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THE PROSPECT OF QUANTITY SURVEYING IN SUSTAINABLE FACILITIES MANAGEMENT

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ABSTRACT

The quantity surveying profession cannot be said to have benefited fully nor optimized its capabilities within the facility management practice. Therefore, this study intends to examine the opportunities available to quantity surveyors in sustainable facilities management practice. However, in order to achieve this aim, it is imperative to assess the features of sustainable facilities management, the quantity surveyor's role in sustainable facilities management, and the competence required by the quantity surveyor in sustainable facilities management. The study is limited to the quantity surveying and facilities management practice in Nigeria; however, the results of the study can be generalized to other countries and in particular, developing countries. Data for the study was collected through the use of well-structured questionnaires administered and distributed to fifty (50) quantity surveying professionals in the built industry with experience in facilities management and with emphasis on past projects within Lagos state, Nigeria. Forty (40) were returned and data collected was analysed using relative importance index (RII). The findings revealed that quantity surveyors have an emerging role in sustainable facilities management and which translate to opportunities being made available for the quantity surveyor.

1.0 INTRODUCTION

Facilities management (FM) is an area that encompasses various disciplines to ensure functionality in the built environment by integrating people, place, process, and technology (IFMA, 2012). Facilities management, is an interdisciplinary business function and refers to a broad range of activities, such as building services management, environmental issues, workspace management, procurement, financial management, etc. and aims to coordinate the demand and supply of facilities and services within public and private organisations (Tranchard, 2016). While facilities management suffers from a general lack of knowledge and awareness and previously considered as the old-fashioned way of care-taking, cleaning, repairs, and

maintenance (Kamaruzzaman and Zawawi, 2010), with reference to Thomson (1990) it can contribute to the relative success or the partial failure of the organisational business.

Nowadays, facilities management encompasses more than building operations and maintenance, it involves property management, business support, and customer and employee support (Thomson, 1990). However, with the increasing utility and maintenance costs, coupled with increasing legislative and regulatory requirements on energy use and carbon reduction, the facilities management practice is now committed to the sustainability agenda and policies as an integral part of their corporate social responsibility (Walker *et al*., 2007). Facilities management professionals have therefore keyed into the prospect of sustainable construction. The United States Environmental Protection Agency (EPA) (2019), defines sustainable construction as "the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from siting to design, construction, operation, maintenance, renovation and deconstruction", where critical concepts of sustainable construction include the protection of the natural environment, choice of non-toxic materials, reduction and reuse of resources, waste minimisation, and the use of lifecycle cost analysis. Quantity surveyors can provide factors that drives sustainability in construction and facilities management as well as the impact of the building's lifecycle costs (RICS, 2009) through their distinctive skills that lie in their ability to both analyse projects and apply the results of the analysis to the necessary areas (Badu and Amoah, 2004).

It has been acknowledged that the quantity surveyors' traditional roles have undergone significant changes over the past two decades due to changing industry demands, project procurement practices, information technology developments and increased levels of competition (Kumaraswamy and Morris, 2002; Fellows *et al.*, 2003; Wong and Fan, 2013). Thus, to remain relevant, competitive and successful; quantity surveyors need to constantly direct their business to new directions and to adapt to imminent changes in their professional practice (Frei and Mbachu, 2009; Smith, 2009). In similar vein, facilities management is considered as a bright new venture for built environment professionals especially in view of the complex buildings that today require appropriate maintenance management: thus leading to an evolution in facilities management practice in Nigeria. With reference to Mohammad *et al*., (2014) in order for organizations nowadays to realize the impact of their facilities, drive sustainability, while achieving overall organisational objectives, they seek to know how these goals generally affect the building's lifecycle costs. This therefore, provides opportunities for which quantity surveyors

and in which they are expected to seize the initiative of broadening their involvement in such areas (Mohammad *et al*., 2014). This is one of the significant future opportunities for quantity surveyors and basis for them to venture into facilities management (Wong and Fan, 2013; Githaiga, 2004). The quantity surveying profession cannot be said to have benefited fully nor optimized its capabilities within the facility management practice. Therefore, this study intends to examine the opportunities available to quantity surveyors in sustainable facilities management practice. Hence, in order to achieve this aim, it is imperative to assess the features of sustainable facilities management, the quantity surveyor's role in sustainable facilities management, and the competence required by the quantity surveyor in sustainable facilities management. The study is limited to the quantity surveying and facilities management practice in Nigeria; however, the results of the study can be generalized to other countries and in particular, developing countries.

2.0 LITERATURE REVIEW

2.1 THE QUANTITY SURVEYING PROFESSION

The profession of quantity surveying dates to the ancient Egyptian civilization who dedicated personnel to carry out estimates and costing for their magnificent structures and buildings. It developed into an occupation during the 17th-century restoration of London after the great fire. In 1836 the profession entered its new age when the new houses of parliament of Great Britain, designed by Sir Charles Barry, became the first major public contract to be fully measured and tendered using detailed bills of quantities for financial accountability. From being a trade-based vocation, quantity surveying has developed into a full-fledged profession widely accepted in the construction industry (RICS, 2015).

