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Program Details

Tuesday, 4 December 2012

0800 – 0900	Registration
0900 – 0930	Opening remarks
0930 – 1000	Keynote 1
1000 – 1030	Tea break
1030 – 1230	Paper presentations: Session 1A, 1B & 1C
1230 – 1330	Lunch break
1330 – 1400	Keynote 2
1400 – 1600	Paper presentations: Session 2A, 2B & 2C
1600 – 1630	Keynote 3
1630 – 1700	Closing remarks
1700 – 1730	Tea break

Welcoming Message

On behalf of the Organising Committee of the 6th ASEAN Post Graduate Seminar (APGS 2012), it is my greatest pleasure to extend our warmest welcome and invitation to all academicians and practitioners around the world to the APGS 2012 that will be held in Kuala Lumpur, Malaysia, in December 2012. This seminar, organized be the Faculty of Built Environment, University of Malaya, Malaysia will cover a wide range of built environment issues.

Sustainability is a common and important them in the field of built environment. It is important from the planning and design stage of construction projects to post-construction stage. In order to assist you cope with the increased complexity and needs of comprehensive construction developments, APGS 2012 will bring together national and international frontline thinkers, academics, executives, government and business officials, practitioners and leaders to present and discuss the pivotal role of the key professions in the achievement of comprehensive and sustainable built environment.

Thus, we look forward to welcome you to Kuala Lumpur, a beautiful city with multicultural and ethnic groups, as a participant in APGS 2012.

Au Yong Cheong Peng
Organising Chairman
Faculty of Built Environment, University of Malaya
Malaysia

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15) Dr. Norhayati Mahyuddin, University of Malaya, Malaysia
16) Dr. Zakaria Alcheikh Mahmoud Awad, University of Malaya, Malaysia
17) Ms. Raha Sulaiman , University of Malaya, Malaysia

Keynote Speakers

Keynote 1: Moving Away from 'Design-by-Disaster' in Fire Safety towards a Sustainable Built Environment

Dr. Farid Wajdi Bin Akashah

Keynote 2: Planning to Make a (Sustainable) Difference: a Question of Ethical Values

Professor Heather Campbell

Keynote 3: Emerging Cities of the Third Wave

Distinguished Professor Allen J. Scott

Papers by Sessions

Session	Time	Theme	Paper Title
1A	1030 – 1230	Urban Planning & Conservation	1) Applying the what if? Planning Support System in Determining Future Residential Land Use Allocation 2) Social Interaction in Football Stadiums as Urban Public Places 3) Urban Futures for Brasilia and Kuala Lumpur: A Literature Review about some Creative Experiences in Coping with a Modern Urban Landscape 4) Model Review and New Residential Land Development Model Construction in Orchard Planting Villages 5) A Review on Place Attachment Indicators and Characteristic of Places 6) The Gajah Menyusu House – The Malay Vernacular Architecture of Langkawi
1B	1030 – 1230	Construction Management	1) Post-Project Reviews in Construction Management: Benefits, Barriers and Success Factors 2) Strategy Customer Relationship Management (CRM) in the Areas of Construction Businesses 3) Bidding Evaluation Criteria for Selection of Contractor: A Comparative Study 4) Conceptualising Issues Relating to The Bills of Quantities (BQ) 5) The Employer's Claim against the Contractor for Damages for Defective Work 6) The Effects of Procurement Systems toward Performance of the Refurbishment Projects
1C	1030 – 1230	Environmental & Sustainable Design 1	1) An Investigation of Window-to-Wall Ration on Daylighting Optimization in High Rise Office Building in Kuala Lumpur 2) Study on Efficiency of Passive Cooling Strategies on Thermal Comfort Attainment within Tropical Climate 3) Application of Sustainability in High Rise Buildings 4) Evaluation of Environmental Sustainable Design Principle in Iranian Primary School 5) Accordance with Nature, the Secret of Sustainability in Historical Villages of Iran 6) Green and Sustainable Buildings: Preliminary Research on the Benefits and Barriers
2A	1400 – 1600	Design, Landscape & Architecture	1) Neighbourhood Design and the Young Elderly Active Lifestyle: A Pilot Survey 2) Factors Affecting Sitting Intention in Open Spaces Based on the Theory of Reasoned Action 3) The Impacts of Visibility and Accessibility of Workplace Layout on Organizational Productivity as Conducted through Face-to-Face Interactions 4) Investigate Traditional Models and Elements in the Contemporary Architecture of Iran 5) Dos Perception of Water Lead Landscape Designers to New Physical Forms?
2B	1400 – 1600	Construction Technology & Facilities Management	1) Strength Characteristics of Steel Fibre Reinforced Geopolymer Concrete Composites 2) Analytical Models for FRP Confined Circular Concrete Columns 3) Selection of Procurement Method For Building Maintenance Management: A Decision Making Model 4) A Review of Public Housing Maintenance Issues and Its Impact on Building Quality and Tenants' Satisfaction 5) Identifying Key Risks in Building Performance 6) Facilities Management Strategies: A Preliminary Review
2C	1400 – 1600	Environmental & Sustainable Design 2	1) Household Energy Consumption and Carbon Foot Print in Ibadan City, Nigeria 2) Making the Switch: Factors Affecting Consumer Preferences for Home Eco-Design Features 3) The Effect of Project Sustainability Management in Construction Industry Development 4) Challenges and Conflicts in Post-Disaster Reconstruction in Historic City of Bam, Iran 5) Reconstruction of Post War Cities through Tourism Development Case Study Khorram-Shahr

