skills required compared to QSs rating. None of the variables have higher performance than the rating of QSs.

Table 5. Test on the Performance of QSs in the Skills Required

Skills	Mean Item score			Kruskal -Wallis test			
	QS	Mech.	Elect	AMOP	Gap	Chi-square	Asymp. Sig.
Valuation skills	4.44	3.83	3.93	3.89	0.55	7.740	0.021*
Knowledge of M&E Services Engineering	4.00	2.92	3.27	3.10	0.90	10.352	0.006*
Measurement/quantification skills	4.53	3.58	3.87	3.73	0.80	13.471	0.001*
Price forecasting skills	4.09	3.08	3.47	3.28	0.81	11.566	0.003*
Installation/Assemblage skills	3.29	2.67	2.60	2.64	0.65	5.290	0.071
Financial management skills	4.50	4.00	4.00	4.00	0.50	7.234	0.027*
Procurement skills	3.94	3.75	3.73	3.74	0.20	0.804	0.669
Documentation skills	4.56	4.08	4.00	4.04	0.52	6.274	0.043*
Interpersonal Skills	4.09	3.83	4.00	3.92	0.17	0.919	0.632
Communication Skills	4.41	4.00	4.33	4.17	0.24	2.083	0.353
Leadership Skills	4.12	3.75	3.80	3.78	0.34	3.953	0.139
Managerial Skills	4.21	3.83	4.00	3.92	0.29	3.519	0.172
Negotiation skills	4.44	4.08	3.67	3.88	0.56	10.975	0.004*
Analytical skills	3.91	3.50	3.67	3.59	0.32	2.332	0.312
Critical thinking skills	4.12	3.67	3.87	3.77	0.35	2.273	0.321
Computer skills	4.18	3.83	4.07	3.95	0.23	1.641	0.440
Team working skills	4.32	4.00	4.00	4.00	0.32	2.127	0.345
Numerical skills	4.71	4.25	4.13	4.19	0.52	8.876	0.012*

**p-value* is significant at < 0.05

Note: *QS* (Quantity Surveyors), *Mech.* (Mechanical engineers), *Elect* (Electrical Engineers) and *AMOP* (Average mean of other professionals)

The findings on the importance of the skills in managing M&E services show that measurement skills, valuation skills, numerical skills, critical thinking, documentation skills, and financial skills are the most important skills for the cost management of M&E services. These results revealed that there is a need to be an expert in the quantification of building services engineering through the help of knowledge of mechanical and electrical services. The knowledge of building services engineering was rated 8th out of 18 variables having a mean value 4.28 which makes it also important. This is consistent with Dada and Jagboro (2012) who stated that building construction knowledge is necessary for the measurement of building work which also applies to M&E services. Oke and Ogunsemi (2009) also supported that QSs needs measurement and valuation skills in the proper cost management of construction project. The implication is that QS need adequate knowledge of M&E services before basic duty of quantification and cost management of M&E services can be carried out. Patacsil and Tablatin (2017); Pang, Wong, Leung and Coombes (2019) noted that team work is the important skills for IT graduates which was perceived by students and members of the industry which partly corroborates with my findings. This means that despite team work is an important skill it is

not the most essential skills for M&E services. Communication skills was also rated among the important skills needed in cost management of M&E services which partly corroborates with Williams (2015) and Vasanthkumari (2019) who noted that communication is the most relevant skills that affects social change of college students and health sector. It could be observed that technical skills were rated most for cost management of M&E services which is in line with Prier et. al (2016) who rated technical skills as very important than the generic skills. This implies that measurement and financial skills are needed so that the amount of budgeted will not be exceeded.

Numerical, critical thinking and documentation skills were rated high with a mean value of 4.57, 4.41 and 4.41 respectively. This finding shows that apart from quantity surveying related skills, it is important for quantity surveyors to acquire the 'soft' skills such as a numeral, critical thinking, and documentation skills to help them carry out their work in a competent manner. This might be that these skills are very important in complementing the technical skills that the reason why it was rated high. Documentation skills are in line with Oladotun and Edosa (2017) who rated the skills very important skills needed in the competencies of QSs. For a quantity surveyor to successfully deliver the M&E project, he/she must be able to think critically to examine the best route to achieve this project. Critical thinking is very germane in solving problems encountered in executing M&E projects among others. This is in support of Patacsil and Tablatin (2017); Hodge and Lear (2011) who revealed that critical thinking is a crucial aspect in the entry level status for IT college students

The findings on the performance on the skills required revealed that QS performs well at numerical skills, documentation skills, communication skills, financial skills, valuation skills, and negotiation skills. The reason why QSs performed high in these skills is that training of QSs equips them with most of these skills. These skills can be acquired through a course on project management, and this is well incorporated in the curriculum used in training QSs in all the tertiary institutions assessed during this study. This is in agreement with Dada and Jagboro (2012) which identified project management as one of the significant competencies gained by QSs over the years.

It was shown that QS performs better at generic skills than the technical skills, technical skills were rated fourth and fifth respectively. In this study, Quantity surveyors performed well in communication skills which is in line with Dean and East (2019); Dhaliwal and Misra (2020) who stated the effective communication among workers affect business outcomes positively. This study was against Radermacher et. al., (2014) findings who noted that communication skills should be improved for students. It was indicated that most new graduate struggle to communicate well with co-workers and customers. Others technical skills that QS performs well are measurement skills and managerial skills

5. CONCLUSIONS AND RECOMMENDATIONS

The industry and educational system provide training to acquire knowledge so that professionals can have the ability to perform their duties well. This study was able to explore the skills required to improve Quantity surveyors' competencies in the cost management of mechanical and electrical services. The study on the skills required revealed that all skills are important but Measurement/Quantification Skills, Valuation skills, Numerical skills, Critical thinking skills, and Documentation Skills are the most important skills in managing M&E services. The research contributes by revealing the most essential and unavoidable skills that are needed by any professionals venturing into M&E industry. These skills can be acquired in the educational institutions and industry by delegating tasks to professionals to build their both their technical and generic skills. The study also showed that the least important skills include computer and installation skills while Quantity Surveyor performs better in Numerical skills, Documentation Skills, Communication Skills, Financial management skills, and Valuation skills but performed least in Knowledge of M&E Services engineering and Installation/Assemblage skills. The study contributes by showing those lagging skills where Quantity surveyors are not performing to the expectation of the industry. This will aid the academia to revise curriculum to improve those lagging skills

Also, it was revealed that there was a moderate relationship between the importance and performance mean of Quantity surveyors. In term of the study, this means that the more importance of a skill, it will also reflect in the performance of quantity surveyors moderately. The results showed that there were ten out of eighteen skills with no significant difference while the other eight has a significant difference in the opinions of professionals. The eight factors or variables means there is divergent of the opinions of professionals while others have converging views. The findings significant contributes to the existing body of knowledge by revealing the gap and relationship between the importance and performance of QSs. Moreover, it also showcases the difference of the views by professionals regarding skills used for the study. Further studies can be conducted in other developing countries in any part of the

world to validate this research for general acceptability. It is therefore recommended that Quantity Surveyors should not shun continuous training e.g., symposium, workshops and seminars to keep themselves abreast of how well to manage M&E services and also to further improve themselves in the areas of installation skills, Knowledge of M&E Service's engineering, price forecasting skills, analytical skills, and measurement skills. These had a wide gap between the importance and the performance rating.

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