

Exploring the Role of Quantity Surveyors in Mechanical and Electrical Services Cost Estimation – Challenges, and Client Implication

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Abstract

Mechanical and Electrical (M&E) services costs constitute a substantial proportion of the total cost of a building. Realistic cost estimates for this element are a desirable option by industry stakeholders because the total building cost can potentially be reduced if the cost of M&E services can effectively be managed. However, M&E services are one building element that quantity surveyors find very difficult to prepare cost estimates for. This study explored the roles of quantity surveyors in the delivery of M&E services cost estimation using the qualitative method of semi-structured interviews to explore the issue. Five professional quantity surveyors were selected for the interview through a purposive sampling technique. The condition for the selection of respondents was a minimum of 15 years of experience in the building construction industry, and a membership of the relevant professional body. The study found that M&E services cost estimates were mostly prepared by M&E services consultants whom quantity surveyors considered to have the qualification and expertise to deal with the specialised nature of the M&E services. Quantity surveyors' participation in direct cost estimation of M&E services was minimal, restricted mostly to the role of proposing alternative suppliers of M&E services, due to their limited knowledge of the M&E services technology. The cost/m² method was predominantly used by quantity surveyors to prepare their cost estimates of M&E services, relying on information obtained from M&E services consultants and historical data of already executed projects of similar nature. Quantity surveyors unanimously agreed that clients were not deriving maximum benefits from their services if they were not able to prepare cost estimates of M&E services. The study recommended continuous collaboration between quantity surveying and the M&E services professions, and the acquisition of relevant education specific to M&E services cost estimation by quantity surveyors.

Keywords: Competencies, Cost estimates, Quantity surveyors, Mechanical and electrical services, Methods, Client, Challenges, Services, and disservices, Sources of information.

Introduction

Mechanical and electrical (M&E) services elements constitute an integral and indispensable component of every building construction project. M&E services not only provide a core function of ensuring comfortable and healthy conditions in a building (Swaffield and Pasquire, 1999), but also contribute substantially to the total contract sum of buildings (Aibinu et al., 2015; Olanrewaju and Anahve, 2015).

According to McCaffrey (2011), M&E services could make up 10% to 70% of total construction cost, depending upon the function of the building. Yusuf and Mohamed (2015) opine that modern buildings are becoming more sophisticated in terms of engineering services and the financial ratio between M&E services and building cost in a modern building is on the increase and could account for up to 50% of a project's total cost. Additionally, about one-third of cost estimates for M&E engineering services miss cost targets (Anderson and Tucker 1994). Effective cost estimation and management of M&E services in buildings is therefore highly desirable by industry stakeholders (Langdon, 2010). This requires quantity surveyors to place increased emphasis on the measurement, cost estimation, and value of M&E services using their skills and competencies in performing these functions (RICS, 2000; Ashworth, *et al.*, 2013). However, the design and increasing complexity of M&E services in modern building projects are creating an enormous cost management gap in estimation for quantity surveyors (Babalola and Adesanya, 2007).

The competencies of quantity surveyors include single-rate approximate cost estimating, cost and procurement advice services, measurement and quantification, preparation of contract documentation, final accounts, and contracts administration of building projects (Arowoia *et al.*, 2022; Ashworth *et al.*, 2013; Shafiei and Said, 2013; AIQS, 1998; and RICS, 1998). These competencies are expected to impact every stage of the building construction project, from the early design stage, right through to the completion of the project. To the client and the consulting team, the competencies of quantity surveyors are a required deliverable to ensure the success of building projects (Cunningham, 2014). Notwithstanding the competencies of quantity surveyors, preparing cost estimates for M&E services elements has always been a difficult task to perform by the quantity surveying profession (Aibinu *et al.*, 2015). The majority of quantity surveyors and surveying firms are not directly involved in the preparation of cost estimates of M&E services, and there appears to be little, or no effort geared toward improving the cost estimation of M&E services. This is evident in the number of contract documents without bills of quantities for M&E services, from which proper cost estimates can be prepared. Cost estimation of M&E services has traditionally been provided by the M&E services consultants and inserted in the bills of quantities by the quantity surveyor as a lump sum (Swaffield and Pasquire 2000).

