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Recent Trends in Social and Behaviour Sciences

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Towards developing Building Services Standard Method of Measurement in Malaysia

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ABSTRACT: Detail quantification and description of items of works based on standard method of measurement (SMM) are not adapted for building services precontract price forecasting by Quantity Surveyors (QS). However, with increasing value of building services in modern buildings, there is need for QS to manage its cost. The variables that prevent quantity surveyors from measuring building services in line with the provisions of an SMM were identified. It was also found that an SMM aligned with local information classification system is important to lay foundation for integration of SMM into model based automated quantity extraction and estimating. The method adopted for the study is literature review and synthesis as well as cross-country comparison of existing SMMs. A conceptual framework was developed to guide industry stakeholders in developing building services standard method of measurement (BSSMM).

1 INTRODUCTION

Traditionally, quantification and description based on the Standard Method of Measurement (SMM) are not adopted by Quantity Surveyors (QS) in determining the contract price of building services. QS and services consultants often base their price forecasts on experience by way of carefully judged percentage additions to the estimated net building cost as assessed by single price rate method (James, 1999; Buys & Mathews, 2005). Single price rate approximate estimating is unsuitable for building services because the costs of building services are not constant between one project and another. Therefore, this matter requires separate attention when preparing an early budget estimate (Swaffield & Pasquire, 1999; Swaffield & Pasquire, 2000; Oforeh, 2008; Davis Langdon, 2010; McCaffrey, 2011). This situation is the same in the Malaysian construction industry because there is no generally accepted SMM for preparing contract price forecasting model (CIDB, 2009b; Sabaria, 2009; Amuda-Yusuf, et al., 2013).

Further, it is widely believed in the construction industry that when the information provided to contractors is inadequate, conflicting, or incorrect, it leads to a reduction in the quality of the work, delays, and increased costs (Azman, et al., 2012). This kind of variability in information has been traced to the lack of coordination between the contract document (Kodikara & McCaffer, 1993; Cartlidge, 2009) and an ill defined quantification and estimating process by consultant QS (Azman, et al., 2012).

The focus of this study, therefore, is to establish a conceptual framework for developing an SMM for building services that would reflect the current

industry practices for adoption in Malaysia. This study is important because an SMM is a key reference material for teaching quantity surveying students and the benefits of adopting it for building services precontract price forecast are aimed at the clients, consultants, contractors, and entire Malaysian construction industry. When developed, the standard will encourage continuous improvement and the adoption of best practices by cost consultants (QS/cost engineers/cost managers) in the cost management of building services locally and at the international level. The adoption of detailed rules of measurement will also support the procurement to pay strategy in the construction Industry Master Plan (CIMP 2006–2015) championed by the Construction Industry Development Board (CIDB). Therefore, the research described in this article is considered to be a part of a strategic approach to ensure that there is alignment between local and international best practices in line with the aspirations of the construction industry to be among the best globally by 2020 (CIDB, 2009a).

2 THE NEED TO USE SMM FOR BUILDING SERVICES BOQ

The need for a detailed and reliable building services estimate based on detailed breakdown of cost is well researched. Buys & Mathews (2005) explained that all the subsystems of building services contribute significantly to installation costs and none of them can be ignored. They suggested that detailed estimation models are required to divide the installation into its subsystems, which allows each item to be priced individually by project stakeholders. However, regardless of the differences in estimating process

Table 1. Barriers to the use of SMM for building services BoQ in Malaysia.

Category	Factors
Level of available information	• Services drawings are not ready at tender stage; • Late involvement of services designers; • Inclusion of contractor design portion; • Non involvement of specialist designers and; • Lack of accepted standard of building services
Estimators Competence	• Quantity surveyors are not sufficiently skilled in the technology of building services; • Services consultant are not conversant with the rules of measurement and; • Slow learning curve by practitioners
Culture and Traditional practices	• Lack of regulatory body to enforce the use of SMM; • Non reflection of local best practices in existing standards and; • QSs are not used to preparing building services BoQ
Complex Technological requirements	A general increase in the value of building services

for an installing contractor or the estimating process of design consultants engaged by the employer, the underlying factor is that all users of precontract price must have the same interpretation of the price information.

Specifically, it is essential for the contractor to use an estimate as the basis for tendering and for the clients and consultants to produce the estimate in order to understand clearly the intentions behind it, the basis of it, and the reasons why it is being produced (Dent, 1980; Bowen & Edwards, 1996; Ashworth, 2004). This is one of the main purposes of a bill of quantity (BoQ) that is based on detailed rules of a standard method of measurement (SMM) (Seeley, 1989; Molloy, 2007; RICS, 2012). Molloy (2007) further argued that BoQ will not fulfil their purpose unless there is agreement about the exact manner in which the items in the BoQ are to be measured and the exact requirements for what is to be included in the rate for each item.

