



## Documenting its Applications in Quantity Surveying Research: A Review

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### ABSTRACT

Literature review is an indispensable segment in scholarly undertaking. Although important, it appears that little has been documented about its process especially from the perspective of research in quantity surveying. This despite such effort could possibly benefit novices attempting to explore the vast territory of quantity surveying intellectual domain. Hence, drawing from the author's recent research in identifying the issues that have impeded the use of the bills of quantities (BQ), this paper aims to document the steps involved in the process of reviewing literatures concerning the research. Accordingly, a nuts-and-bolts approach to literature review has been put forward in the background and it strives to describe the steps following the review processes carried out in the research underpinning this paper. This paper reflects that the process for reviewing the literature could be viewed as iterative-cyclical. In this regard, searching; mapping; analysing and synthesising have been recognised as the important steps in the process. The paper also demonstrates that the use of NVivo assisted greatly in the process and adds significant value through its pragmatic features and useful displays. The paper discussed these processes in relation to research in quantity surveying which is significant to the domain or a part thereof.

## 1. Introduction

Review of the literature is necessary to demonstrate the researcher's awareness on the current progress and the state of a specific area of knowledge (Hart, 1998). It is an essential process, which inform the researcher on the limitations of previous research before adequate relationships can be drawn to justify how current research may fit in the context of previous findings. Thorough literature review helps to identify the focus for the research (Creswell, 2003) and enable the researcher to clearly see the progress of a subject in the same area of research (Sekaran and Bougie, 2010). This, according to Fellows and Liu (2008), will help any researcher from re-inventing the wheel or wrongly contemplating a gap of otherwise an important research into a subject.

Being important, there seems to be various approaches to literature review across different domain of knowledge. These were specific and normally carried out to achieve particular goals in the research. The variability of approaches to literature review indicates the specific purpose for which it was undertaken. In this regard, it appears that little has been spent in documenting the process of this vital research component, saved the outcomes shaping out from it. It becomes clear that any effort to deconstruct and document the process would be advantageous. This will benefit future researcher, especially novices pursuing interest in any research such that of quantity surveying.

Thus, this paper aims to document the steps involved in a review process by drawing direct illustration from the author's recent effort on identifying issues concerning the application of the BQ to the contracting organisations (Shamsulhadi, 2015; Shamsulhadi *et al.*, 2014). These are the researches that underpinned this paper which have been focused on restructuring relevant issues found in the literature. The extensive application of review techniques learned and applied from textbooks have strengthened the understanding of the process, hence making it a sound basis to objectively support the work presented in this paper.

The methodological nature of this paper requires background knowledge on the relevant steps involved in literature review. These are gathered by sourcing from various published materials which includes Hart (1998); Ridley (2008) and Booth, *et al.* (2012). This ensures that the documented steps are in accordance to the published materials. Flowchart summarising the technical aspects is also developed from the references to ensure important steps are not missed throughout the process. In this respect, the flowchart developed helps to explain general process to literature review and form the main reference from which the appropriate steps in the process have come to light.

Apart from the flowchart, this paper has also considered the application

of dedicated analysis software – NVivo to support the process. The software facilitates in synthesising evidences collected from the review thus helps to minimise errors which prone to occur with the manual analysis. Besides, the graphical representation features of the software have characterised much of the steps discussed in this paper and significant in espousing focal nodes relevant to the outcome of the review. The following section provides definition to literature review. It also presents brief technicality of the process.

## 2. The ‘Literature Review’

Definition of literature review was found in materials sourced for this paper. In this respect, a collection of definition was given in Ridley (2008, p. 3) and consist of various emphasise on its role and purpose. Amongst this, the definition by Hart (1998, p. 13) was mostly cited across sources. This is obvious as the definition unpicked what a review process entails, which was found to focus on documents as the essential components in the process. Hart (1998, p. 13) states:

*[LR is] the selection of available documents (both published and unpublished) on the topic, which contain information, ideas, data and evidence written from a particular standpoint to fulfil certain aims or express certain views on the nature of the topic and how it is to be investigated, and the effective evaluation of these documents in relation to the research being proposed (Hart, 1998, p. 13).*

Thorough literature review helps to develop various parts of the study (Welman *et al.*, 2005). It shows a researcher’s familiarity with the topic (Hart, 1998) and helps prevent wastage of valuable resources caused by reinventing the wheel (Sekaran and Bougie, 2010). A researcher needs to evaluate the research that has already been undertaken, to show and subsequently explain the relationship among the findings (Saunders, *et al.*, 2007). Saunders, *et al.* (2007) maintain that literature review will almost always seek to draw out the key points and trends in the published findings, hence allowing readers to see the current research against the backdrop of relevant researches in the area.

Though significant, Hart (1998) stated that researchers especially novices are constantly baffled with the technicality involves in literature review. This comes as the data for analysis is information and not the common data collected via pre-construct research instrument (Hart, 1998). The emphasis is that the analysis requires critical understanding and interpretations towards arguments that others have proposed, by systematically extracting ideas and concepts from the literature (Hart, 1998). Hence, literature review should weave all relevant information in a cogent and logical manner, rather than a chronological bits and pieces of inept information (Sekaran and Bougie, 2010).