Very few studies on M&E services exist (Arowoia *et al.*, 2022; Arowoia and Akinradewo, 2021; Mitchell, 2016; Oladipo, 2013; Shittu *et al.*, 2008; Swaffield and Pasquire, 1999) *via-a-vis* M&E services cost estimation. Practically, there is no such study on M&E services cost estimation from the construction industry's perspective in Ghana. This makes M&E services cost one of the least explored areas in research. The cost significance of M&E services makes it imperative for quantity surveyors to have knowledge and appreciation of the cost implication of M&E services scope of work.

This study had the objective to explore the role and challenges of quantity surveyors, and methods used in the cost estimation of M&E services in buildings. A qualitative method of semi-structured interview was used to explore the issue. Content analysis was used to analyse the interview transcripts.

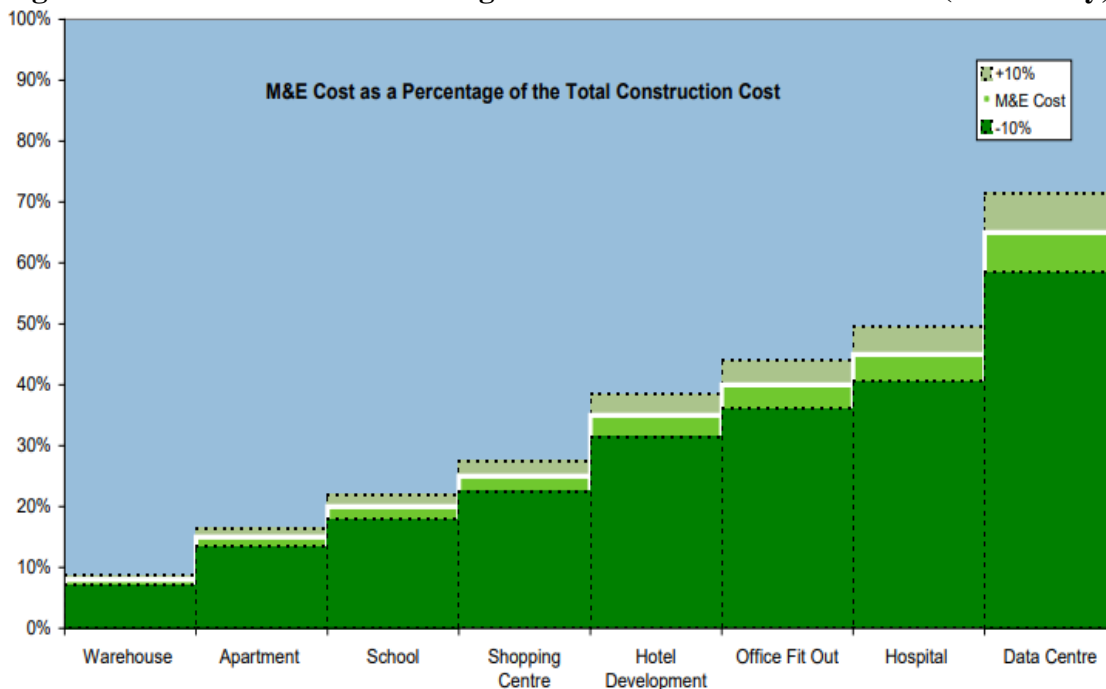
Literature Review

Significance of M&E Services in Buildings

M&E services constitute essential facilities that make buildings more than a shelter (Swaffield and Pasquire, 2000). M&E services are one of the essential works of the modern building construction

