

ENHANCING BUILDING SERVICES COST MANAGEMENT KNOWLEDGE
AMONG QUANTITY SURVEYORS

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A thesis submitted in fulfillment of the
requirements for the award of the degree of
Master of Science (Quantity Surveying)

Faculty of Built Environment
Universiti Teknologi Malaysia

AUGUST 2013

Special dedicated to:

My beloved parents, Ayah and Mak

My dearest siblings,

Abang Rizal, Kak Jue, Kak Ida, Abg Joe, Kak Eni, Abg Ang, Kak

Ena, Adik Paih

Who offered me unconditional love and support...

My supportive supervisor, Dr. Sarajul Fikri Mohamed

Who teach and guide me throughout the research...

All my faithful friends,

My dearest roommates,

Nurizan, Mazlin, Khairiah, Nisa

My Comrades,

Shazwani, Ganiyu, Amirrul Amir, Faizal, Hayani, Dayah, Farah,

Noien, Wani, Yong, Akma, Ridzuan, Qayyum, Hafiz and Shidah

For their friendships and supportive that brightens my research life...

ACKNOWLEDGEMENT

In the name of Allah, most benevolent and ever-merciful, All praises be to Allah Lords of the worlds. First and foremost, I would like to express my heartfelt gratitude to Dr Sarajul Fikri Mohamed to be such inspirational, supportive, patient and being so consideration through my research journey to produce a quality work, generous advices, guidance, comments, patience, commitments and exposed me to the world of research. I would also like to thank my examiners who provided encouraging and constructive feedback. It is not an easy task, reviewing a thesis, and I am grateful for their thoughtful and detailed comments.

This thesis was funded by grant by Universiti Teknologi Malaysia and I would like to endlessly thank university for the generous support. As a member of the Universiti Teknologi Malaysia, I have been surrounded by wonderful friends; they provided a rich and fertile environment to study and explore new ideas. Thank you Shazwani, Ganiyu, Nurizan, Mazlin, Khairiah, Nisa, Amirrul Amir, Faizal, Hayani, Farah Farhana, Hidayah, Anne, Akma, Hazren, Halwani, Ridzuan, Qayyum, Hafiz and Shidah and others who being so supportive along the lonely journey.

In addition, my sincere appreciation especially to my parents; Remeli and Fatimah; my siblings; Rizal, Norhalida, Rozaini, Ruzaina and Mohd Faiz who have never declined me any support and endlessly love throughout my research journey. They have been very supportive to my ideas and kept inspiring me besides pouring me their unconditional love that has been the drive in pursuing my dreams. Heartiest thank.

Last but not least, to Allah, most gracious and most merciful. Most thankful to Allah. Alhamdulillah. Without Allah I cannot strive to the end of the journey. Thank you for the strength and courage given. Thank you for the help with everything. Your grace and love is what I need in my whole life. May the love for you Allah, is greater than the love for your creatures.

ABSTRACT

It is essential for quantity surveyors to improve their knowledge in building services cost management to avoid financial loss in a construction project. The need of mechanical and electrical quantity surveyor in construction industry is vital for clients to have a proper cost management of building services. The objective of this research is to examine the level of involvement of quantity surveyors in the cost management of building services. It investigates the nature of quantity surveyors' knowledge gap in building services cost management and identifies the measures to bridge the knowledge gap in building services cost managements. The research methods used are questionnaires survey among quantity surveyors and semi structured interviews among quantity surveyors and building services engineers, who are randomly selected from those having at least 10 years of experience in construction industry. Four crucial gaps were identified as the barriers which hinder quantity surveyors to manage building services cost management. The main gap is the omission of building services in the scope of work of quantity surveyors which lead to the work being passed to the building services engineers. Traditionally, the quantity surveyors are not involved in building services cost management. Therefore, quantity surveyors faced difficulty in understanding and interpreting mechanical and electrical components during measurement due to the non-availability of complete drawing. Furthermore, quantity surveyors are not well-skilled to manage building services cost management and seldom included in the scope of works. Hence, it is recommended that building services training and Quantity Surveyor Building Services Programme should be included in the program syllabus and curriculum so as to enhance the knowledge of quantity surveyor and increase their involvement in the field. Quantity surveyors should be responsible and play their roles in controlling the cost of a project. They must have a thorough knowledge in building services work other than building works for them to venture into a wider scope of works.