In the present-day construction industry, Jagboro (2016) states that quantity surveyors are construction cost experts that are concerned with financial probity from the onset up to the execution of both new development projects and refurbishment works. While Royal Institution of Chartered Surveyors (RICS) (2019) define the role of quantity surveyors, as "ensuring that the resources of the construction industry are to the best advantage of society by providing the financial management for projects and a cost consultancy service to the client and designer during the whole construction process." Similarly, Ashworth and Hogg (2007) argue that quantity surveyors use their ability to analyze cost components of a construction project scientifically and apply the results of their analysis to a variety of financial and economic problems confronting the developer and the designer.

Quantity surveyors, also known as construction economists or cost managers, are saddled with cost accountability and financial probity of the construction industry (Babalola and Anifowose, 2015). Quantity surveyors are professionals in the building environment that have the training and ability to analyze cost components and practical physical construction works of a project in a successful way to solve the problem peculiar to each project (Nnadi *et al*., 2016). According to the Quantity Surveyors Registration Board of Nigeria (QSRBN) Act No. 31 of 1986 (CAP Q1 LFN, 2004) the qualified professional quantity surveyors duties are and which are similar to the Royal Institution of Chartered Surveyors (2019a): preliminary cost advice and feasibility estimates; cost estimate, cost planning and cost management; tender management including preparation of bills of quantities, contract conditions and assembly of tender documents; contract management and contractual advice; valuation of construction work; claims and dispute management; advice on construction methods; advice on contractor selection; preparing tender documents; obtaining or negotiating tenders/bids; developing and agreeing on accounts with/for contractors; making expenditure statements for taxation and accounting purposes; facilities auditing; cost controls and post-contract management; project management and coordination; value and procurement management; and lifecycle costing. It is clear that the roles quantity surveyors play in the built environment are enormous and can be related to the essential roles needed for sustainable development. With reference to Thayaparan *et al*. (2011) there is long life emphasise on the commitment of the quantity surveyor to learning and Wao and Flood (2016) reveals that the competencies of the quantity surveyor are far reaching and can be applicable to the management of the building. Unfortunately, in the context of Nigeria, the potentials of quantity surveyors are yet to be fully utilized in facilities management.

2.2 FACILITIES MANAGEMENT

Facilities management refers to a broad range of activities, such as building services management, environmental issues, workspace management, procurement, financial management, etc. (Tranchard, 2016). Facilities management became a recognised academic discipline in the 1990s (Sharma and Lawrence, 2017) and has since then risen to be a professional management discipline focused on the efficient and effective delivery of support services for the organisations that it serves. It has grown into an interdisciplinary business function with the objective of demand coordination and supply of facilities and services within public and private organisations; facilities management contributes to the relative success or the partial failure of an organisation’s business (Thomson, 1990).

Recent definitions of facilities management by the International Facility Management Association (IFMA) (2014), and the International Organization for Standardization (ISO) (2017) state that facilities management is an organisational function that integrates people, place, process and technology within the built environment to improve people's quality of life and the core business productivity. Similarly, the European Standards (2018) defines facilities management "as an integrated process that supports and improves the effectiveness of the primary activities of an organisation by the management and delivery of agreed support services for the appropriate environment that is needed to achieve its changing objectives". These definitions agree with Hakim *et al.*, (2006) that facilities management is the integration of organisational processes to ensure and sustain organisational effectiveness and improve peoples' lives through effective planning, designing, using and managing buildings, systems, equipment and furniture. However, having a good knowledge of facilities management history will help facilitate the understanding of the core principles of facilities management.

Up until forty years ago, organisations maintained, serviced and cleaned their buildings using in-house staff; the concept of facilities management had not yet evolved (Atkin and Brooks, 2005). Facilities management started in the United States and owes its origin to the growth of office administration, especially in the areas of bringing together large groups of people and computers to fit into office spaces in buildings. In the 1960s, Ross Perot in the United States in his efforts to fit computers into the workplace invented the term 'facilities management'. However, the scope of facilities management has widened since then to include systems, furniture and office design (Wiggins, 2010). The move toward using systems furniture known as cubicles and the introduction of computer terminals into the workplace, and managers of workplaces needing guidance on how to manage these and people, helped in starting the course of facilities management. This guidance was later provided by the Facility Management Institute (FMI) was founded in 1979. Before this time, no organisation focused on providing information to manage the office environment (IFMA, 2014). In 1980 the National Facility Management Association (NFMA) was formed and in that same year, gave birth to the International Facility Management Association (IFMA) to accommodate a growing Canadian membership. IFMA is the world's largest and most widely recognized international association for FM professionals, supporting more than 24,000 members in 94 countries (IFMA, 2014).