industry, providing comfortable conditions in a room, and contributing a significant proportion to a building's capital cost (Aibinu et al., 2015). In Figure 1, McCaffrey (2010) gives the proportion of M&E services cost to the total cost of different building types. This cost ranges from 10% to as high as 70% depending upon the type of building. For instance, the M&E services cost for buildings like hospitals, laboratories, mega shopping complexes, and hotels, can account for approximately 40% - 60% or even more of the capital costs (Figure 1). As buildings grow in size and complexity, so is the complexity and cost of the M&E services (Aibinu et al., 2015; Olanrewaju and Anahve, 2015). The greater the increase in the size of M&E services in capital cost, the higher the operation cost and the maintenance of the building while in operation (Olanrewaju and Anahve, 2015). This cost is expected to rise depending on the sophistication of the M&E services. (Yusuf et al., 2017). Similarly, Ashworth (2010) alleges that close to 80% of the operating costs of buildings can be attributed to M&E services. Further, according to Rawlinson and Dedman (2010), M&E services can take up 15% of the total volume of a building. Hall and Greeno (2007) also posit that building services cannot be ignored and architects have to learn to accept and accommodate the increased need for components like pipes, ducts, and cabling encroaching onto their designs. Industry stakeholders expect the cost of M&E services to be effectively managed because of the significance of M&E services and their relative cost to the total cost of building projects (Kumar, 2009; CIDB, 2009; Yong et al., 2004). The cause of time and cost overruns could be attributed to the interface problem between the knowledge of quantity surveyors and the technology of M&E (McCaffrey, 2011).

Figure 1: M&E Costs as a Percentage of the Total Construction Cost (McCaffrey, 2010).



The Quantity Surveying Profession and M&E Services Cost Estimation

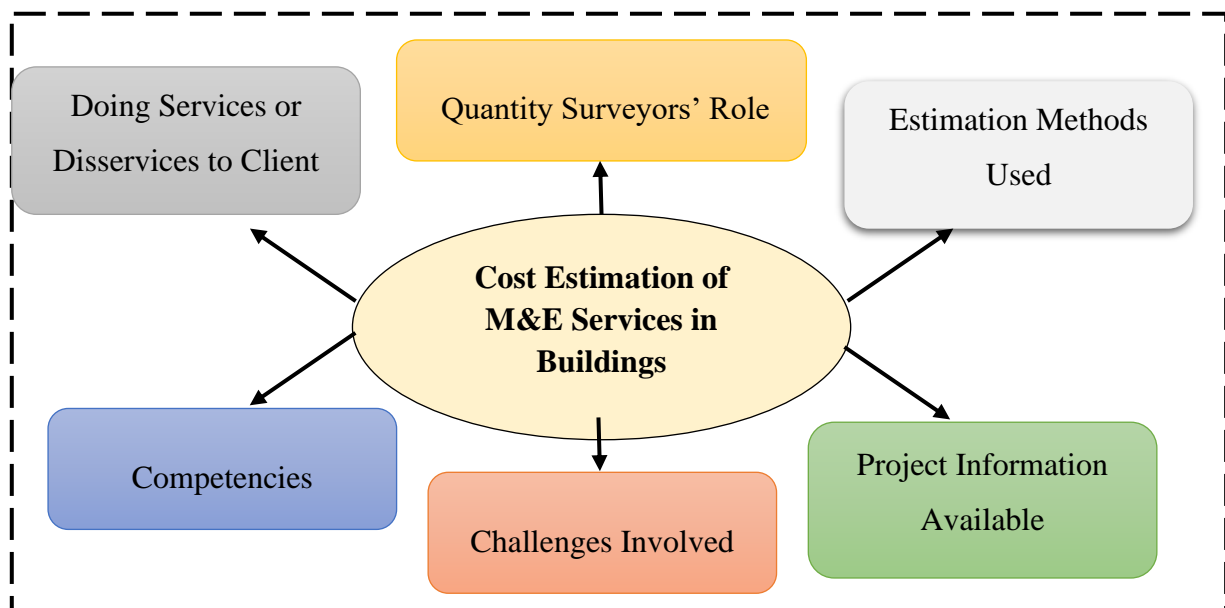
McCaffrey (2011) describes the conventional approach to quantity surveying in construction projects as involving the quantity surveyor handling the building work costs, while M&E services engineers manage the M&E aspects of the project. However, he argues further that this traditional approach constitutes a long-existing failure in the quantity surveying profession as M&E services engineers are not trained to handle cost estimation as effectively as the quantity surveying profession. Mitchell (2016) cites the Interim Measure 1 of the Irish PWC, which is founded on the belief that the quantity surveyor is best placed to