There seems to be significant emphasis from the references on the process commanding to the literature review outcome. This includes the need to be critical and systematic. According to Saunders, *et al.* (2007) being critical means having the appropriate skills to appraise or evaluate the relevant piece of literature. It is the judgement a researcher exercise in deriving the review (Saunders, *et al.*, 2007). While critical was associated with thinking, being systematic is about the flow of process involved in the review. According to Booth, *et al.* (2012) this consists two principal aspects which are methods and presentation. Booth, *et al.* (2012) continued to highlight that methods are the conduct of search, appraisal, synthesis and analysis whereas presentation involves the act of

reporting these steps. These were the important concepts in literature review in allowing the process to be performed to concede to the right amount of quality (Booth, *et al.*, 2012; Tranfield *et al.*, 2003).

The concepts suggested that thinking and process are the important aspects in literature review (Booth, *et al.*, 2012). Hart (1998) stated that this concept is rather generic hence is relevant across disciplines and applicable to any domain. This somehow explains the variability of approaches to literature review. In this respect, the generic application of the concepts has allowed researcher to suit and adjust the processes to his or her review requirements (Sekaran and Bougie, 2010). This is often characterised by the subject and purpose the review is conducted. Irrespective, documentation of the processes is considered important. This stimulates how the thinking and process intertwine in a specific domain.

As the paper is focused on the literature review process, the following section will first outlined the generic approach and processes to literature review. This is to enable prior understanding to the literature review technicality, with a view to produce a review with an acceptable breadth and clarity. Effort will subsequently be expanded to explain the processes carried out in relation to the research underpinning this paper. This adds to the knowledge base and bolstering current understanding in this respective domain.

## 3. The Literature Review Process

The literature review process was illustrated by Saunders, *et al.* (2007, p. 56) as an upward spiralling process. It started by clear research questions and objectives, and proceeded by generating and refining relevant keywords. The process continued by searching and obtaining relevant literatures before these are then subjected to evaluation. This cycle is repeated with added focus and draft revision before finally culminating to the critical review of the literature.

There has been emphasis that literature review should be carried out systematically. This implies that review process should contain a proper methodological structure and strives to eliminate the potential for developing any kinds of bias (Booth, *et al.*, 2012; Denyer and Neely, 2004; Tranfield, *et al.*, 2003). Rousseau in Booth, *et al.* (2012, p. 25) states:

*[Being] systematic means comprehensive accumulation, transparent analysis, and reflective interpretation of all empirical studies pertinent to a specific question. Reliance upon any sampling or subset [of the literature] risks misrepresenting its diversity in findings, outcome methods, and frames of reference (Rousseau, et al. (2008) in Booth, et al. (2012, p. 25).*

The idea of systematic review was outlined in the paper by Tranfield, *et al.* (2003). This was further refined by Denyer and Neely (2004) and presented by Saunders, *et al.* (2007, p. 72) as: (1) Develop clear and precise aims and objectives for the LR; (2) Pre-planned search methods; (3) Comprehensive search of all potentially relevant articles; (4) The use of clear assessment criteria in the selection of articles for review; (5) Assessment of: quality of research and the strength of the findings; (6) Synthesising using a clear framework, and; (7) Presenting the result in a balanced, impartial and comprehensive manner.

Drawing from the above suggestions, an approach suggested by Booth,

et al. (2012) was to cover iteratively, by exhaustively citing all relevant literatures and capturing new evidence as it emerges continuously from related researches. This is simplified by Booth, et al. (2012) in the

author's **SALSA** framework (acronym of Search, Appraisal, Synthesis and Analysis).