ABSTRAK

Mempertingkatkan pengetahuan dalam pengurusan kos kemudahan bangunan oleh Juruukur Bahan adalah sangat penting bagi mengelakkan kerugian yang tinggi dalam sesebuah projek. Perlunya seorang Juruukur Bahan Mekanikal dan Elektrikal dalam industri pembinaan adalah penting bagi klien untuk pengurusan kos kemudahan bangunan yang betul. Objektif kajian ini adalah untuk mengkaji tahap penglibatan Juruukur Bahan dalam pengurusan kos kemudahan bangunan; mengenal pasti sifat jurang pengetahuan Juruukur Bahan dalam menguruskan kos kemudahan bangunan dan mengenal pasti langkah-langkah untuk merapatkan jurang pengetahuan tersebut. Kajian metodologi yang digunakan adalah soal selidik di kalangan Juruukur Bahan, temu bual semi-struktur dengan kedua-dua pihak yang terlibat; Juruukur Bahan dan Jurutera Kemudahan Bangunan dipilih secara rawak yang mempunyai sekurang-kurangnya 10 tahun pengalaman dalam industri pembinaan. Terdapat empat jurang penting yang dikenal pasti sebagai kekangan Juruukur Bahan dalam mengendalikan kos kemudahan bangunan. Antara kekangannya ialah penolakan kemudahan bangunan daripada skop kerja Juruukur Bahan mengakibatkan skop kerja tersebut diserahkan kepada jurutera kemudahan bangunan. Secara tradisionalnya, Juruukur Bahan tidak terlibat dalam pengurusan kos kemudahan bangunan. Jadi, Juruukur Bahan menghadapi kesukaran dalam memahami dan mentafsir komponen kemudahan bangunan semasa membuat pengukuran kerana lukisan projek yang tidak lengkap. Tambahan pula, Juruukur Bahan tidak berkemahiran untuk menguruskannya dan jarang dimasukkan ke dalam skop kerja Juruukur Bahan. Oleh itu, latihan dalam bidang ini dan Program Juruukur Bahan Kemudahan Bangunan perlu dimasukkan ke dalam kurikulum dan sukatan program adalah dicadangkan untuk meningkatkan pengetahuan Juruukur Bahan dan meningkatkan penglibatan Juruukur Bahan dalam bidang ini. Juruukur Bahan perlu bertanggungjawab memainkan peranan mereka dalam mengawal kos projek. Mereka juga hendaklah mempunyai pengetahuan yang mendalam dalam kemudahan bangunan selain dari kerja bangunan sahaja untuk berkecimpung dalam bidang yang lebih luas.

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LIST OF ABBREVIATIONS

BCIS	-	Building Cost Information Service
BoQ	-	Bills of Quantities
BQSM	-	Board of Quantity Surveyor Malaysia
BS	-	Building Services
QS	-	Quantity Surveyor
M&E	-	Mechanical and Electrical
RICS	-	Royal Institution of Chartered Surveyors
RII	-	Relative Important Index
RV	-	Respondents of Validation
SMM	-	Standard Method of Measurement
SMM M&E	-	Standard Method of Measurement of Mechanical and Electrical
SWOT	-	Strength-Weaknesses-Opportunity-Threats

CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter covers background of research, problems statement and research proposition. Other than that, this chapter also highlighted the research questions, research objectives, scope of the research, methodology used in the research and significance of the research.

1.2 Background of Research

Quantity Surveyor (QS) is a professional individual that knows everything about the budget and estimation of construction cost, the economics of building up buildings, managing the tender and also the project as well (Abd Rashid, 1987; Hiew and Ng, 2007). Besides, QS also specialized in applying the knowledge of cost and prices of work, labour, materials and plant that required, as well as responsible in implication on deciding at the beginning step of the project with the responsible of

ensuring the values of the project (Abdul Aziz, 2009). QS will describe clearly about the project and precisely explain all the requirements, the designs and the arrangement of the Bill of Quantities (BoQ) to ease the contractor can estimate the work easily and quickly. Meanwhile, QS should also be able to write clearly in language that will not be misunderstood by other parties who also use the BoQ later.