CONCEPTUALISING ISSUES RELATING TO THE BILLS OF QUANTITIES

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Abstract

Bills of Quantities (BQ) are an indispensable tool for the management of a construction project. In recent years, numerous studies have been conducted to assess its applicability and many without doubt have recognized its significance in the construction process. Despite this recognition, reviews of the literatures have suggested that the BQ is flagged with issues which rendered it to be less useful to certain parties in construction. Empirical evidence from past researches have justified the presence of the issues, however without any coordinated effort in drawing the desired solution, the issues remain daunting and continue to become an academic and industry-wide concern. In view of the above, this paper seeks to critically identify and classify all issues related to the BQ with an aim to propose a conceptual framework as a basis to understand BQ related issues in a holistic manner. The paper which employed an extensive, broad based literature review approach had established that issues related to the inadequacy of BQ information as significant across the literatures thus prompting for action to be carried out. As an approach to understand the significant issue further, the paper has proposed the conceptual framework which contains what supposed to be the *ideal situation* as opposed to the current situation and further called for the establishment of *the line of information equilibrium*as the basis for assessing the issue. With such a framework in place, it is envisaged that the issue concerning BQ information imbalance could be untangled to achieve the desired solution.

Keywords: adequacy, bills of quantities (BQ), conceptualizing, information, research

1. INTRODUCTION

Information is the life-blood of a construction project (Atkin, 1995). Information generation is in fact a major source of activity in any construction projects(Kwakye, 1997; Nourbakhsh *et al.*, 2012) and the essence of construction management (Winch, 2010) without which a construction organisation would cease to function (Griffith *et al.*, 2000). As one of the important activities in the construction process, the construction industry generates a massive amount of information (Atkin, 1995). According to Atkin (1995), on average, a project worth £25 million will generate some 150,000 drawings and 6,000 site instructions. Given the sheer volume of information generated, effective and efficient communication is an integral part of the construction process (Griffith, *et al.*, 2000) in ensuring an effective performance by project participants.

The demand placed upon informationonthe construction project is enormous. By and large, the progress of construction activities depends on the right parties receiving the right information at the right time (Kwakye, 1997). In addition, there is also a growing awareness on the significance of information as the hallmark in increasing efficiency (McDonagh, 1995). Owing to this reason, it is

imperative for all parties in a project to be supplied with the right information in an adequate and timely manner (Hackett *et al.*, 2006; Kwakye, 1997; Laing, 1976)in order to achieve the objectives of a project.