2.1 Barriers to the use of SMM for building services

The factors preventing the adoption of SMM for building services by quantity surveyors in Malaysia were identified and categorised into four by (Amuda-Yusuf, et al., 2013) as shown in Table 1.

2.2 SMM development in other countries

The first SMM was published by RICS in 1922 and the latest edition is the seventh edition (SMM7), which will be replaced by RICS new rules of measurement NRM in 2013. The drafting and arrangement of

work sections in the SMM2 was prepared and published over a decade ago and was based on British SMM6 (Institution of Surveyors Malaysia, 2000; Abdul Rashid, 1992). British SMM6 have been replaced by SMM7 since 1988. Unlike the traditional work sections in SMM2, the British SMM7 and SMMs in other countries such as Singapore, Australia, and New Zealand are based on the Construction Industry Classification Systems (CICSS) used in their respective countries. CICSS are used to support the information management process in the construction industry. The classification structure in a CICS defines the concept hierarchies that can be used for document classification, thereby providing a common framework for document organisation and management among project participants (Caldas & Soibelman, 2003). Examples of CICSS include the Masterformat and Uniformat used in North America, CI/SfB used in Europe, and Uniclass used in the United Kingdom (Winch, 2010).

According to (Kang & Paulson, 2000), CICSS consist of both a work breakdown structure for classifying information that comes from actual construction phases and an information management system for classifying materials. Uniclass includes classification facets that cover the common arrangement of work sections, electronic product classification, and civil engineering SMM (CESMM). The British SMM7 has been prepared to conform with the common arrangement of work sections (Seeley, 1989; Goh & Chu, 2002; Gelder, 2010), and the rules of measurement for each work section are in the same sequence. The construction electronic measurement standards (CEMS) in Singapore were based on a code of practice for the classification of construction cost information (Goh & Chu, 2002; Yong, et al., 2004).

2.3 Procedure for developing national standards

The variables that are considered necessary in the development of national standards by previous authors have been considered. In addition, the procedure followed in the development of SMMs in other countries as contained in the prefaces of the various editions reviewed during cross country comparison of SMMs (although not reported in this study). The summary of the recommended actions for SMM development are presented in Table 2, and was adopted to build-up a conceptual framework for developing the proposed BSSMM presented in Figure 1.

3 CONCEPTUAL FRAMEWORK FOR BSSMM DEVELOPMENT

The conceptual framework for building services SMM development was underpinned by the recommendations from previous studies and procedures stated in existing SMMs. This was developed by mapping the recommendations in Table 2, to guide the development process, therefore, Figure 1, represents a relational mapping of the recommendations deduced from

Table 2. Procedures for developing national standards.

Recommended Action	Author
There must be a conscious effort to involve industry role players in developing standards in order to reduce barriers to change;	(Goh & Chu, 2002; Goedert & Meadati, 2008)
Standards must be kept simple and concise as possible;	(Kodikara, 1990; Ingirige, et al., 2001; Goh & Chu, 2002)
Identify (in both private and public sectors) drivers of the developed standard and convince them in order to influence other players to follow suit;	(Sivan, 2000; Ingirige, et al., 2001; Goh & Chu, 2002)
Win – win results must be targeted while negotiating the alternatives to select from a standard; and	(Goh & Chu, 2002; Nani, et al., 2008)
Develop assistance schemes to help small and medium firms embrace standardization and construction information technology	(Goh & Chu, 2002; Nani, et al., 2008)

literature synthesis and include necessary actions for the identification and engagement of relevant stakeholders whose efforts are required for building services SMM development responsibility matrix for various stakeholders are shown in Table 3.

3.1 Selection of SMM development committee

It is desirable that the SMM development process be championed by the users of SMM (RISM) in collaboration with the major construction industry stakeholders (CIDB, Jabatan Kerja Raya, MBAM, Academia). The selection of members of the SMM development committee should be based on experience in the development of similar standards in addition to experience in the art of cost management of construction works. Consideration could also be given to the regional and international construction experience of the members.