In addition, QS need to be careful in calculating the works measured, broadly expand their knowledge in the measuring, as well as systematically visualize the drawings and details (Lee *et al.*, 2005). One of Quantity Surveyor's biggest tasks is preparing BoQ for construction project proposed (Abd Rashid, 1987). In the other study that had done by Matipa (2008), the professional QS will provide the initial and future cost that have considered by the team that focused on designing.

Apart from that, QS also play an important role to improve the efficiency and competitiveness of construction work by reducing the confrontation, not only secured the comprehensive brief from the client but to ensure the most suitable procurement route. The effective cost control procedure and the value of the money need to be provided by the QS all the time and make sure the client's satisfy with all the requirements such as time, quality, function and allocation of risk. It can be done by reducing the scope for errors and omissions to the minimum level and added some values or capital to the project as well (Matipa, 2008).

Besides that, QS acquire and operate the variety of skills that can be found outside the normal and traditional QS field that continuously expand their scope of project until the 21st century based on the changes, the needs and the expectation of the clients. The extensive and comprehensive skills may require in QS's knowledge base. Professional QS need to be prepared, versatile, adaptable, and innovative to face all the challenges in quantity surveying sectors. Hence, the 21st century QS must be competent in order to meet the needs of the clients in the built up the environment that competence with the integration of knowledge, the skills, individual attributes and cost orientation (Meyer and Semark, 1996).

On the other hand, according to Cooke and Walker (1995), the role of QS as a separate profession is unknown in Denmark and Germany. QS role was performed as an architect or engineer consultant as part of their professional services. Most of QS professions were done by architect and engineer. Meanwhile, in France, the QS come nearest to carrying out the same function as the QS in the United Kingdom. Their services were regarded as a technical service and are not considered to be on the same professional level as an architect or the engineer.

Meanwhile, in Netherland the quantity surveying function is undertaken by the architect as part of his professional service. For example, the architect is responsible for providing cost advice at the project feasibility stage and contractor is responsible for preparing interim payment applications during the project (Cooke and Walker, 1995). There is not mentioning about any role of QS in engineering services in building.

According to BQSM (2011), QS in Malaysia has regarded as a project construction consultant and has been trained in all aspects including costs of the construction, and the administration of financial and contractual. QS will function as an advisor to the architects and engineers regarding about the cost implications of their designs and to ensure the clients' interests. QSs' capability and skills are estimating the project costs, organizing the tender documents, appraising the payments and variation of the works, administering the contract and settle the final account.

Davis Langdon (2010) asserts that cost management of buildings should be the responsibility of quantity surveyors. However, it has been observed that QSs are not involved in active cost management of building services (Potts, 2008). College of Estate Management (2010) observed that QSs need to provide reliable cost advice on building services throughout the feasibility stage, tendering and procurement process. QS also needs to demonstrate a working knowledge of building services although it is not expected to demonstrate the same knowledge and ability of an

engineer (College of Estate Management, 2010). In order to achieve all the needed information, QS also needs a good communication skills towards their project team and instead of being persevering and proactive in looking for the information about the specifications and drawings. According to Levitt (1994), in building services, the estimator need to possess experience and knowledge in plumbing, mechanical and electrical work in order to prepare the estimation costs. In most cases, contractors specializing in the plumbing, mechanical or electrical trades will develop the detailed estimate based on the design of the respective system utilizing experienced personnel despite the fact that QSs should be the one who prepare the Bill of Quantities (BoQ) for building services as well as other related works. This role is not provided by QSs because there is an interface problem between the knowledge base and skill of QSs and the technologies associated with building services (Swaffield and Pasquire, 2000). In addition, they also stated that QSs could not provide a good service to their clients unless they could manage the costs of the total building projects. Thus, QS need to have good competencies to render the services to the required degree of skills and expertise (Oke *et al.*, (2010).

