

# UNDERSTANDING THE CHALLENGES IN SUSTAINING THE BILLS OF QUANTITIES IN MALAYSIA

Shamsulhadi Bandi<sup>1</sup> and Fadhlin Abdullah<sup>2</sup>

<sup>1</sup>Post-graduate student, <sup>2</sup>Assoc. Prof. Sr Dr

Department of Quantity Surveying

Faculty of Built Environment (FBE)

Universiti Teknologi Malaysia

Skudai Campus, Johor Bahru

Johor, Malaysia

<sup>1</sup>shamsulhadi2@live.utm.my, <sup>2</sup>b-fadhlin@utm.my

## Abstract

Reviews of the past and current literatures have indicated differing views and opinions on the future outlook of the Bills of Quantities (BQ). Numerous issues have been identified from the literatures and until a viable solution is identified, current issues will likely limit its potential as a source of information in construction project. Based on the identified issues, this paper aim to identify issues relating to the usage and application of BQ in the construction industry by critically reviewing and appraise the existing literatures. The study has employed an extensive literature reviews which extensively synthesized findings, suggestions and comment of previous research works in order to identify key points imperative to strategize future research work. As a result, 13 general issues and 17 specific issues pertaining to the application of the BQ in the construction industry have been outlined which are applicable in Malaysia and elsewhere. At the end of the paper, a list of challenges confronting the BQ is presented as a basis for further improvement and starting point for future research work to be carried out.

**Keywords:** bills of quantities, improvement, issues, Malaysia, research.

## INTRODUCTION

The Bill of Quantities (BQ) is an integral part of the quantity surveying profession. BQ production remains an essential service in many quantity surveying practices and is often regarded as the bread and butter of the profession (Charles, 2007; Olatunji *et al.*, 2010). Traditionally, the main source of income for the independent quantity surveying consultants were derived from the preparation of BQ (Marsden, 1996) and it is in fact the service which established the profession (Ferry *et al.*, 1999; Marsden, 1996).

According to Baccarini and Davis (2002), BQ is a document that itemises the quantities of materials and labour in a construction project. It represents a breakdown of construction works into component parts such that their sum equates with the whole (Hughes, 1978). From a historical perspective, this particular document was first developed in the mid-1800s and was based on the best practice of the day which consisted of measuring and valuing work after it was completed (Jaggard *et al.*, 2001). The architect and construction client soon realized the potential of BQ in a project and with due recognition, quantity surveyors were then directly engaged to prepare the document and acting alongside for the client.

Though BQ is an important document within the construction industry, research works carried out to date have indicated that BQ is not without its weaknesses. According to Ashworth and Hogg (2007), there is a considerable decline in the use of BQ in the UK since 1985 and it was reported that the rate is accelerating since the turn of the 21<sup>st</sup> century. In Australia, similar findings were also reported where according to Wood and Kenley (2004) and Davis and Baccarini (2004), the use of BQ has been declining for thirty years. It is in fact, that in some states in Australia, BQ is under considerable review for its use and purpose (Kinlay, 1984b; The BOQ Working Group, 1995).

In Malaysia, even though BQ still forms the bulk of quantity surveyor's professional fees (Fadhlin and Ismail, 2006; Rosli *et al.*, 2008), there have been concerns on its relevancy in representing the approximate parameters of construction activities (Atikah and Khairuddin, 2011; Khairuddin, 2011a, 2011b) and adequacy of its information (Mohd Hisham and Azman, 2008; Rosli *et al.*, 2006). It was reported by Hamimah *et al.* (2011) in a study that information provided in BQ is less useful from the viewpoint of the contractors. Further reviews across literatures are in tandem with the findings concluded by Hamimah *et al.* (2011). For instance, Baccarini and Davis (2002) and Wood and Kenley (2004) found that the location of information in BQ was not adequate for its purpose which render BQ less useful to contracting organizations. Turner (1983) and Wood and Kenley (2004) on the other hand lament and add that information contained in BQ is not in its final form and of limited use. The information would be more useful to the contractor if details are given (Ahenkorah, 1993; Hamimah, *et al.*, 2011; Holes, 1990) in terms of work location and types of operation expected from the contractor. Review across literatures has indicated various issues pertaining to BQ application in the construction industry (Baccarini and Davis, 2002; Khairuddin, 2011b; Mills, 1991). As a bridging attempt, a preliminary study underpinning this paper was conducted (*see*: Shamsulhadi, 2011) with the aim to identify issues relating to the usage and application of BQ in the construction industry. Hence, the purpose of this paper is to critically review and appraise the existing literatures to identify the issues relating to BQ application that reflects the challenges in sustaining the BQ for the benefit of the profession and the industry as a whole.