3.2 SMM stakeholder identification and engagement strategy

Stakeholders for the purpose of the research are individuals or groups who have an interest or any aspect of rights or ownership of the proposed BSSMM development project, and could contribute to, or be impacted by, either the use of the SMM. According

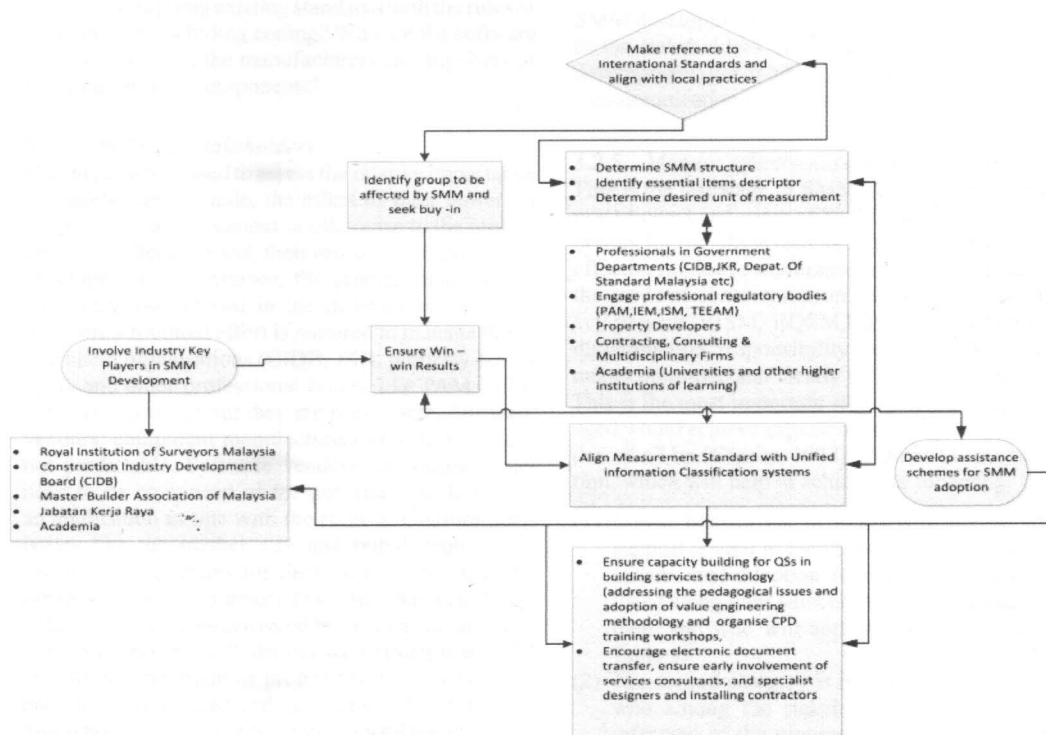


Figure 1. Conceptual framework for BSSMM development project in Malaysia.

to (Walker, et al., 2008) stakeholders could be categorized into upstream and downstream stakeholders for the purpose of clear identification and development of the engagement strategy. In this context, therefore, the upstream stakeholders are considered as the professional bodies that uses SMM (BQSM, RISM, MBAM, CIDB, JKR) and they need to champion the development of SMM; The downstream stakeholders are regarded as those organizations (public and private) and professional bodies that could influence the use of the developed SMM (ISM, PAM, IEM, TEEAM, contractors and manufacturers, Software vendors; Department of Standards Malaysia; etc.).

The essence of this procedure is to assist to trigger a course of inquiries that leads to a better understanding of the nature and types of power and influence the various stakeholders could exert on the proposed projects and there are five steps involved to successfully manage stakeholders. (Walker, et al., 2008) and the steps include identifying stakeholders; Prioritize stakeholders; visualize stakeholders; engage stakeholders and; monitor effectiveness of communications.

3.2.1 Identify stakeholders

Power is the mechanism through which stakeholders influence the direction and decision for a project (Newcombe, 2003). To identify stakeholders there is need to determine the potential financiers of SMM; Who are the users of SMM? Who are those to be impacted by BSSMM development? What standards are available in the country? Who are those to be involved in aligning existing standards with the rules of measurement including coding? Who are the software vendors? Who are the manufacturers and suppliers of building services components?

3.2.2 Prioritize stakeholders

The three factors used to assess the relative importance of stakeholders include, the effect of their power on the project; their closeness or otherwise to the project under consideration and; their readiness to react to the development. For instance, the general public would have very low interest in the development process, therefore a minimal effort is required to manage them. The client organisations (CIDB, JKR, property developers and other professional bodies like PAM, IEM, ISM) are powerful but they are predictable. Software vendors, equipment manufacturers and suppliers are not predictable. Software vendors for instance may need to be convinced of the potentials of designing an application in-line with the rules of measurement, issues like the market size and initial capital outlay are critical issues for them to consider. Clients' organisations will support any idea that could add value to the services delivered by cost consultants and other practitioners will identify with efforts that could lead to the alignment of project team's goal but they need to be convinced and persuaded. Therefore, this group needs to be accorded high priority because their support or otherwise could mean the success or failure of the SMM development project. The greatest

danger/opportunity is from the users and financiers of SMM (RISM, BQSM, MBAM). Their readiness to finance in the lifeblood of the development and adoption of the outcome

The building services SMM development committee should organize a workshop whereby key client representatives (public and private) and other project team participates to develop strategies for prioritizing stakeholders based on the parameters above. Perhaps, a scale developed to rank the factors will be appropriate.