Since then, facilities management has developed as a vocation, handling complex and challenging roles and it has helped contribute to the business performance of organisations

around the world (Alexander, 2003). The FM market spread across to Europe with the establishment of EuroFM in 1990 and the British Institute of Facilities Management (BIFM) in 1993 (Shah, 2007). The BIFM is a merger of the Association of Facilities Managers (AFM) launched in 1986 and the Institute of Facilities Management (IFM) launched in 1990. These institutions provide information on the state-of-the-art developments of facilities management, which helps members to make more informed business decisions through effective management (Wiggins, 2010).

In other developed countries such as Japan, New Zealand, Hong Kong, Singapore Australia and South Africa, facilities management has been successfully developed and established. It is recognised in these countries as an activity that can achieve more effective management of buildings, its services, and associated workforce, in support of the strategic objectives of an organisation (Kamaruzzaman and Zawawi, 2010). According to Shah (2007) facilities management in Australia is one of the fast growing industries with an annual turnover of more than AUD$60 billion. Germany and France are also significant facilities management markets. In developing countries such as Malaysia, Uganda and Nigeria, facilities management is still developing. Malaysia for instance, is now putting great focus and emphasis on facilities management, particularly in the public sector (Kamaruzzaman and Zawawi, 2010). In Uganda, the facilities management industry, though not officially recognised, exists in a capacity to grow steadily in line with the economy (Natukunda, 2013). This is the conclusion of a study carried out in order to project the growth of facilities management in Uganda. In Nigeria, facilities management is relatively new and the growth of the profession has been slow. It is practiced in government agencies, corporations and non-profit institutions that have realised the benefits of FM (Adewunmi *et al.*, 2012). There is also the presence of the International Facility Management Association (IFMA) Nigerian Chapter and limited research has been conducted in relation to facilities management in corporate organisations, outsourcing, and in relations to higher institutions of learning.

2.3 SUSTAINABLE FACILITIES MANAGEMENT AND THE QUANTITY SURVEYOR'S ROLE

The pursuit for sustainability has led governments and construction industry players to design strategies, policies, regulations, laws and initiatives that call for more adoption of sustainable buildings and development (Ortiz *et al*., 2009). The idea of Sustainable Facilities Management has developed simultaneously with the primary concept of sustainable development and the cumulative rise of the scale of forecasted climate change (Elmualim *et al*., 2012). Sustainable

development represents a process and a framework for redefining social progress and redirecting economies to enable all people to meet their basic needs and improve their quality of life, while ensuring that the natural systems, resources and diversity upon which they depend are maintained and enhanced, both for their benefit and for that of future generations (Shah, 2007). In construction, sustainable development is represented in the implementation of sustainable construction which is described as a construction process which integrates benefits such as environmental responsibility, social awareness, and economic profitability to society (Miyatake, 1996). With reference to Langston *et al*., (2001) sustainable construction relates to tendering, site planning and organization, material selection, recycling, and waste minimization. Sustainable construction utilises scarce resources and energy, materials, building components, technologies and efficient design to reduce construction's impact on the environment (Roziha *et al*., 2017). While it is understandable that it is challenging to deliver sustainable construction goals in the light of environmental degradation, quantity surveyors can play an essential role in achieving sustainability.

Sustainable construction provides the quantity surveyor with new roles in green costing and carbon management, however it he faces the challenge of responding quickly to the changing requirement of client (Seah, 2009). According to Ma and Luu (2013) quantity surveyors provide not only advices to clients/developers to establishing their sustainability targets, but also the comparable information of alternatives to the design team in a green project. This is significantly important in selecting the most cost effective option for a sustainable design. When selecting the most suitable contractor for a green project, the quantity surveyor plays a major role by conducting his traditional roles with sustainability in view. With his expertise in cost management, and knowledge of construction methodologies, the quantity surveyor can assist clients in achieving their sustainable objectives over the life cycle of a green project. The quantity surveyor is ideal for this role because he understands buildings, its specifications and measurement and is therefore, best suited to measure physical material quantities and then determine the initial materials that have environmental impacts and life cycle costs and these aspects are vital to the practice of sustainable facilities management (Yi Min, 2016).

According to International Facility Management Association (2012), sustainable facilities management is "the process of integrating the people, place, organisational business and process in a way that optimises the economic, environmental and social benefits of sustainability". In other words, sustainable facility management influences employees and different management

levels within the clients' organization which subsequently, impact the service delivery to ensure the incorporation of sustainable criteria, such as energy reduction, waste minimization, procurement controls and fair pay. Combined, these have a balancing effect on the budget with net savings achievable over the lifetime of a contract while providing improved service delivery (Shah, 2007). The features of sustainable facilities management are as shown in Table 1.