The study employed an extensive literature review which extensively synthesized findings, suggestions and comments of previous research works in order to identify key point imperative to strategize future research work. The paper will begin by determining the most dominant issue pertaining to BQ application in the construction industry before placing emphasis on the issue which necessitates immediate attention and further investigation. The paper however, has no intention to suggest solution to the dominant issue identified, instead it presents a list of challenges confronting the BQ as a basis for further improvement. The paper which is based on a broad basis of literature also seeks to highlight general issues which are significance in the context of the Malaysian construction industry for necessary action to be carried out. Hence, by framing the issues into one specific context, the problems confronting the BQ can be studied in detail prompting robust plan and rigor strategy for an ultimate and conclusive solution.

## **BQ revisited**

The BQ has been prepared in various forms for the last 300 years and an integral part of documentation in construction (Milliken, 1996). Generally, BQ translates the requirements depicted in the drawings and described the specification in the form of quantified items and descriptions (Hughes, 1978). It contains a schedule of fully described and quantified items of labor, plant, materials and other works which is set down in a systematic and recognized manner (Kwakye, 1997). Its purpose is not just to itemize construction work into component parts but to do this in such a way that a contractor is able to affix a price to the items regardless who prepare the bills and the generality of contractors (Hughes, 1978). With the current size and complexity of construction project, it would be impossible for contractor to price a medium and large size project without a BQ (Seeley, 1997).

Review on major texts concerning quantity surveying indicate that the primary function of BQ is to assist contractor with the preparation of an estimate for tendering (Ashworth and Hogg, 2007; Lee *et al.*, 2005; Waterworth and Weddle, 1978). This function remains important though BQ may also aid in other aspects of contract management such as for interim valuations and final account (Ashworth and Hogg, 2007; Seeley, 1997; Waterworth and Weddle, 1978; Wilcox and Snape, 1980). Other functions which deem to be relevant and important are not presented here owing to the limited space available but can be found elsewhere, *see*: (AIQS, 2001; Ashworth, 2004; Ashworth and Hogg, 2007; Blyth, 2001; Davis *et al.*, 2009; Fryer *et al.*, 2004; Hamimah, *et al.*, 2011; Hughes, 1978; Khairuddin, 2011b; Kwakye, 1997; Mohamed and Stewart, 2003; Mohd Hisham and Azman, 2008; Seeley, 1997; Shamsulhadi, 2011; Turner, 1983; Waterworth and Weddle, 1978; Wilcox and Snape, 1980).

Adequately prepared BQ offers construction projects and those involved in it with many advantages. According to Seeley (1997), BQ reduces contractor's estimating risks and tendering cost while to the client, it provides common basis for tender evaluation purposes. In addition, priced BQ from completed project is an excellent source for future estimating and provides readily available data for asset management, maintenance scheduling, taxation and insurance purposes (Davis, *et al.*, 2009). BQ also holds a key place in the flow of communication between the pre and post contact stages of a contract and the only real communication connections between the client and the contractor (Laing, 1976).

## **Determining the most dominant issue relating to BQ application**

Table 1 indicates general issues formulated from the literature concerning BQ application in the construction industry. Based on the synthesis conducted, thirteen (13) general issues were formulated and presented with the corresponding authors. Accordingly, issue on 'BQ information' (No. 6) has been identified as the most dominant issue discussed within the available literature. This suggests that issue on BQ information necessitates immediate attention and requires further investigation to be carried out. Details on issue towards BQ information will be presented in later part of this paper.