The information from the Royal Institute of Chartered Surveyors (1991) acknowledged that quantity surveying will led the profession to become professional QS and these will respond to the client needs. Moreover, QS must continue to improve more on their own initiatives where the competencies of QS in managing cost of project. Venturing in managing cost of building services area become a question as QS has the knowledge of building services that been taught in education level, even not in genuine and thorough knowledge as building services engineer. Compared to those who expert in construction cost management, QS has a necessity to manage it. According to Senaratne and Sabesan (2008) asserts that QS can accomplish this expertise by learning from the experience, past, sharing knowledge within the profession and enhancing the module of QS programme in education level. Thus, Aliyu (2006) stated that the role of QS, just in case of other professionals, must be adjusted in order to remain relevant in the 21st Century economics realms of things.

Hence, this research argued that the cost advice provided by QSs could be enhanced if there is improvement in the QSs' knowledge of building services in buildings. These enable QS to have adequate understanding of the technology of building services and provide active cost control advice that will deliver better value for client's money in the total cost management of a project.

1.2 Problems Statement

According to Gura (1984), building services engineering covered all the engineering systems that related with the building. The regular cost of engineering services is about 20 percent to 50 percent from the total of the project cost. Meanwhile, McCaffrey (2010) asserts that the average building services cost is between 10 to 70 percent of the total construction cost in United Kingdom (UK). QS building services tend not to get involved in building structure and finishes cost management but they should play an active part to advice on cost management of external site services and building work in related to services. Generally, the overall average cost of building services is in 15 to 30 percent of the total construction project cost (Cartlidge, 2009). Moreover, according to Marsh (2003), building services covers 60 percent of the capital cost and 90 percent of operating cost. Thus, it contributes a quite high amount of percentage in building cost and there is need to be concentrated. In addition, Powell and Mole (2003) asserted that the value of building services can represent up to 50 percent from a project cost and important to get advice from professional on this field. To put in a nutshell, building services field needs to concentrate too by professional as the range of cost is quite high as shown in Table 1.1. Hence, a proper and detailed BoQ building services should be prepared to avoid variation and a good cost management needs to establish to avoid cost risk by client.

Table 1.1: Building Services Cost's Range of The Total Construction Cost

Author/ Year	Article	Citation
Gura (1984)	Role of The Building Services Engineering Consultant	Building services covered all the engineering systems that related with the building. The regular cost of building services is in the range of 20 percent to 50 percent of the total construction project cost.
Powell and Mole (2003)	The Surveyors' Construction Handbook	Values of building services can represent anything up to 50 percent of a project's total cost and it is a considerable proportion of the construction risk. Therefore, it is important to get a proper advice on this field by professionals.
Marsh (2003)	Building Services Procurement	Building services covers 60 percent of the capital cost and 90 percent of operating cost, where always have profound effect on the business cost.
Cartlidge (2009)	Quantity Surveyor's Pocket Book	Services element is 15 to 30 percent of cost significant and it is quite high and make sense to concentrate more.
McCaffrey (2010)	What is an M&E QS?	Building services can be ranged between 10 to 70 percent of the total cost of construction. If the elements are not managed by building services QS, the client will be exposed to a significant cost risk.

Electrical designers also need to figure the structures of the building that included the wiring, planning and coordinating the layout of the electrical system (Traister, 1975; Levitt 1994; Ashworth and Hogg 2002). The service designer should obtain an authentic knowledge of the building construction and competent to portray the drawing or plans in order to complete the project with all necessary mechanism (Traister, 1975). Then, QS can also explain the drawing precisely and easily as well can manage to measure the drawing accurately. Otherwise, Cartlidge (2009) argued that the item will measure as provisional sum because of lack of detailed information. QS needs to demonstrate the genuine knowledge of building services however, they always rely on the services or design engineer capabilities to design and manage the technical.