According to Barton (1985), information represents data or knowledge evaluated for specific use. Subsequently, the data are processed to provide meaningful information and transmitted by the process of communication (Barton, 1985; Dainty *et al.*, 2005).At present, the information requirements in construction organizations are considerable due to the increasing complexity of buildings, legal, statutory and contractual requirements (Griffith, *et al.*, 2000). From the literature point of views, the types of information required in a typical construction project could be classified into commercial (or financial), technical, legal and managerial (or administrative) information (Atkin, 1995; Griffith, *et al.*, 2000). These types of information were later represented in various forms such as reports and drawings which will be produced by various participants in a project. Irrespective of the forms it represents, the amount of information undeniably needs to be adequate (Kwakye, 1997) and matches with the needs of others (Atkin, 1995) to ensure effective performance by project participants.

In the area of quantity surveying, the BQ is regarded as an important form of information produced by the Quantity Surveyor in the design phase of a project (Kwakye, 1997). According to Hughes (1978) and Turner (1983), the BQ represent an itemisation breakdown of construction works into components parts such that their sum equates with the whole. The itemisation process carried out by the Quantity Surveyor results in numerical and structured textual information (Fryer *et al.*, 2004) which is envisaged to fully and accurately describe a project. According to Atkin (1995), the BQ is a type of technical information. It sets down the various items of work in a logical and recognized sequence in an order ready to be priced by the contractors. In order to discharge this function effectively, it is essential that it conveys as much information and details as possible (Ahenkorah, 1993; Hackett, *et al.*, 2006). The inclusion of necessary information in the BQ with level of details will assist tenderers and project participants to function more effectively hence purporting construction project to be delivered successfully thus meeting its objectives (Hackett, *et al.*, 2006).

The BQ has a strong relationship with and was regarded as fundamental to the traditional lump sum system of construction procurement(Jaggar *et al.*, 2001; Seeley, 1997). The relationship has proven to remain strong given the acceptance of the traditional lump sum system of construction procurement in the local construction industry(Khairuddin, 2002). This was affirmed by the Construction Industry Development Board (CIDB) record for the year 2007 to 2011 (CIDB, 2009, 2010, 2011, 2012)as shown in 'Table 1' which reflects more than 90% adoption for the said procurement system compared to other types of procurement systems used locally. Hence, the relatively strong adoption of the said procurement system indicated a seamless, unified and centrality of the BQ in the construction industry.

Table 1: The frequencies on the use of the traditional lump sum system as compared to other types of procurement

Type of procurement	Year/Percentage									
	2007	%	2008	%	2009	%	2010	%	2011	%
Traditional lump sum system	6906	*93.86*	6125	*93.91*	6724	*95.52*	6930	*96.30*	6445	*96.84*
Other types of procurement	452	*6.14*	397	*6.09*	315	*4.48*	266	*3.70*	210	*3.16*
Total number of projects executed	7358	*100.00*	6522	*100.00*	7039	*100.00*	7196	*100.00*	6655	*100.00*

Source: Adapted from CIDB quarterly construction statistical bulletin. Data as at Mac 2012

However, regardless of the centrality of the BQ in the Malaysian construction industry, review of relevant literatures has indicated that the BQ is flagged with various issues in its use and application (Kwakye, 1997). The literatures which covered much on issues related to the BQ have focused on identifying the issues and yet, no conceptualization has been proposed as an approach to achieve a workable solution. This is considered as a serious gap with the previous literatures and amount to a missing link with the current research effort and understanding. In order to bridge the gap, there is a need to conceptualize the issues related to BQ, and through conceptualizing, actions could then be planned to achieve the desired solution.