manage all building costs including those relating to services. Unfortunately, for most quantity surveyors, getting involved in M&E services is an unknown territory (Ashworth, 2010; Marsh, 2003). In most cases, cost estimates of M&E services are wholly left in the remit of the M&E services engineer (McCaffrey, 2010). According to Arowoia and Akinderawo (2021), the preparation of a bill of quantities, and installation of M&E services, which provide the basis for subsequent cost estimation of M&E services are not well incorporated in the curricula of some Nigerian tertiary institutions. Yusuf et al. (2012) agree that quantity surveyors are not always fully aware of the technology of M&E services and so the measurement of the services may be difficult. Swaffield and Pasquire (2000) state that a sufficiently accurate cost estimate depends on an accurate understanding of the quality of M&E services required by the client. Notwithstanding the issue of lack of technical knowledge in M&E services as a major setback, for the quantity surveyor to provide value-added services to the client, they must have the competencies to prepare cost estimates for this all-important element of M&E services (Yusaf et al., 2013).

Methodology of Research

The study employed a qualitative method, using a semi-structured interview approach to collect data. A review of relevant literature and personal knowledge of the building construction industry aided the design of the interview guide. The study targeted quantity surveyors as respondents. A purposive sampling technique was used in the selection of the study respondents. The criteria for the selection were that a respondent should be a member of a relevant professional body and must have a minimum of 15 years of work experience in the building industry. This was meant to guarantee the credibility of the information provided by respondents. Longer tenure in the industry could signify potential exposure to a substantial number of M&E services projects, while professional affiliation indicates adherence to best practices and procedures. Five professional quantity surveyors agreed to participate in the interview out of initially 9 contacted. A telephone interview was arranged and conducted with the respondents at a date and time convenient to them. The telephone interview was adopted upon request by respondents. Six thematic areas were explored in the interview (Figure 2). On average, each interview lasted for 35 minutes.

Figure 2: M&E Services Cost Estimation and Issues



Results and Discussion

Role of Quantity Surveyors

This theme highlights the role of quantity surveyors in the cost estimation of M&E services. The interviews unveiled a division of responsibilities among quantity surveyors and other professionals engaged in preparing cost estimates for M&E services. These individuals were tasked with achieving a balance between what was required and what was affordable. The major findings revealed that the involvement of quantity surveyors in the cost estimation of M&E services was minimal, as M&E services engineers predominantly led the estimation process and prepared these cost estimates.

Quantity surveyors primarily played the role of assessing the reliability of the cost estimates prepared by M&E services engineers. Others simply accepted the lump sum cost figure provided by M&E services engineers into the bills of quantities without probing as they lacked the skills in M&E services work and preferred to avoid involving themselves in M&E services cost controversies they could not defend. The objective of the assessment was to ensure that the cost figures for M&E services were realistic and did not exceed the client's expectations and budget. The methods used for assessment varied and included reliance on trust for M&E services engineer's estimates based on past experiences, utilisation of in-house expertise, and verification through suppliers' information.

Main Question

Do you or does your firm prepare cost estimates for M&E services?