Currently, sustainable facilities management presents new opportunities for quantity surveyors. These include analysing and advising on green capital costs, promoting the benefits of life cycle management; green financing and green leases; cost-effective sustainable strategies; property performance appraisals; value management; and engineering solutions, as well as the use of information technology such as building management systems and information models (Deen, 2015).

In the preparation of cost plans, quantity surveying professionals have to allocate additional costs for obtaining green building certification; their costing has to embrace the cost allotment that covers all possible aspects of construction (Roziha *et al*., 2017). In a green project, for instance, the involvement of quantity surveying professionals at the early stage is crucial so that the preparation of green-designed is developed within the allocated budget. Further, their role is essential to advise the designers on the parameters of prices, design efficiencies, design factors and green requirements. The practice should enhance value management practices and risk management (Roziha *et al*., 2017).

More roles played by the quantity surveyor in sustainable facilities management include: adopting and utilising Building Information Modelling (BIM), this enables the quantity surveyor provide enhanced service to clients. With BIM the quantity surveyor gains considerable time in the quantification and cost calculation of tasks providing additional time for other quantity surveying services (Crowley, 2013). Also, according to Gardiner and Theobald (2013) quantity surveyors can encourage the construction industry to use more recycled materials from buildings which are being demolished, such as steel beams and crushing old brick and concrete for use in new concrete by showing the cost savings in relation to new materials as well as reducing environmental impact.

With reference to Oke *et al*., (2010), the quantity surveyor's role in sustainable facilities management is a relevant role in which he can diversify and develop as in other such as arbitration and other dispute resolution procedures, development appraisal, insolvency,

insurance, project management, property investment funding, research methodology and techniques, taxation allowance and grants and valuation.

3.0 RESEARCH METHODOLOGY

The research design adopted for this study is a well-structured questionnaire survey which was used to collect information that provided answers to the central research questions. This study is a descriptive research which looks at the prospects of quantity surveying in sustainable facilities management. The research was restricted to the Lagos state, Nigeria and did not focus on the prospect of quantity surveying outside Nigeria or Lagos state. According to Ibenegbu (2017) a large percentage of construction activities, high-rise buildings, professionals in the built environment and quantity surveying firms in Nigeria have their head office in the Lagos state. The responses from these quarters helped to ascertain the viability of the prospect of quantity surveying in facilities management. The population of the study is majorly professionals in the built industry which are experienced quantity surveyors in (consulting, contracting, private sector, public sector and schools of higher learning) and also other professionals in the built environment with experience in facilities management were involved in the study, with emphasis on past projects within Lagos state, Nigeria.

Stratified Random Sampling method is adopted for this research and the sample size involves fifty (50) construction industry professionals who have been actively involved in facilities management for at least 5 years and which included ten (10) quantity surveyors from consultancy firms, ten (10) from construction companies, eight (8) from integrated practice, twelve (12) from government establishments and ten (10) from the educational sector. The Stratified Random Sampling method ensures that strata of a given population are each adequately represented within the whole sample population of the study (Crossman, 2019). The instrument used for data collection for the study was a well-structured questionnaire informed by literature review. The questionnaire consists of four sections; Section 1 of the questionnaire contains question items to collect the respondent's demographics and responses on some key attributes of the respondents which includes academic and professional qualifications and experience which are required to evaluate the viability of the response gotten from the respondents. Section II of the questionnaire was designed and constructed to collect data on the features of sustainable facilities management, while Section III was designed to collect necessary information for the identification and assessment of the opportunities available to quantity surveyors in sustainable facilities management. Section IV was designed to collect data on the

Quantity surveyor's relevance in sustainable facilities management. All sections were set on a five-point scale (5= Strongly Agree 4=Agree 3=Fair 2=Disagree 1=Strongly Disagree).

A total of fifty (50) questionnaires were distributed to the targeted respondents thorough the hand to hand medium, electronic mail and online form. The electronic medium served the following factors such as broader reach, convenience, low administration cost, speed and timelessness, eases of data entry and analysis. Follow-up phone calls, personal visits and emails were made to respondents to remind them about the survey and encourage participation. The analysis of survey is carried out by Relative Importance Index (RII). RII is the mean for a factor which gives its weight in the perceptions of respondents (Tam and Le, 2006). RII allows identifying most of the important criteria based on participants' response and it is an important tool for priorities indicators rated on Likert type scales (Rooshdi *et al*., 2018).

$$\mathbf{RII} = \mathbf{\Sigma w\ AN} = \frac{\mathbf{5}\boldsymbol{n}+\mathbf{4}\boldsymbol{n}+\mathbf{3}\boldsymbol{n}+\mathbf{2}\boldsymbol{n}+\mathbf{1}\boldsymbol{n}}{\mathbf{5}\boldsymbol{N}}$$

Where,

W= is the weighting given to each factor by the respondents ranging from 1 to 5. (For example, n1=number of respondents for strongly disagree, n2= number of respondents for disagree, n3= number of respondents for fair, n4= number of respondents for agree and n5= number of respondents for strongly agree).