The aim of this paper is to propose a conceptual framework as a basis to understand the BQ related issues holistically before a plan of actions could be drafted to achieve the desired solution. The study has employed an extensive literature review on BQ related issues in identifying the most significant issue as the basis for developing the conceptual framework. This will pave the way for a conclusive solution to the main issue and a catalyst for further works to be carried out.

2. LITERATURE REVIEW

The construction industry is an important economic sector in Malaysia. It is central as being the catalyst for development and a major indicator and determinant of domestic performance in the economy (Abdul Razak *et al.*, 2010). In order to sustain the industry's growth, there is an urgent need within the industry to streamline the construction processes and to coordinate information in a quest for an improved construction performance. The need for streamlining and coordination was evident due to the nature and the environment in which the industry operates which was characterized hardly by separation and fragmentation of different organizations(Kwakye, 1997; Ofori, 1990). Fragmentation in the construction industry exists due to the diversification of its participants. Although volatile and sometimes adversarial, it is an indispensable character of the industry which may impede the success and performance of a construction project.

The issue on information in the construction industry has received considerable attention among researchers and many have associated the information advancement with the computing technology. For instance, studies by Chen and Kamara (2011)and Nourbakhsh, *et al.*(2012) delved into the development of mobile computing technology in a quest to improve site information management in a construction project. Yet, regardless of the gains from the leap, the studies admit that the

establishment of user's information requirements and identification of any factors that affects its development were of paramount prerequisite for such technology to kick-off. Their opinions were in line with Atkin (1995) who has foreseen the difficulty to provide sufficient information that matches precisely with the needs of others and hence, on the onset, instilling the awareness on the significance of information as the hallmark in increasing construction efficiency (McDonagh, 1995).

To the Quantity Surveyors, the BQ is regarded as an important output that represents information produced in the design phase of a project (Kwakye, 1997). 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). The BQ entails vast amount of information that can be used in many ways (Hackett, *et al.*, 2006) and the only real communications between the client and the contractor (Laing, 1976). According to Seeley (Seeley, 1997), with the increasing scale and complexity of building operations, it would be impossible for contractor to price a medium and large sized project without a BQ. The recognition indicates the position of the BQ in the construction industry and reinforcing its status as an important medium of communication.

In the context of the Malaysian construction industry, BQ preparation lay at the centre of services offered by the independent quantity surveying firms in Malaysia (Abdul Rashid and Normah, 2004; Fadhlin and Ismail, 2006; Rosli *et al.*, 2008). According to Abdul Rashid and Normah (2004), BQ preparation formed 84.4% of total works outsourced by the Public Works Department of Malaysia (PWD). BQ preparation was also reiterated by Rosli *et al.*(2008) as the backbone of the Malaysian Quantity Surveyors professional's fees. It forms the majority of their income and a prominent activity in any quantity surveying establishments throughout Malaysia. The familiarity of the Malaysian construction industry with the traditional lump sum system of construction procurement and the amount of BQ related workload shows that the BQ is still relevant and worth for further improvement.

Regardless of the position of the BQ in the construction industry, there were evidences from the UK that showed the application of the BQ was in fact declining. The eleventh survey report on contract in use published by the Royal Institution of Chartered Surveyors (RICS) (Ashworth and Hogg, 2007; RICS, 2010)for instance, has reported a measurable decline in the use of the BQ since 1985 as shown in 'Table 2'. It was also perturbing to learn that for the first time, the use of the BQ by value of projects has dropped below 20% from 64.7% recorded in 1985.