**Table 1:** General issues identified from the literature

No.	List of general issues	Authors
1	Alternative construction method	(Contributed, 1964)
2	BQ accuracy	(Abdul Rashid and Normah, 2004; Ashworth and Hogg, 2007; Hamimah, <i>et al.</i> , 2011; M. F. Hodgetts, 1984; Leon, 1966; Matipa <i>et al.</i> , 2008; Rosli, <i>et al.</i> , 2008)
3	BQ credibility	(Blyth, 2001; Choy and Sidwell, 1991; Davis and Baccarini, 2004; Davis, <i>et al.</i> , 2009; M. F. Hodgetts, 1984; Khairuddin, 2011b; Marsden, 1996; Morledge and Kings, 2006; Rosli, <i>et al.</i> , 2008; The BOQ Working Group, 1995; Uher, 1996; Wexler, 1986)
4	BQ format	(Kodikara and McCaffer, 1993; Skoyles, 1964, 1968; The BOQ Working Group, 1995)
5	BQ function	(Ashworth and Hogg, 2007; Blyth, 2001; Ferry, <i>et al.</i> , 1999; M. Hodgetts, 1985; Khairuddin, 2011b; Uher, 1996)
6	BQ information	(Ahenkorah, 1993; Baccarini and Davis, 2002; Benedict, 1972; Contributed, 1964; Cornick and Osbon, 1994; Hamimah, <i>et al.</i> , 2011; Holes, 1990; Jaggar, <i>et al.</i> , 2001; Kinlay, 1984a, 1984b; Kodikara and McCaffer, 1993; Kodikara <i>et al.</i> , 1993; Leon, 1966; Mohd Hisham and Azman, 2008; Morledge and Kings, 2006; Rosli, <i>et al.</i> , 2006, 2008; Slattery, 1994; Smith and Hoong, 1985; Turner, 1983; Waterworth and Weddle, 1978; Wood and Kenley, 2004)
7	BQ preparation	(Abdul Rashid and Normah, 2004; Ashworth and Hogg, 2007; Charles, 2007; Ferry, <i>et al.</i> , 1999; Khairuddin, 2011b; Kinlay, 1984a; Matipa, <i>et al.</i> , 2008; Rosli, <i>et al.</i> , 2008; The BOQ Working Group, 1995)
8	BQ rates	(Akintoye <i>et al.</i> , 1992; Mohd Hisham and Azman, 2008)
9	BQ recognition on builder's knowledge	(Benedict, 1972)
10	BQ and cost estimate	(Mills, 1991)
11	Current need of construction environment	(Davis, <i>et al.</i> , 2009; Khairuddin, 2011b; Smith and Hoong, 1985; Turner, 1983)
12	BQ presentation	(Barker, 2011; Olatunji, <i>et al.</i> , 2010)
13	SMM base measurement	(Davis and Baccarini, 2004; Leon, 1966)

### Issues with BQ information

Table 2 present specific issues with BQ information which were derived from synthesizing the literature. Generally, issues with BQ information have stemmed out from its inadequacy and limitation to satisfy varying management aspects of a construction project. By referring to Table 2, there are various aspects of inadequacy identified which has contributed to its current limitation. For instance, information on the connection between cost and time related parameters are inadequately provided [5, 6] which indirectly constraint cash flow projection [3]

for a project. Besides, it was also found that BQ information is currently inadequate to convey the exact quality of materials required [8] for a project which result in pricing issue [10] to the contractor. In addition, BQ users are actually asking for more information to be supplied on the location of quantified items [15]. The information may enable them to plan their work more effectively which in return improve the overall performance of the project.