Answer

"Not really, we don't engage ourselves in the cost estimation of M&E services, at least in this office. The services engineers normally are the ones who prepare and provide these estimates for incorporation into the BoQ". (QS1).

"At least not in the past few years because the firm I work for usually brings in the M&E services consultants from the start. The architect chooses to rely on the M&E guys a bit more than we the quantity surveyors". (QS2)

"The M&E consultants have been providing the cost estimates for M&E services. We rarely prepare these cost estimates ourselves, I don't remember the last time". (QS3)

Follow-up Question

If you don't provide these cost estimates, how are you able to assess the reliability of the M&E services engineers' cost estimates?

Answers

"Like I said earlier on, in some of the cases, there are some things that you can check as a QS, others you cannot. You can also call, because sometimes when you look at the specification you can ask them to give you a particular supplier or brand that they recommend, so you can refer to them and ask them to give you a quotation". (QS1)

“If you have done a previous project with M&E guys and then maybe from your initial budget, and what cost they also gave was realistic, then from that, you know that if you move on to another job with the same M&E consultants at least you have the idea that over the years they have provided a bit of realistic rates for you”. (QS2)

“Normally there is a way that we look at it. For example, if we are doing highly serviced projects, like hospitals, labs, offices, we depend on our in-house services guys to check the reliability of the cost estimates”. (QS3).

“No, we don’t. Because the knowledge of M&E services is lacking by us, we are not able to probe the engineers’ cost estimates that much. Even senior Quantity Surveyors are sort of afraid to do that because if there should be any cost overrun or underrun, how are they going to defend themselves”. (QS4)

“No, I have no means of doing that, it’s a matter of trust and professional ethics”. (QS5)

Methods for Preliminary Cost Estimation of M&E Services.

This section of the interview is related to the estimating methods for M&E services cost estimation by the quantity surveyors. The interviews shed light on the main method used, and the limitations associated with its usage. The interview revealed quantity surveyors’ over-reliance on the cost per floor area (cost/m²) method for preparing cost estimates when necessary. This method utilises historical data from similar projects. In the absence of historical data, however, quantity surveyors depended on their experience and information obtained from services engineers to prepare M&E services cost estimates.

The main weakness identified with the cost/m² was the inaccurate cost estimates it gave. For instance, the absence of data on past projects of a similar nature to which to compare the new project was found to affect the accuracy of the cost/m² method. Similarly, the uniqueness of the proposed project, the lack of standardised dimensions, and project flexibility in the local building industry made the use of the cost/m² method quite limited and problematic.

Main Question

We know that one of the basic responsibilities of every QS is to prepare cost estimates and provide cost advice services to the consulting team. Notwithstanding this fact, the M&E services engineer has been preparing the cost estimates for M&E services. What estimating method is available to you as a QS if it becomes necessary to prepare your cost estimates for M&E services?

Answers

“The services guys that we work with, they do the cost estimates. However, if it becomes very necessary, the cost per square meter of a similar project approach is used from historical data, by adjusting for time”. (QS1)

“Most of the time, comparative cost estimate using the cost/m² based on previous projects of a similar nature is used to price M&E services. However, if the new project is unique, with no similar information to past projects, I rely on my expertise to try to come up with some rough estimates”. (QS2).

“If the client needs cost at the early stage, we just fall on historical data of cost/m² of similar project.” (QS3)

“Well, some of the projects you realise that the M&E guys are already on board. However, if they are not, then you the QS must come up with the cost estimates using your experience and whatever information is available at the time”. (QS4)

Follow-up Question

Can you think of any weaknesses in the method currently used for M&E services cost estimation by you?