Table 2: Percentage of projects (by value) where BQ (firm and approximate) are used as tender documents in the UK

	1985	1987	1989	1991	1993	1995	1998	2001	2004	2007
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
The use of the BQ by value of projects	64.7	55.5	55.9	50.8	45.7	46.1	30.1	23.1	26.1	15.2

Source: Adapted from RICS (2010, p.8) and Ashworth and Hogg (2007, p.256)

Base on the report published by RICS, there were possibly many reasons that had contributed to the decline. For instance, according to Hodgetts (1985) and Ferry et al. (1999) the function of the BQ was limited for calling in tenders only despite its image for being a laborious and costly exercise (Blyth, 2001; Charles, 2007; Khairuddin, 2011; Rosli, *et al.*, 2008). To make matters worse, the data in the BQ was also found to be hardly manipulated (Jaggar, *et al.*, 2001) which requires some sort of rework (Kodikara *et al.*, 1993) in order to adequately adhere to the demand of the construction process. The piles of the issues which were not properly addressed over the years have let the BQ stagnant and less appealing to the industry, hence purporting for its decline in the construction industry.

Although the report showed that the BQ is facing a bitter reality of waning, the attention and awareness given by the industry on the importance to improve the BQ was actually increasing. This is apparent from various studies conducted that talked on the issues as well the moves from the professional bodies – for instance, the RICS with the New Rules of Measurement or NRM - with varying interest. However, the effort to improve the BQ could move to despair if the industry disregards the requirements to understand the issues in a holistic manner. By understanding the issues through proper conceptualising, robust actions could be planned which in return, yield favourable and useful results applicable to the industry.

3. METHODOLOGY

In order to come out with the conceptual framework, a thorough literature reviews was conducted to identify all issues related to the application of the BQ. The reviews process, which was broad based, was aimed at examining, synthesizing and recording all issues discussed by various authors in books, journals and other scholarly works. The recorded issues were later categorized according to themes in view of determining and identifying an issue considered as significant. The significant issue will become the focus of this paper and will be conceptualised further for better understanding.

4. CONCEPTUALIZING THE ISSUE

The literature review process had generally managed to reveal that issues concerning the BQ could be broadly categorized into eight categories: 1) inadequate information, (2) unreliable and inaccurate rates and quantities (3) poor and unimproved production technique (4) unimproved format (5) limited function (6) poor and unimproved presentation (7) failure to recognised builder's knowledge and (8) unable to fulfil the current demand of construction environment. 'Table 3' is the outcome of the review process which had classified the issues according to the appropriate categories. According to 'Table 3'issue pertaining to 'inadequate information' was identified as the most significant issue surrounding the BQ based on the number of previous studies dedicated to discuss on the subject. In addition, this issue was also found to be significant as all other issues are similarly related to the aspect of information. Generally, the issue has stemmed out from its inadequacy to satisfy varying management aspects of a construction project. This issue has eventually led to dissatisfaction from the construction industry.

Base on the understanding gained through examining, synthesizing and classifying the literatures, the inadequacy of BQ information could be conceptualised to surface due to the imbalance that exist between the producer and the subsequent users of the BQ. The imbalance in this instance refers to the lop-sidedness from the *line of information equilibrium* on the part of the BQ producer and the expectation of its users. The situation in return, has prompted disequilibrium to exist which renders the information unfit and inadequate for its intended purpose.

Table 3: The synthesis - summary on the issues identified from the literature review process

Category	Issues identified	Authors
(1) Inadequate information	1) Inadequate information and form for site management purpose	(Contributed, 1964; Holes, 1990; Kodikara, *et al.*, 1993; Leon, 1966; Rosli *et al.*, 2006; Smith and Hoong, 1985; Waterworth and Weddle, 1978)
	2) Inadequate information details for contractor's use	(Ahenkorah, 1993; Hamimah *et al.*, 2011; Holes, 1990)
	3) Inadequate information for cash flow projection	(Hamimah, *et al.*, 2011; Smith and Hoong, 1985)
	4) Inadequate information for site operation	(Baccarini and Davis, 2002; Hamimah, *et al.*, 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, *et al.*, 2011; Jaggar, *et al.*, 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, *et al.*, 2011; Kinlay, 1984a)
	9) Inflexible information for data coordination	(Kodikara, *et al.*, 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, *et al.*, 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, *et al.*, 2011; Holes, 1990; Jaggar, *et al.*, 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, *et al.*, 2001; Rosli, *et al.*, 2008)
(2) Unreliable and inaccurate rates and quantities	1) Its accuracy depends on drawings and specifications provided by the designers.	(Leon, 1966)
	2) BQ production can only begin when certainty is established in the design	(Ashworth and Hogg, 2007; Matipa *et al.*, 2008)