A= is the highest weight (i.e. 5 in the study)

N= is the total number of respondents.

The relative importance index ranges from 0 to 1 ($0 \leq RII \leq 1$). The rating of all the factors for degree of significance was based on the value of their respective relative importance index (RII). Mbamali and Okotie (2012) interpreted the RII Values as follows:

- $RII < 0.60$ is assessed to have a low significance; - $0.6 \leq RII < 0.80$ is assessed to have high significance; and - $RII \geq 0.80$ is assessed to have very high significance.

4.0 DATA PRESENTATION

For this study, 50 questionnaires were sent out, and 40 usable and fully completed questionnaires were returned thus achieving 80% per cent response rate. This high response rate can be possibly credited to the interest of the respondents in the research topic and the use of some of the

techniques suggested in Cooper and Emory (1995) such as personalised approach, follow-ups, questionnaire length, anonymity, and final report incentive.

Table 1: Demographic characteristics of the respondents

Demographic characteristics		**Frequency**	**Percent**
Gender	Male	27	67.5
	Female	13	32.5
	Total	40	100.0
Profession	Quantity Surveying	27	67.5
	Builder	2	5.0
	Facility Manager	5	12.5
	Architecture	1	2.5
	URP	1	2.5
	ESV	1	2.5
	Engineering	2	5.0
	Non – response	1	2.5
	Total	40	100.0
Highest Education Qualification	HND	3	7.5
	PGD	1	2.5
	B. Sc./ B. Tech	11	27.5
	M. Sc./ M. Tech.	24	60.0
	PhD	1	2.5
	Total	40	100.0
Professional Affiliation	None	12	30.0
	NIQS	20	50.0
	NIA	1	2.5
	NSE	2	5.0
	NIOB	2	5.0
	NIESV	2	5.0
	Others	1	2.5
	Total	40	100.0
Nature of Organisation	Building works only	9	22.5
	Building and Civil works	16	40
	Mechanical and Electrical works only	1	2.5
	Options C & D	2	5
	Education	9	22.5
	Others	3	7.5
	Total	40	40
Familiarity with sustainable development goals	Never heard of it	1	2.5
	Moderately	28	70.0
	Very Familiar	11	27.5
	Total	40	100.0
Aware of the concept of sustainable facilities management	No	2	5.0
	Yes	38	95.0
	Total	40	100.0

Table 1 shows that 67.5% of the respondents are males while 32.5% are female. On the respondent's profession, 67.5% were quantity surveyors, 12.5% were quantity surveyors working as facility managers, 5% were quantity surveyors with building and engineering qualifications respectively while the remainder were from other professions (Architects, Urban and Region Planners, Estate Surveyors) and 2.5% did not respond. In relation to educational qualification, 60% had M.SC./ M. Tech., 27.5% had B.Sc./ B. Tech., 7.5% had HND and 2.5% each had PGD and PhD respectively. Also, 50% of the respondents are affiliated with NIQS, 5% are affiliated with Nigerian Society of Engineers, Nigerian Institute of Building and Nigerian Institute of Estate Surveyors and Valuers respectively while 5% are with other professional bodies and had no affiliation.

In addition, the table shows that 22.5% of the respondents work with Building works only, 40% with Building and Civil works, 5% work with Building, Civil, Mechanical and Electrical works, 2.5% are with Mechanical and Electrical works, 22.5% are in Education while 7.5% are in other work areas. Lastly, 95% of the respondents are aware of the concept of sustainable facilities management, 27.5% are very familiar with sustainable development goals, 70% are moderately familiar with it while 5% were not familiar with sustainable development goals.

Figure 1: Number of years worked in the construction industry

Figure 1 shows that 32.5% of the respondents have worked between 0 – 5 years in the construction industry, 30% have 6 – 10 years' experience in the industry, 27.5% have between 11- and 15-years' experience and 5% each have worked 16 – 20 years and above 20 years respectively.