Answers

“Yes, the weakness I would identify is the interior design space and item specification. The two projects might be similar in form and function alright but if specifications and finishes differ, then you have a challenge with the cost/m² method”. (QS2)

“Problem with our part of the world is that, in most of our building types, we don’t follow standardised dimensions, and because of that flexibility, it is not so easy to transfer information from one project to the other, thereby making the usage of the floor area method a bit wrong and problematic”. (QS3)

“The cost/m² has flaws. Looking at similar projects that have been completed in the past, their finishes might differ from the proposed project. Another problem is the lack of data for a similar project to which to make the comparison”. (QS4)

“Because every project is unique, the cost/m² method might not give accurate estimates. At times for example per m² area of a new project might contain more sockets and switches than the historical project. These variations can be 30% to 45% in some cases”. (QS5)

Sources of Information for Cost Estimation of M&E Services

By analysing the questions and responses, this analysis highlights the sources of project information available to quantity surveyors for cost estimation of M&E services. The interview uncovered the non-existence of a centralised location or body in Ghana, akin to the Building Cost Information Services (BCIS) in the UK, from where quantity surveyors could obtain cost information for the analysis of the cost of building elements. Quantity surveyors had to make their efforts to secure information for the cost estimation of M&E services. The primary source of information for quantity surveyors was records of past projects. This suggests that quantity surveyors maintained records of historical projects in their firms, potentially explaining the prevalent use of the cost/m² method in the industry, as this method thrives on past data. Quantity surveyors also relied on architects and M&E services engineers for information to assist in the cost estimation process for M&E services. In particular, in-house services professionals made access to information much easier for quantity surveyors. This collaboration and communication with M&E services engineers played a crucial role in quantity surveyors’ understanding of some of the technical aspects and cost implications of M&E services as established in the interview.

Main Question

What sources of information are available to you in the preparation of cost estimates of M&E services?

Answer

“Based on similar previous projects, the percentage of M&E services that constitute the total cost can be used for the current project by adjusting for time. This provides a guide as to the cost of M&E services elements for a building”. (QS1)

“The GhIS has no pool of information like the BCIS, from where quantity surveyors can obtain information for cost estimation for various elements of a building. Even though over the years, there has been such thinking around, it has not materialised yet. It is up to individual offices and individual practicing quantity surveyors to look for information to come up with their cost estimates”. (QS2)

“Basically, it is the architect’s design information that I depend on because, by the time we will be preparing the cost estimates, M&E services drawings are normally not ready. Most of the time, by the time the M&E services drawings are ready, things might have changed”. (QS3)

“Architectural information like the floor area, levels of storeys, number, and sizes of rooms, the purpose of rooms some services layout drawings, and historical data of similar projects, if they are available can be used to derive cost estimates of M&E services elements”. (QS4)

“If you have in-house M&E professionals, it makes access to information easier, otherwise, you have to go out there as a QS to look for information from the M&E guys”. (QS5)

Challenges in Cost Estimation of M&E Services

This section of the interview transcripts explains the specific challenges encountered by quantity surveyors in the cost estimation of M&E services, providing a comprehensive understanding of the difficulties involved in the delivery of M&E services cost estimation. Furthermore, the analysis can explore the perception of quantity surveyors regarding the sufficiency of their training and education to perform cost estimates of M&E services.

A careful analysis of the interview transcripts revealed that M&E services drawings were often not available or designed to the required level of detail, making it very challenging for quantity surveyors to prepare M&E services cost estimates. The interview also exposed the difficulty in understanding the technology and installations of the M&E services system, creating a knowledge gap for quantity surveyors. This knowledge gap posed a serious challenge for quantity surveyors and inhibited their ability to engage in effective cost estimating of M&E services.

The over-dependence on M&E engineers' estimates also constituted a challenge for quantity surveyors in M&E services cost estimation, as revealed in the interview. With M&E services engineers already in charge, quantity surveyors did not feel motivated enough to want to involve themselves in serious M&E services cost estimation, limiting their role. Quantity surveyors acknowledged the inadequacies in their training and education as a major disadvantage impacting their ability to prepare M&E services cost

estimates. They particularly expressed the need for the acquisition of relevant education and training specifically focused on M&E services specifications, installation, and cost estimation.