	3)	BQ inaccuracy promotes disputes.	(M. F. Hodgetts, 1984)
	4)	BQ produced is inaccurate in terms of its quantities and descriptions.	(Abdul Rashid and Normah, 2004; Rosli, *et al.*, 2008)
	5)	Nett quantities and inaccurate quantities are major dissatisfaction among contractors in the way quantities are provided in BQ.	(Hamimah, *et al.*, 2011)
	6)	BQ rates are unreliable as it vulnerable to human error (artificial high and low) and variability in contractor's pricing.	(Akintoye *et al.*, 1992)
	7)	BQ descriptions compel estimators to use unit rates as the pricing basis.	(Mohd Hisham and Azman, 2008)
	8)	SMM measurement approach (the case of Australia) is overly complex.	(Davis and Baccarini, 2004)
	9)	SMM rules promote quantities inaccuracies in BQ.	(Leon, 1966)
(3) Poor and unimproved production technique	1)	BQ preparation takes extra time and delaying the date for calling tenders.	(Abdul Rashid and Normah, 2004; Ashworth and Hogg, 2007; Khairuddin, 2011; Kinlay, 1984a; Rosli, *et al.*, 2008)
	2)	BQ production is a sequential process and is normally prepared at the late stage of the design process.	(Ferry, *et al.*, 1999; Matipa, *et al.*, 2008)
	3)	Inadequate time to prepare BQ lead to poor BQ quality.	(The BOQ Working Group, 1995)
	4)	BQ production is labour intensive and requires significant portion of QS cost.	(Charles, 2007)
(4) Unimproved format	1)	BQ format other than trade fails to facilitate contractor pricing.	(The BOQ Working Group, 1995)
	2)	BQ format do not indicate project's buildability, work sequence and control of work.	(Skoyles, 1968)
	3)	BQ format do not adequately reflect the interaction between the design and the production process.	(Skoyles, 1964)
	4)	BQ format is not adequate to fulfil its maximum functions.	(Hughes, 1978)
	5)	BQ format and data presentation are the major cause for inefficient flow of estimating data.	(Kodikara and McCaffer, 1993)
(5) Limited function	1)	BQ primary function is limited to just calling competitive tenders rather than a document for management and cost control of construction on site.	(Ferry, *et al.*, 1999; M. Hodgetts, 1985)
	2)	BQ benefit as checking and coordinating document is not fully explored.	(Blyth, 2001)
	3)	Some limitations of BQ as tender document are:(1) presence of errors (2) incomplete (3) cannot be used to control project cost (4) cannot facilitate the use of probability cost estimating (5) poorly structured and too bulky	(Uher, 1996)
	4)	BQ is too detailed, not appropriate for all types of construction works.	(Ashworth and Hogg, 2007; Khairuddin, 2011)
	5)	BQ is no use to the client and inaccessible to the client who has paid for their production.	(Blyth, 2001; Kinlay, 1984a)
(6) Poor and unimproved presentation	1)	BIM technology is able to respond faster and challenging the traditional method for producing quantity.	(Barker, 2011)
	2)	Traditional measurement would not be able to	(Barker, 2011)

	compete the speed of response created by auto measurement.	
	3) BIM potential to automate quantity measurement might threaten client's requirement for quantity surveying services.	(Olatunji *et al.*, 2010)
(7) Failure to recognize builder's knowledge	1) BQ fails to acknowledge builder's input.	(Benedict, 1972)
(8) Unable to fulfil the demand of construction environment	1) BQ fail to adapt change to suit the needs of a changing industry.	(Davis *et al.*, 2009; Smith and Hoong, 1985; Turner, 1983)
	2) BQ fail to adapt change and no longer relevant to represent the approximate parameters of construction.	(Khairuddin, 2011)