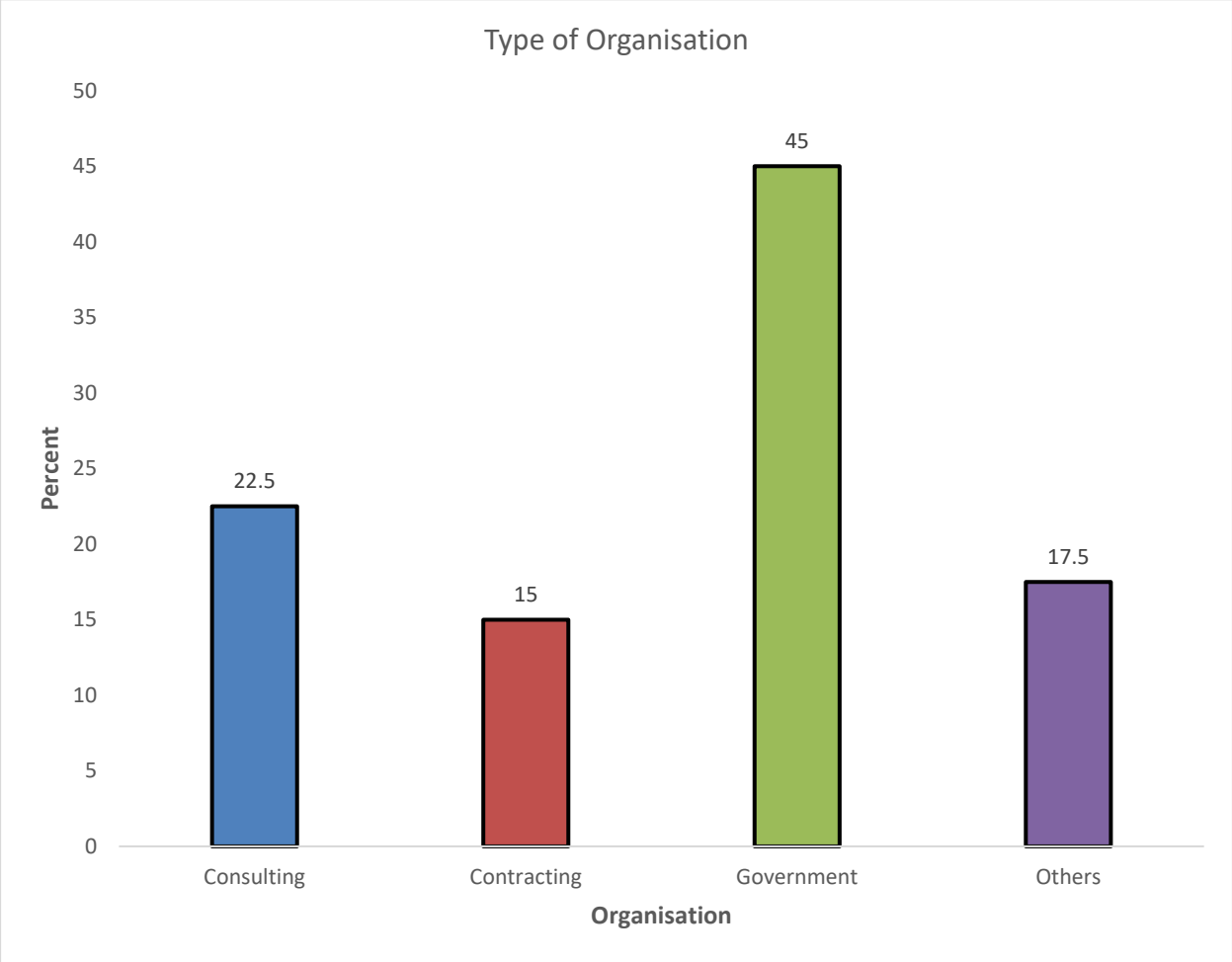

Figure 2: Type of Organisation

Figure 2 shows that majority of the respondents work with government organisations, 22.5% are in Consulting firms, 15% work in Contracting firms and 17.5% work in other organisations.

Table 2: The Features of Sustainable Facilities Management

	FEATURES OF SUSTAINABLE FACILITIES MANAGEMENT	1	2	3	4	5	NO	TOTAL	MEAN SCORE	RII	RANK
1	My organization has a functioning facilities management department	2	2	14	15	7	40	143	3.58	0.71	3rd
2	Sustainable goals is at the core of my organization	1	6	15	13	5	40	135	3.38	0.67	7th
3	There is improved indoor environmental quality in my organization.	1	2	12	21	4	40	145	3.63	0.72	2nd
4	Materials are reused and recycled in my organization	6	15	15	3	1	40	98	2.45	0.49	15th
5	There is increased use of environmentally-preferable products	6	9	18	6	1	40	107	2.68	0.53	14th
6	There is efficient resource use and management in my organization	1	1	19	16	3	40	139	3.48	0.69	5th
7	There is efficient energy management in my organization	1	2	15	20	2	40	140	3.5	0.7	4th
8	There is efficient waste minimization in my organization	1	2	18	17	2	40	137	3.43	0.68	6th
9	There is reduced negative impact on theenvironment by the facility	1	4	26	8	1	40	124	3.10	0.62	12th
10	My organization considers the impact of the building/facilities on the employees' health	1	5	19	11	4	40	132	3.30	0.66	8th
11	In my organization, we adhere to the set regulatory requirements for sustainability	1	9	14	12	4	40	129	3.23	0.64	9th
12	Continuous monitoring is carried out in my organization to track the sustainability performance of the facility	3	8	16	11	2	40	121	3.03	0.60	13th
13	Incorporating sustainable practice in my organization has led to operational efficiencies and effectiveness	3	9	9	15	4	40	128	3.20	0.64	9th
14	My work environment is comfortable and healthy	1	1	5	30	3	40	153	3.83	0.76	1st
15	There is reduction in carbon emission by my organization facility	1	6	23	6	4	40	126	3.15	0.63	11th