Main Question

In your candid opinion, what would you say are some of the challenges that confront you and inhibit your abilities to prepare cost estimation of M&E services?

Answers

“Well let me say that, because M&E services are mostly not available at the initial stages, and where available are not designed to the level and details that you want to see, the QS is not able to take out quantities and price them. However, if drawings are available and well done, then based on experience the QS should be able to quickly come up with some quantities and maybe cost estimates”. (QS1)

“One of the major challenges is being able to understand the various aspects of M&E services and how they are installed in a building. Once you know how these aspects are related and work together, then you have an idea about their estimation. Currently, I don’t think we have that experience, and that is what makes us lag in M&E cost estimating is concerned”. (QS2)

“The problem with the QS is that we don’t have the in-depth knowledge in M&E services systems. One thing I have realised is, that if you have limited knowledge in a particular area of work, there is no way you can get the cost right, and if you force yourself to do it, then you are most likely to mess up and cause embarrassment to your good self and team”. (QS3)

“My knowledge is so minimal when it comes to M&E systems. So normally, I don’t want to try at all. I would prefer the M&E consulting engineers to prepare the cost estimates. I just pick their cost and add it to the cost of the project”. (QS4)

Follow-up Question

Do you think the quantity surveyor's training and education are sufficient to allow for the proper preparation of cost estimates for M&E services systems as in other building fabrics and finishes?

Answers

“The education is simply not enough. What I realised is, we pick experience on the job”. (QS1)

“We don’t have it. Currently, our education and training are not enough. The problem has always been the electrical and air-conditioning works. There should be a comprehensive programme for M&E services every semester at our universities to ensure that we understand the issues of M&Es. I am very weak in that area, and I don’t want to go there at all”. (QS2).

“The basic training, I would say is somehow ok. Our education, however, does not place too much emphasis on M&E systems and cost estimation”. (QS3)

Competencies in M&E Services Cost Estimation

This section addresses the competencies of quantity surveyors in M&E service cost estimation. A thorough analysis of the interview transcripts indicated that quantity surveyors lacked the necessary competencies and skills to generate reliable cost estimates for M&E services. Notably, they expressed a lack of confidence in their own M&E services cost estimates and demonstrated a preference for the estimates provided by M&E services engineers.

The specialised nature of M&E services and the expertise of M&E services engineers made them more qualified than quantity surveyors to provide these estimates. The findings confirmed the gap in knowledge among quantity surveyors in M&E services technology, serving as an obstacle to the preparation of M&E services cost estimates. The interview further emphasised the importance of collaboration, and the acquisition of relevant education and training in M&E services to enhance the competencies of quantity surveyors in the delivery of M&E services cost estimation at all times.

Main Question

In your candid opinion, which of the two professionals; the quantity surveyor, or the M&E services engineer, do you think is more qualified to prepare accurate cost estimates of M&E services?

Answers

“Currently, I would be more biased towards the M&E engineers to be more placed to perform budget estimates of M&E services than quantity surveyors because they are specialists in those fields. We don’t have the relevant education and what it takes to do that”. (QS1)

“The M&E consultant currently is more placed because they do the designs and appreciate their own design and cost estimates”. (QS2)

“If you don’t have an M&E guy that you can fall on to generate cost estimates, then you are in trouble. M&E guys are more competent and well placed. My knowledge is so minimal when it comes to M&Es”. (QS3)

“I think M&E services is a bit more of a specialist area. It is not a traditional role. So, it might take quantity surveyors some time to catch up”. (QS4)

“Well, the QS has the tools to do a better job, but we will need some more specialised training and education, and then the M&E consultants have to better understand how to communicate to the QS their intentions. Until that is achieved, the services engineers are in a better position to provide cost estimates for M&E services”. (QS5)

Quantity Surveyors’ Offer of Service or Disservice to the Client

This section focuses on the traditional responsibilities of quantity surveyors as cost estimators and advisers to the project team. It examines the potential consequences of offering inadequate service to clients if quantity surveyors are unable to manage the cost of M&E services. The viewpoints of respondents are analysed.