3.2.3 Visualize stakeholders

Once the stakeholders have been identified and their influence prioritised, the next is to visualize the relationship of each stakeholder to the SMM development. To position the SMM development centrally and develop a virtual relationship of how best they can be managed. This will lead to a clear understanding of what role, responsibility, relationship that each participant has on SMM development and adoption.

3.2.4 Engage stakeholders

This is mainly concerned with how win-win result could be actualized and communicated to the relevant party for buy-in. The stakeholders' receptiveness is analysed, possibly, on an appropriately scored scale to identify optimal engagement position. This type of dynamic information flow between participants undertaken in an open and thorough approach could facilitate reflection and deliberations among the stakeholders (Mathur, et al., 2008). This will ensure that the SMM development process is sensitive and responsive to the stakeholders' (users and those affected by its development) needs and conditions. It will also enable a communication plan to be developed.

3.2.5 Monitor effectiveness of communication

This is the last stage of SMM development. Have the practitioners and users of SMM really understand the drivers for the SMM development? To achieve this an effective mode of communication is required and Once the mode of communication has been developed, the key players (RISM, BQSM, MBAM) should allocate dissemination responsibility to the SMM development committee and clearly define reporting system. This is the most important stage and if properly managed would achieve expected results. This approach is described by (Capper, 1998) as planned communication, which will help to achieve the following:

- (1) It will help to get in touch with people whose support is vital to the success of the SMM development and adoption scheme. These people are listed along with what help, if any is needed from them and who will approach them as shown in Table 3.
- (2) The second category is internal communications, who among the stakeholders need to be kept informed of the progress, challenges and obstacles? This is the responsibility of RISM, BQSM and MBAM

Table 3. Responsibilities of various industry stakeholders in the proposed SMM development Project.

Roles and Responsibilities	Institution of Surveyors Malaysia (ISM), Royal Institution of Surveyors Malaysia, (RISM), Board of Quantity Surveyors Malaysia (BQSM)	SMM development Committee/Consultants	Construction Industry Development Board (CIDB), Jabatan Kerja Raya (JKR,)	Department of Standard Malaysia	Academia	Software Vendors	Institute of Architect Malaysia (PAM), Institute of Engineers Malaysia (IEM), Contractors, Manufacturers, TEEAM	Master Builders Association Malaysia (MBAM)
Form SMM development committee	•							
Establish overall direction	•	•	•	•	•	•		•
Arrange funding for SMM Development	•		•					
Develop objectives, targets and programmes	•	•	•					
Identify local best practices	•	•	•	•	•	•	•	•
Consult Professional Bodies that use SMM	•	•	•					
Consult professional bodies that influence the use of SMM		•					•	•
Review SMM in others countries	•	•			•	•		•
Obtain copyright permit	•	•	•					
Draft and make SMM proposal to the Industry	•	•			•			•
Obtain and reflect industry assessment of the new SMM	•	•			•			•
Develop an assistance scheme	•	•		•	•	•		

- (3) Finally, external communications needs to be considered. Is there anyone outside who needs to be kept informed? (International standards that references need to be made, the issue of copyright and patents, manufacturers and software vendors).

4 CONCLUSION

The need to develop building service standard method is a result of the increasing complexity and value of building services in modern buildings. In addition, the standard would be adopted in the academia in teaching students as well as providing a basis for training existing professionals. This will enhance the quantity surveyor's ability to provide more reliable building services precontract price forecast and post contract cost monitoring. The responsibility matrix for key industry stakeholders presented in Table 3.

The conventional practices of adopting standards and codes from overseas countries may fail to achieve desired results in view of the developments in IT and the need to align local practices with international standards. Therefore, development of SMM aligned with local industry classification systems is essential and this can only be achieved when all key stakeholders are actively involved. Similarly, the deployment and adoption of Building Information Modeling (BIM) in the global construction marketplace is a reality and this will transform the current

method of working including quantity surveyors roles. Because it is widely held that for a reliable automated quantity extraction and estimating process in 5D BIM, QS need to develop a framework that could generically represent different design conditions and a vocabulary for describing the different design conditions that influence the construction cost in the computer. Therefore, the proposed SMM is expected to lay efficient foundation for integrating the rules of measurement in the quantity resource schema of the Industry Foundation Class (IFC) in 5D Building Information Modeling (BIM) environment. This will enable QS to collaborate effectively with other project team in BIM environment to achieve better value for clients money.

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