Table 2 addresses objective one of this research study and which states "To assess the features of sustainable facilities management". Table 2 shows "my work environment is comfortable and healthy" ranking first with a mean score of 3.83 and RII of 0.76. according to Mbamali and Okotie (2012) RII values of between 0.60 to 0.80 is assessed to have a high significance value. This is followed by "There is improved indoor environmental quality in my organization" which is ranked second and "My organization has a functioning FM department ranking third. "Materials are reused and recycled in my organization ranked last. Table 2 shows that the respondents identify with and understand the features of sustainable facilities management and thirteen (13) out of fifteen (15) features of sustainable facilities management has a high significant RII value of between 0.60 to 0.80. Table two similarly shows that these sustainable facilities management features are practiced in the respondent's organization.

Table 3: The Roles Played by Quantity Surveyors in Sustainable Facilities Management

	THE ROLES PLAYED BY QUANTITY SURVEYORS IN SUSTAINABLE FACILITIES MANAGEMENT	1	2	3	4	5	NO	TOTAL	MEAN SCORE	RII	RANK
1	Cost and carbon management consultation through the integration of cost and carbon footprint	1	1	14	23	1	40	142	3.55	0.71	11th
2	Cost preparation for green facilities	1	1	6	28	4	40	153	3.83	0.76	5th
3	Measurement and benchmarking of property performance against contemporary standards	1	3	9	23	4	40	146	3.65	0.73	6th
4	Consulting on Green Building rating system	3	2	15	17	3	40	135	3.38	0.67	13th
5	Building information model (BIM)	1	1	4	26	8	40	159	3.98	0.79	4th
6	Valuing sustainability of a property	4	2	8	21	6	41	146	3.56	0.73	6th
7	Give advice on renewable energy source and use	3	4	13	16	4	40	134	3.35	0.67	13th
8	Provide guidance on efficient measures on how to reduce wastage of materials and portable water	2	4	8	24	2	40	140	3.50	0.70	12th
9	Building life cycle costing appraisal	1	2	1	26	10	40	162	4.05	0.81	2nd
10	Integrating information and management	1	3	15	18	4	41	144	3.51	0.72	8th
11	Sustainability strategy development.	2	2	10	22	4	40	144	3.6	0.72	8th
12	Managing building operations and maintenance systems.	1	1	4	26	8	40	160	3.98	0.80	3rd
13	Cost control and reporting.	1	1	1	23	14	40	168	4.2	0.84	1st
14	Waste management.	1	2	11	24	2	40	144	3.6	0.72	8th

Table 3 assesses the roles played by the Quantity surveyor in sustainable facilities management and addresses objective two of the research study. It shows that the most role played by the Quantity surveyor in sustainable facilities management is “Cost control and reporting” with a meanscore of 4.20 and RII of 0.84 ranking first. According to Mbamali and Okotie (2012) RII values of between 0.60 to 0.80 is assessed to have a high significance value. The second ranked Quantity surveying role in sustainable facilities management is “Building lifecycle costing appraisal” and the third ranked is “Managing building operations and maintenance systems”. The least roles played by the Quantity surveyor in Quantity surveyors in sustainable facilities management is “Consulting on green building rating system” and “Giving advice on renewable energy source and use” ranking last. Table 3 shows that Quantity surveyors play a highly significant role in all the fourteen (14) roles listed with the RII values in the table ranging from 0.60 to 0.8 and above 0.80.

Table 4: Competency Standards Required by The Quantity Surveyor in Sustainable Facilities Management

	COMPETENCY STANDARDS REQUIRED BY THE QUANTITY SURVEYOR IN SUSTAINABLE FACILITIES MANAGEMENT	1	2	3	4	5	NO	TOTAL	MEAN SCORE	RII	RANK
1	Leadership and Strategy	0	0	2	23	13	40	166	4.15	0.83	7th
2	Effective Communication	0	0	2	20	18	40	172	4.3	0.86	1st
3	Sustainability and Environmental Issues	0	0	1	22	17	40	171	4.28	0.85	3rd
4	Risk Management	0	0	4	19	17	40	168	4.2	0.84	5th
5	Energy and Utility Management	0	0	6	23	11	40	160	4	0.8	9th
6	Financial Management	0	0	8	22	11	41	162	3.95	0.81	8th
7	Procurement, Contracts and Contract Management	0	0	1	25	14	40	168	4.2	0.84	5th
8	Human Resources Management	0	0	5	27	8	40	158	3.95	0.79	10th
9	Quality Management	0	0	1	23	16	40	171	3.65	0.85	3rd
10	Operations & Maintenance	0	0	13	24	5	41	151	3.68	0.75	11th
11	Project Management	0	0	13	22	5	40	147	3.68	0.73	12th
12	Information and Knowledge Management	0	0	1	19	18	40	172	4.3	0.86	1st