5. THE CONCEPTUAL FRAMEWORK

Skinner(1979), whose research concentrated primarily on examining the utility of the BQ in the process of building contracting, has defined the concept of adequacy as "the absence of any necessity to make additional allowances, alterations or amendments before making use of the information presented in the bill" (p. 50). Taking cue from the work of the author, the concept of the inadequacy of BQ information applicable to this paper could be referred to as the need to make such allowances etc. due to the deviation, in comparison to what is perceived as the *ideal situation*. 'Figure 1' in this instance, is the representation of the concept. By referring to 'Figure 1', the '*IDEAL SITUATION*' will amount to perfect equilibrium where the requirements for information from BQ users are met by the amount of information given by the producers. In order for the ideal situation to take place, both *BQ producer* and *BQ users* need to be cleared with their own requirements and this will also involve both parties to let the other party know every bit of their requirements. For example, if a contractor (i.e. *BQ users*) requiring information on the location of a measured item in the BQ (i.e. *the information*), he or she has to let the Quantity Surveyor (i.e. *BQ producer*) knows his requirement in order to situate his information requirement on the *baseline*. The Quantity Surveyor in return, has to let the contractor get the information otherwise equilibrium will not be created

In contrast, review of the literatures has indicated that the ideal situation is currently smeared by the '*IMPERFECT SITUATION*'. Worse, further review of the literature has indicated that the type, amount and forms of information that will establish the baseline were currently uncoordinated and disorganized. The establishment of the baseline by ascertaining the type, amount and forms of BQ information is therefore prerequisite before attempt could be made in assessing the current deviation from the *ideal situation*.

Following the breadth of the issue, there are many situations which could lead to the imperfect situation or simply, *n*. As an example in 'Figure 1', BQ users are expecting beyond what are needed while BQ producer is giving too few information. In this situation,*vacuum* will be created along the information continuum (i.e. *area of BQ information imbalance*) and this will create a hurdle as far as information in the construction industry is concerned. The information vacuum created though the illustration is currently the concern of various authors. However, approach to identify every

imperfect situation as an effort to rectify every type of BQ information disequilibrium will not be possible given the limitless combination that may occur in the construction industry - *n*. Regardless of the limitation, the establishment of the baseline will act as a gauging scale where any situation could be compared to in pursuit of the ultimate solution.