In addition, the engineer always be the references when having the difficulty in understanding the design or obtaining the information because graduated engineers must have an immense body of technical knowledge and possess personal, interpersonal and system-building skills to function in teams and be prepared to produce products and systems (Bankel *et al.*, 2003). Furthermore, the additional expectation from QS graduates in developing as a whole, mature, thoughtful individual implicitly. The two roles of professional QS are really needed in order to have an excellent, first-class and worth work of detailed and proper BoQ of building services. However, the end result is whether the QS have the infinite knowledge in building services to prepare the BoQ. According to College Estate Management (2010), QS should have a broad comprehension to study, interpret and understand M&E drawings and qualifications. Some engineering systems or mechanism are hard to understand and they have to look for additional information from the engineer in order to explain it.

Traister (1975) claimed that it is very crucial the person who is responsible for costing electrical drawings and specification to have a knowledge of the elements of building construction, the skills to interpret architect drawings such like M&E drawings and the ability to portrait the entire building structures that related with the electrical system. Furthermore, sometimes the services designer calls upon the

contractor to prepare an estimate cost of the work in order that a proper additional charge may be improved or a credit given. In spite of QSs main task to prepare the bills, current practices shows that building services engineer who is not familiar with the methods used to prepare the necessary detailed cost information carry out the function. Hence, the estimator must has a wide comprehensive knowledge of building services works to fill in the gap where QS could manage cost management in building projects including building services works in practice (Levitt, 1994).

Thus, this research is conducted as Traister (1975) and College of Estate Management (2010) argued that QS should has the working knowledge and a wide comprehension to interpret and understand M&E drawings and specifications so also building services engineer needs to be able to visualize the building structure and its relation to the building services system. In addition, Ekundayo *et al.* (2011) said that QS should provides a proper cost management of construction project in the context of forecasting, analyzing, planning, controlling and accounting and further suggested that competent QSs must has a range of skills, knowledge and understanding which can be applied in a scope of contexts, firms and organizations. College of Estate Management (2010) also stressed that the integration of the two professionals can produce a better, good and value of work of detailed and proper BoQ of building services. Hence, these problems can be overcome through this research whereby considering the outcome of the research which improving credibility of a quantity surveyor by knowledge especially in managing cost of building services.

1.3 Research Proposition

This research suggests that the cost management of building services provided by QSs need to be enhanced if there is an improvement in the QSs' knowledge of building services in buildings. This will enable QSs to have adequate understanding of the technology of building services and provide active cost control

advice that will deliver better value for client's money especially in building services work.

1.4 Research Questions

Research questions are:

- i. What is the level of involvement of quantity surveyors in cost management of building services?
- ii. What is the nature of quantity surveyors' knowledge gap in cost management of building services?
- iii. What are the strategies to bridge quantity surveyors' knowledge gap in cost management of building services?

1.5 Research Objectives

Research objectives are:

- i. To examine the level of involvement of quantity surveyors in cost management of building services.
- ii. To investigate the nature of quantity surveyors' knowledge gap in cost management of building services.
- iii. To propose strategies to bridge quantity surveyors' knowledge gap in cost management of building services.

1.6 Scope of Research

This research conducts the questionnaire survey among the QSs in consulting firms and semi-structured interview among QS and mechanical and electrical consulting firms. The research will restrict the population of QSs to have minimum ten (10) years working experiences in the field to answer the semi-structured interviews and no restricted experiences for questionnaires respondents. This population is more relevant to the respondent of the research and familiar to the cost estimating practices.

1.7 Research Methodology

The method that was used is mixed method or well known as triangulation method. This method was used because of the compatible strengths and has non-overlapping weakness (Bewer and Hunter, 1989). It involves the recognition that all methods have their own limitation as well as their strength (Tashakkori and Teddli, 2003). The method used is to acquire the strength of findings, to minimize the acceptable explanations for conclusion from data collected and to explain the different aspects of a situation. Hence, the research started qualitative research with literature reviews that included the materials from books, journals, conference papers and other sources. Qualitative research is very subjective to the nature because the research highlighted on the meanings, understanding and explanation. According to Naoum (2008), the information collected from qualitative research will be classified under two categories that are exploratory and attitudinal. The research endures exploratory research because of the limitation of the knowledge about the topic and used semi structured interview method. Furthermore, the purpose of exploratory research is entangled with the need of clear and precise statement of the stated problem. In this research, researcher has conducted exploratory research for three consistent purposes which are diagnosing specific situation, screening alternatives

and to represent new ideas (Zikmund, 1997) as shown in Figure 1.1. The raw data provided in exploratory research will be obtained from the interview or recorded conversation or a description of what has been observed. On the other hand, quantitative method also use by developing sets of questionnaire.