Table 4 shows an assessment of the competency standards required by the Quantity surveyor in sustainable facilities management and addresses objective 3 of the research study. The most competent standard required by Quantity surveyor in sustainable facilities management are "Effective communication" and "Information and knowledge management" ranking first with a mean score of 4.30 and RII of 0.86. This is followed by "Quality management" and "Sustainability and environmental issues" both ranking third. The least competent standard required by the Quantity surveyor in sustainable facilities management is "Project management" ranking last. Table 3 shows that Quantity surveyors are highly competent in sustainable facilities management with the RII values of all the competency standards 0.60 to 0.80 and 0.80 and above.

Table 5: The correlation coefficient between the roles and relevance in Sustainable FM

Variables	Mean	Std. Deviation	n	r	p	Remark
QS roles in Sustainable FM	69.81	11.40	40	0.430	0.006	Sig.
QS relevance in Sustainable FM	77.14	12.39				

Table 5 compares the respondents rating of the roles and relevance of quantity surveyors in sustainable facility management. It reveals a mean score of 69.81 (sd = 11.40%) for the roles of quantity surveyors and a mean score of 77.14 % (sd = 12.39%) for the quantity surveyor's relevance in sustainable facilities management. The analysis in Table 5 shows the correlation coefficient obtained as 0.43 ($p < 0.05$) and which according to Dancey and Reidy (2007) implies

that there is a moderate but significant relationship between the roles and relevance of quantity surveyors in sustainable facility management.

5.0 Discussion of Findings

This study is aimed at determining the opportunities available to quantity surveyors in sustainable facilities management and this was carried out by outlining the features of sustainable facilities management, evaluating the quantity surveyor's role in them and assessing the competence required by the quantity surveyor in sustainable facilities management. Based on the findings from the respondents, it is quite obvious that quantity surveyors are well aware of the features of sustainable facilities management, they can play a highly significant role in sustainable facilities management and are highly competent in sustainable facilities management roles.

The findings of the research are similar to the research done by Oladokun, (2011) and Roziha *et al*,. (2017) that the opportunities and roles available for the quantity surveyor within sustainable facilities management industry are undeniably vital to the sustainability of the construction industry. The findings show the roles played by the quantity surveyor in sustainable facilities management and which include: cost and carbon management consultation through the integration of cost and carbon footprint, cost preparation for green facilities, measurement and benchmarking of property performance against contemporary standards, consulting on green building rating system, building information modelling (BIM), valuing sustainability of a property, give advice on renewable energy source and use, provide guidance on efficient measures on how to reduce wastage of materials and portable water, Integrating information and management systems, sustainability strategy development, waste management, building life cycle costing appraisal, managing building operations and maintenance systems and cost control and reporting.

It can be concluded that the quantity surveying and facilities management profession share a lot of similarities in terms of competencies such as in financial, contractual, and procurement management and as stated by (Kamaruzzaman and Zawawi, 2010). However, Brown, *et al*., (2001) argue that this does not necessarily mean that quantity surveyors possess sufficient competencies to provide the overall facilities management roles given the gaps in quantity surveyors' competencies, especially within the operational context such as property and building services maintenance and support service operation. Chan, *et al*., (2002) then suggest that the

basic facilities management competencies can be learned at academic institutions preferable tertiary institutions and more knowledge can be acquired by individual quantity surveyors over a period of time through professional practice, education and continuous professional development (Dada & Jagboro, 2012). Therefore, quantity surveyors need to take proactive measure to ensure smooth accessibility into the facilities management discipline.

6.0 Conclusion

The increased demand and need for sustainability in construction justify the need for more effective ways of managing both the design and construction stages of the building life cycle. Thus this research serves as a beacon for quantity surveyors to appreciate the lucrative opportunities available in sustainable facilities management especially as key areas for growth and learning. Due to industry challenges and global threats, the quantity surveying profession is continually evolving and as such, it is vital for quantity surveyors to continuously seek new areas of business practices and acquire knowledge required to shift into identified new fields and meet up with the demanding needs of the client. The quantity surveying profession can be relevant in facilities management with the improvement of quantity surveyors' competencies in accordance with facilities management requirements.

7.0 Reference

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