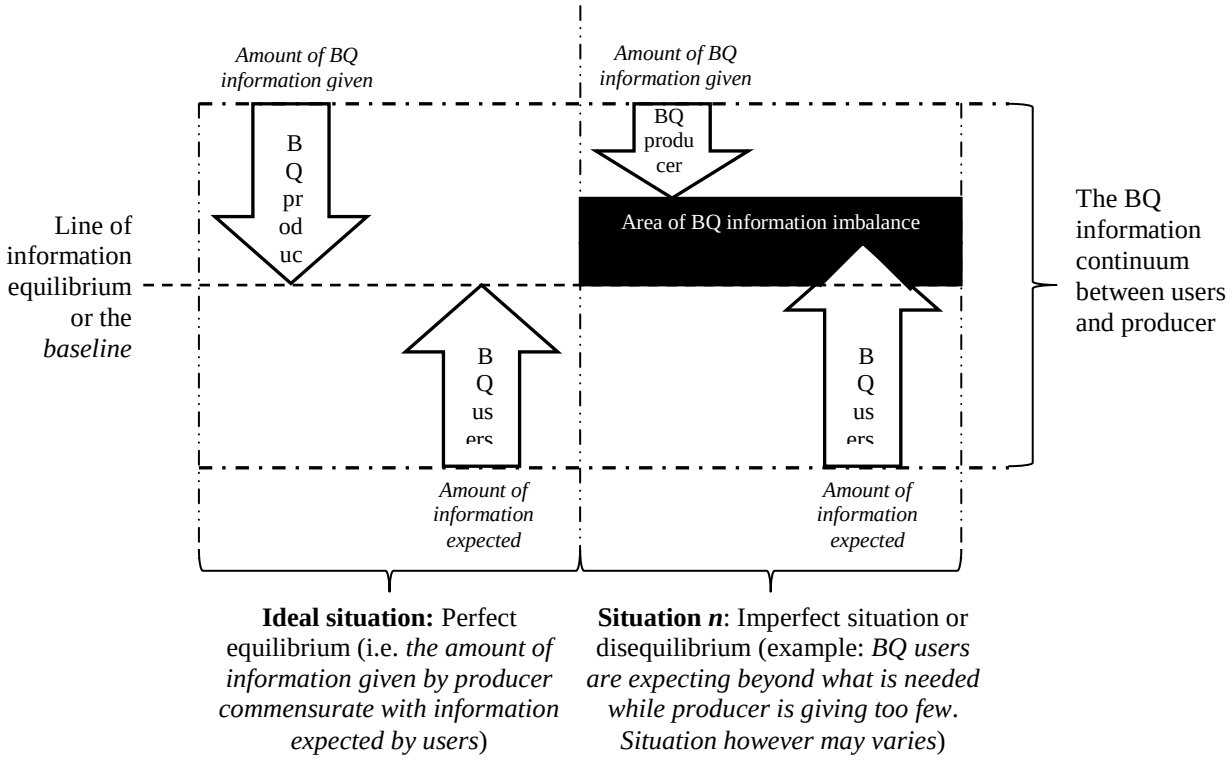

Figure 1: The conceptual framework on the inadequacy of BQ information

6. BEYOND THE CONCEPT

By understanding the issue conceptually, further action could be planned in order to solve the imperfections through scientific approach. This will involve identifying the step which is considered prerequisite before the next step could follow suit. Based on the understanding from the concept, the establishment of *the line of BQ information equilibrium*or simply the baseline is the prerequisite before current situation could be assessed.

For this reason, actions need to be planned for the purpose of establishing the baseline. This will involve thorough investigation on its usage among the users, examining the problems associated with its current use and probably, identifying any impacts the problems give to the construction projects. Following this, the specific requirements of the users could be identified and these requirements should partly amount to the baseline of BQ information.

In order to complete the baseline, comparison needs to be made between the user's requirements and the current form and presentation of the BQ. The process will highlight the information which is currently unmet by the BQ producer thus formulating the complete baseline.

For the purpose of assessing the adequacy of the BQ information, the comparison process which is conducted between the user's requirements and the current form and presentation of the BQ is itself an assessment of its adequacy. Besides formulating the baseline, the process will also indicate either the current information is adequate or not which should be considered as another milestone in the process.

7. CONCLUSION

The paper has reviewed issues pertaining to the application of the BQ in the construction industry and has found that the issues could be categorised to eight broad categories. Following the categorisation, the most significant issue discussed in the literature was identified and focus was then given to further conceptualise the issue as a preliminary approach to plan for a solution. According to the outcome of the synthesis, issues pertaining to the adequacy of the BQ information were identified as significant thus requiring immediate attention. In order to understand the issue holistically, the paper has proposed a conceptual framework as a basis to plan the steps of actions. According to the conceptual framework proposed, the issue with the adequacy of the BQ information had risen due to the deviation from the ideal situation which had been caused by the lop-sidedness of information from the line of the information equilibrium. The situation in return, has prompted disequilibrium to exist which renders the information unfit for its intended purposes. Beyond the proposed conceptual framework, the paper had called for the establishment of the line of the BQ information equilibrium or simply the baseline in assessing the adequacy of the current information provided in the BQ. By having the baseline in hand, the current situation could be assessed as one of the prerequisite step in suggesting the desired solution.

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