**Table 2:** Specific issues with BQ information

No.	List of specific issues	Authors
1	Inadequate information and form for site management purpose	(Contributed, 1964; Holes, 1990; Kodikara, <i>et al.</i> , 1993; Leon, 1966; Rosli, <i>et al.</i> , 2006; Smith and Hoong, 1985; Waterworth and Weddle, 1978)
2	Inadequate information details for contractor's use	(Ahenkorah, 1993; Hamimah, <i>et al.</i> , 2011; Holes, 1990)
3	Inadequate information for cash flow projection	(Hamimah, <i>et al.</i> , 2011; Smith and Hoong, 1985)
4	Inadequate information for site operation	(Baccarini and Davis, 2002; Hamimah, <i>et al.</i> , 2011; Leon, 1966; Smith and Hoong, 1985)
5	Inadequate information on connection between cost and time related parameters	(Mohd Hisham and Azman, 2008)
6	Inadequate information on time related parameter	(Contributed, 1964; Hamimah, <i>et al.</i> , 2011; Jaggar, <i>et al.</i> , 2001; Mohd Hisham and Azman, 2008; Morledge and Kings, 2006; Smith and Hoong, 1985)
7	Inadequate information to address the user's need	(Wood and Kenley, 2004)
8	Inadequate information to convey the quality of material	(Hamimah, <i>et al.</i> , 2011; Kinlay, 1984a)
9	Inflexible information for data coordination	(Kodikara, <i>et al.</i> , 1993; Smith and Hoong, 1985)
10	The information provided does not fulfil the contractor's need for accurate pricing	(Benedict, 1972; Kinlay, 1984b; Morledge and Kings, 2006)
11	The information provided is not in final form	(Kodikara and McCaffer, 1993; Kodikara, <i>et al.</i> , 1993)
12	The information provided is unstandardized and require sub-processes	(Cornick and Osbon, 1994)
13	Lack of information details to explain construction processes	(Hamimah, <i>et al.</i> , 2011; Holes, 1990; Jaggar, <i>et al.</i> , 2001; Turner, 1983; Wood and Kenley, 2004)
14	Location of information is not adequate for contractor's utilization	(Baccarini and Davis, 2002; Wood and Kenley, 2004)
15	Location of quantified items in the proposed building is inadequately indicated	(Slattery, 1994)
16	Potential of information for other purpose is not fully explored	(Kinlay, 1984b)
17	Unclear connection between BQ and construction process	(Jaggar, <i>et al.</i> , 2001; Rosli, <i>et al.</i> , 2008)

## BQ issues – the Malaysian scenario

Based on the broad basis of literatures covered thus far, the general issues (refer ‘Table 1’) identified are in parallel with some of the issues currently confronting BQ application in the Malaysian construction industry. According to Table 3, as far as the Malaysian construction industry is concerned, issues pertaining to ‘BQ information’ seem to be the most discerning issues discussed in local studies. It is based on this reason that effort should be channelled to understand the challenges in order to plan for viable solutions.

**Table 3:** Specific issues with BQ information applicable to the Malaysian construction industry

No.	List of specific issues	Authors
1	Inadequate information and form for site management purpose	(Rosli, <i>et al.</i> , 2006)
2	Inadequate information details for contractor's use	(Hamimah, <i>et al.</i> , 2011)
3	Inadequate information for cash flow projection	(Hamimah, <i>et al.</i> , 2011)
4	Inadequate information for site operation	(Hamimah, <i>et al.</i> , 2011)
5	Inadequate information on connection between cost and time related parameters	(Mohd Hisham and Azman, 2008)
6	Inadequate information on time related parameter	(Hamimah, <i>et al.</i> , 2011; Mohd Hisham and Azman, 2008)
7	Inadequate information to convey the quality of material	(Hamimah, <i>et al.</i> , 2011)
8	Lack of information details to explain construction processes	(Hamimah, <i>et al.</i> , 2011)
9	Unclear connection between BQ and construction process	(Rosli, <i>et al.</i> , 2008)

## The challenges in sustaining the BQ

Though issues identified are imperative for the overall improvement of BQ, changes would not be easy to be introduced in the document unless major mind-shift could take place within the industry. Modern Quantity Surveyors who prepare the document should leave the shackle of their current comfort and find ways on how the document can benefit not only them, but also the contractor and clients who has paid for it. According to Mohd Hisham and Azman (2008), barriers to change from the existing mindset can only be speculated. To the author, it is probably because the high risk of an unproven process, innovations and major learning curve. Besides, there is an opinion which suggests that BQ should avoid the situation where the Quantity Surveyors appear to be telling the contractor ‘how to do the job’ or making assumptions as to his or her efficiency (Ferry, *et al.*, 1999). However, until better cooperation can be fostered among differing parties in the project, current issues on BQ would likely to prevail.

Table 4 presents a list of challenges which placed focus on issues related to BQ information. The list which was derived from numerous studies concerning BQ in Malaysia and elsewhere was not meant to be exhaustive but to indicate starting points from which future

works could be carried out. By understanding the challenges of the current situation, research could then be more focused to one intriguing issue thus yielding favourable and usable results. There will definitely be other challenges confronting other issues as identified in 'Table 1' however; those are excluded in this paper owing to the focus and constraint of space.