The interviews revealed a unanimous acknowledgment among the majority of quantity surveyors that their inability to generate dependable cost estimates and offer cost advice services for M&E services constituted a significant disservice to clients. The over-dependence on M&E services engineers' cost estimates by quantity surveyors without an effective mechanism to evaluate the credibility of these estimates, raised a major concern about the quality of services offered to clients by quantity surveyors. Most quantity surveyors admitted that their lack of control over M&E services cost estimates represented a disservice to clients and undermined their prominent role as advisors on project costs. One respondent, however, presented a divergent view, asserting that the industry operated as a team where the collaborative effort and expertise of individual professionals contributed to the project success. He contended that even if M&E services engineers were engaged in M&E services cost estimation, quantity surveyors continued to maintain a crucial role in reviewing and providing advice on the M&E engineers' estimates, while also proposing alternative solutions.

Main Question

As a quantity surveyor, you are responsible for providing cost advice and cost estimation services on building projects. However, the services engineers have been providing cost estimates for M&E services. Would you consider your inability to provide these cost estimates a disservice to the client?

Answers

“Yes, it is very worrying. Based on experience you realised that a four-bedroom house say, cannot have the cost of services alone amounting to Ghc1million irrespective of the quality requirement. So, you see, we do a disservice to the client if we are not able to evaluate and give them good cost advice”. (QS1)

“Yes, yes, it’s true and it bothers me a great deal. As QS you have no control over the cost of M&E services. Cost is just dumped on you by the services engineers, and you don’t even have a means of assessing the credibility of it. Meanwhile, you are considered a cost advisor to the client”. (QS2)

“Honestly, the client is not fully benefitting from our services if we are unable to provide cost estimates and advice services on M&E works, and I see that as a great disservice”. (QS3)

“I don’t think the situation is that worrying. Rather, we must accept the fact that it is teamwork and that we have cross-functional knowledge. Knowledge is no longer anybody’s preserve now. If there is an M&E guy on board, then we try to bring out the best of whatever he has to offer. We review the M&E guys' cost estimates and advise on alternatives. For you to see the contributions of the QS in M&E estimates, just remove the QS from the equation and see the confusion that would arise. Either way, I think the QS plays a major role. Is not a disservice, is just that you are allowing a specialist to contribute more but we are guiding what they contribute”. (QS4).

“Yes, I think so and it is quite embarrassing because once you are the cost advisor, you should be well-versed in every area of the project, be it M&Es or whatever. QS should have the upper hand in every cost aspect of the project, otherwise, how do you dispute or confirm cost estimates by the M&E engineer when called upon to advise on that by the client?”. (QS5)

Conclusion

The interviews emphasised the limited participation of quantity surveyors in M&E services cost estimation, primarily focusing on offering advice on alternative suppliers and brands of M&E services. It revealed the cost per square meter (cost/m²) method as the main approach for estimating M&E services costs, utilising information from M&E services engineers and historical project records. While quantity surveyors were typically engaged to provide cost estimates and advise on the overall project cost, in the case of M&E services, they tended to rely on the cost estimates provided by M&E engineers due to a lack of competencies in this area. This was a notable disservice to the client by quantity surveyors because M&E services costs alone can potentially impact the overall project cost substantially. The extent of importance of M&E services costs is that, if these costs or estimates are not managed well, it could eventually lead to project cost overruns and failure. The findings underscored the importance of continuous development of the quantity surveyors' competencies to include a comprehensive understanding of M&E services systems and cost estimation through relevant education and training. Improved knowledge and skills in M&E services technology are expected to ensure more accurate cost estimates, efficient project delivery, and increased client satisfaction and confidence.

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