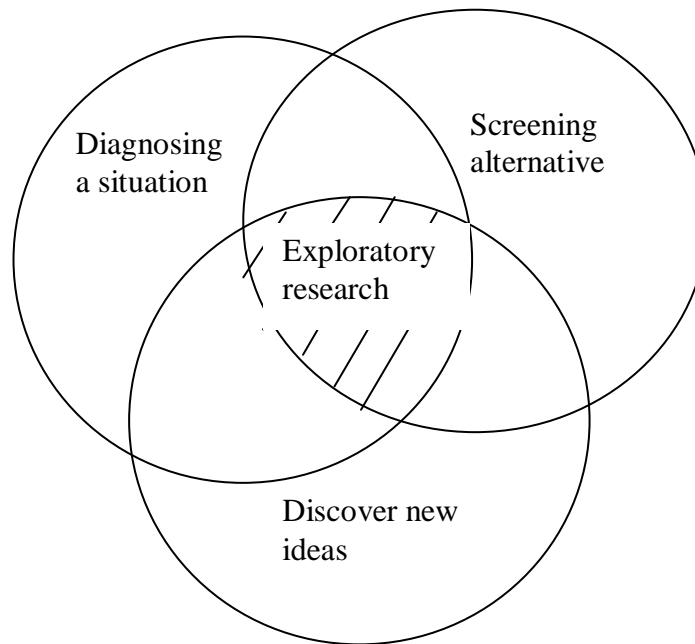


Figure 1.1: Exploratory Research (Adapted from Zikmund, 1997)

1.8 Significance of Research

This research was conducted to propose the strategies to bridge the knowledge gap that exists in building services cost management. It will enable preparation of a detailed BoQ building services measure accurately in accordance with a viable standard method of measurement (SMM) and intelligently priced. In this context, Standard Method of Measurement for Building Works: Second Edition (SMM 2) was established in Malaysia in 2001 was less concentrate on engineering services in building (Yusuf, 2012). SMM 2 less referred for these measurements as

construction cost consultants are not master enough in this area. As the results, the measurements for particular item are given to building services engineer. According to Levitt (1994), the development of detailed estimate for plumbing, building services works require the estimator to have experiences in these areas. However, building services engineers also need to have a wide knowledge in buildings works area to ease QSs when interpret drawing and specifications.

Other than that, an improvement of syllabus QS and engineer programmes at education level need to be accomplish in order to help future QS to manage the total cost management of building services. Where, Liebowitz and Beckman (1998) said the tacit knowledge possess automatically by the academician can be change into explicit knowledge for students to practice or the academician themselves convey the knowledge personally to them during class as people can be trained to use tacit knowledge and develop their skills (Smith, 1998). In addition, Love *et al.* (2005) asserts that with the higher levels of expertise and knowledge, higher effectiveness in problem solving and enhanced employee capability which later be the benefits itself for QS. QS also can offers better service to their clients in a construction project.

Thus, the need of bridge the gap for QS to fully involve in total cost management of building projects includes building services is compulsory. These two professional have to integrate the knowledge towards a better understanding drawing and other related matters in preparing a detailed BoQ building services by QS whether integrates in knowledge or in practice. Hence, this research helps both professionals to achieve mutual understanding and do the best in the particular scope of works respectively (McCaffrey, 2010). According to Yusuf (2012), the adoption of standard method of measurement is also a viable to achieve this. Furthermore, a proper standard method of measurement and related administration contractual for building services can be established to ease QS to manage building services cost management.

1.9 Conclusion

BoQ of building services is prepared by provisional sum which leads to possibility of high risk value to clients. In addition, the proportion of building services amount cover up to 70 percent from total cost of project. Thus, it needs to be concern and concentrate on to avoid clients face financial risk and a proper BoQ of mechanical and electrical can be produced. Hence, this research is conducted to investigate the problems aroused and propose strategies to bridge the gap identified.

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