**Table 4:** Challenges confronting BQ information

No.	List of challenges
1	BQ information should be produced and presented in manners which satisfy site operation and management purposes.
2	BQ information should explicitly explain an item for accurate pricing by the estimator.
3	BQ information should specifically convey the required quality of a material.
4	BQ information should be provided in the form which satisfy its intended users and should not necessarily require rework or sub-processes.
5	BQ information should closely relate to construction processes.
6	BQ should contain information which addresses the need of its users.
7	Cost information should provide linkage to time related parameter for cash flow projection purpose.
8	BQ information should be flexible enough for conversion and coordination.
9	BQ information should be leveraged beyond its current function and use.
10	Location of BQ information should facilitate contractor's plan and need for utilization.
11	BQ should provide detailed information on the location of all quantified items.

### **The significant potential of BQ related research to the Malaysian construction industry and beyond**

Extensive research in the areas identified and suggested in this paper will offer significant contribution to the profession as a whole. It is the challenge and responsibility faced by the profession to stay relevant and a task that requires accomplishment. As a service which underpins the quantity surveying profession, researches under the theme will help in driving out inefficiencies from the current process and at the same time, provide empirical evidence in answering issues in placed. To signify the relevancy and the need for research concerning BQ application, separate study carried out by Abdul Rashid and Normah (2004) and Fadhlin and Ismail (2006) has found that BQ preparation still remain at the centre of services offered by quantity surveying firms in Malaysia which according to Abdul Rashid and Normah (2004), accounts for 84.4% of workload outsourced by the Public Works Department of Malaysia (PWD). Other data which support and signify the need for research in BQ application was gathered from the Malaysian Construction Industry Development Board (CIDB). According to CIDB (2012), as of December 2011, 96.84% (or 6,445) of projects awarded in Malaysia were reported using the conventional (or traditional) type of contract which according to Jagggar, *et al.* (2001) and Seeley (1997), advocates the use of BQ as fundamental to the process. Collectively, empirical data published by studies mentioned, have indicated that BQ is widely in use and have stood the test of time (Franks, 1984). Focus on this aspect of research is therefore needed and in fact, fundamental for the development and survival of the profession.

Although there is an agreement by the industry on the relative importance of BQ, the process underlying its production may still be susceptible to the changes and ideas brought about by the hype in the area of information technology. For instance, the Building Information Model (BIM) was quoted by many to be able to revolutionize the profession (Olatunji, *et al.*, 2010) and is regarded as the future of the construction industry. Its potential in facilitating quantification

and later BQ production however, are seen by many as a major disincentive to the profession to stay relevant while meeting the current industry expectation. Although BIM potential has been lauded for quite some time, the technology underlying the idea still needs much exploration, research and also development. According to Jung and Joo (2011), there is a need to develop a practical framework for BIM implementation and this view was also shared by Gu and London (2010). The status of BIM which is still under major development offers an exciting avenue for research in many areas in quantity surveying including BQ. Interoperability and lack of software integration were perceived as the current barrier in the present implementation of BIM (Becerik-Gerber and Kensek, 2010) and therefore, as far BIM is concerned, any research undertaken would provide input to assist in BIM development, bridge the current know-how and place the profession at the forefront of the technology. If these were undertaken, the profession would comfortably sit at the steward position rather at tail who is endlessly threatened by changes brought about in the industry by various stakeholders.

## CONCLUSION

The paper has so far discussed and presents its findings on the most dominant issue with regard to BQ application in the construction industry. Through synthesizing, it was found that BQ information was mostly discussed and criticized by researchers who conducted research under the theme. Further examination of the area concerned had revealed various aspects of inadequacy which contributed to its current limitation. The inadequate connection between cost and time related parameters is one example of the BQ current limitation and therefore, much need to be done in order to bridge the current situation. Though changes for improvement are welcomed, barriers for implementation would still exist in the form of resistance. The resistance could be due to unproven process or simply complacency with the existing process and procedure. The paper has also placed a great emphasis in understanding the issues which are relevant in the context of the Malaysian construction industry. The findings has indicated that 'BQ information' was considered as an intriguing issue based on merit of studies which therefore requiring immediate attention from the academics and industry alike. In order to assist for the establishment of future research works, a list of challenges which related to issues with 'BQ information' has been presented. The presented challenges were envisaged to act as a basis for BQ improvement and a catalyst to bridge the current knowledge. The paper has also outlined the significance of BQ related research to the profession as a whole. Research under the theme is in fact wanting given its wide adoption in the industry and also the effect of the current hype in information technology.

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