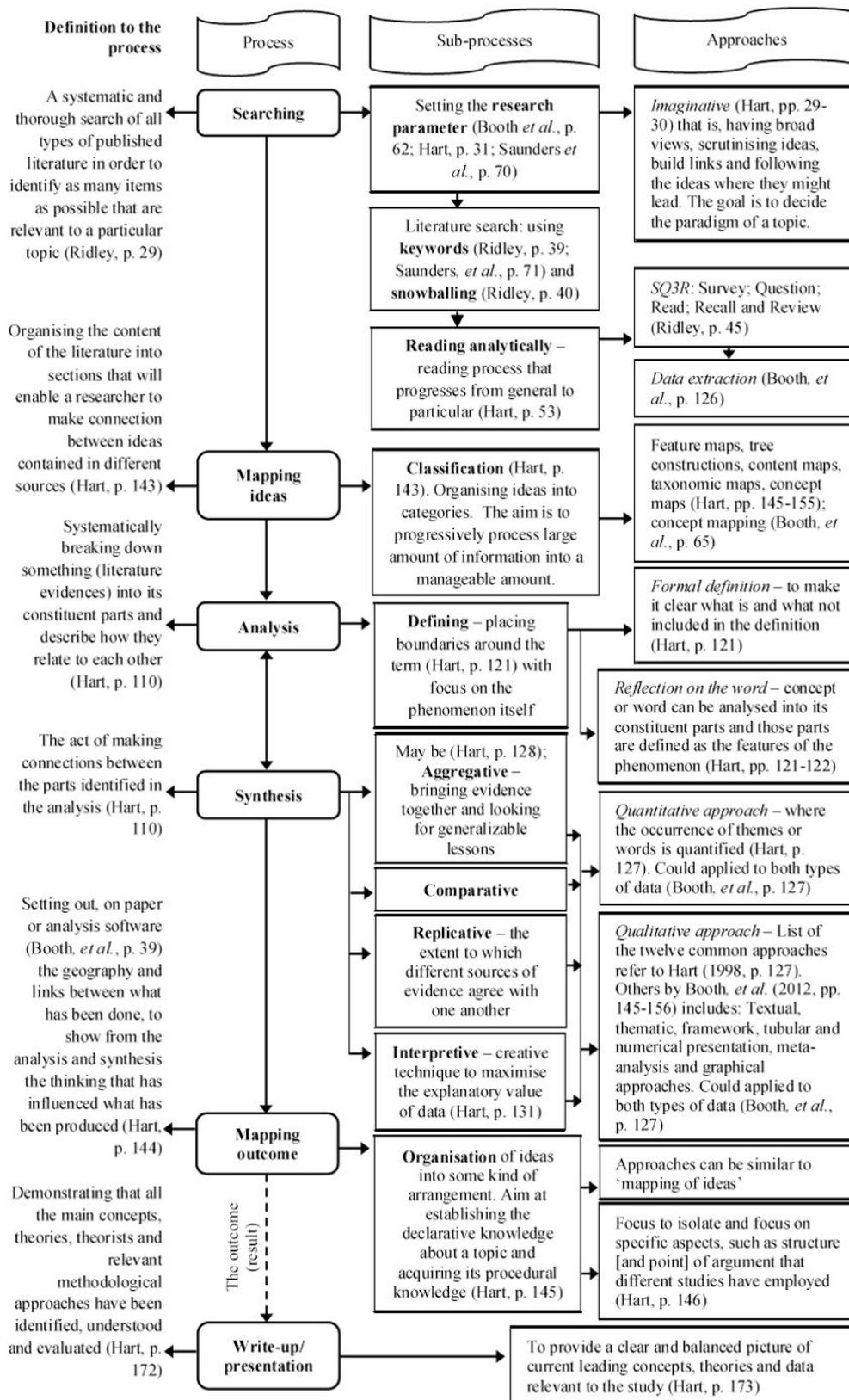


Figure 1: The processes involved in literature review

(Developed based on Hart (1998); Saunders, et al. (2007); Ridley (2008) and Booth, et al. (2012))

The above implies that literature review is not a linear process despite having a clear start and expected deliverable. Rather, it is a back and forth effort to iteratively frame new literature evidence and one that is simply cyclical (Grix, 2004, p. 45; Ridley, 2008, p. 80). Ridley (2008) maintained that there is no clear cut-off point when one activity ends and the other begins while Hart (1998) opined that the process will never be definitive.

Although it is important to continuously incorporate relevant studies in a review, there is always intimidation that a review will never be finished (Fellows and Liu, 2008, p. 62). It is rather impossible to review every single piece of literature concerning a subject (Saunders, *et al.*, 2007, p. 57). In countering this, Fellows and Liu (2008) suggested for the establishment of a realistic 'dead-line' to close entries to the review. Hence, the purpose of literature review is not to summarise everything that has been written, but to review the most relevant and significant research on the topic (Saunders, *et al.*, 2007, p. 57).

The knowledge gained from the study on literature review results a useful understanding on the process and technicalities involved. This is presented in Figure 1 as a series of a process flow and aim to bring together every sub-processes and approaches relevant to the main process. Reference to the relevant materials is given with further explanation taking place in the following sections of this paper.

Figure 1 shows a summary of process to literature review developed from the references. It lists the common processes identified and detailed out how the processes should ideally be carried out. The processes essentially involved five main steps. These start with searching, mapping of ideas, analysis, synthesis and finally mapping of outcome. The steps as Ridley (2008) opined is iteratively-cyclical. The aim being the critical review of the literature (Saunders, *et al.*, 2007). The following sections present the documented processes from the researches underpinning this paper. Efforts have been made to explain how the literature review was carried out in relation to the processes shown in Figure 1.

#### 4. Searching

The researches underpinning this paper were aimed at recapitulating relevant issues concerning the use of the BQ by the contracting organisations. Two objectives were outlined: (1) to explore the issues impeding the use of the BQ; and (2) to restructure the issues following the outcome of the review. The aim and objectives outlined help to set the research parameter. Keywords were drawn from the objectives and the snowballing technique was used to locate relevant literatures. It commenced by searching in leading monographs before further references are identified through backward and forward approaches (Webster and Watson, 2002). All references were then subjected to analytical evaluation.

#### 5. Mapping of Ideas and Analysis

Mapping involves putting together different strands that make up the topic to enable analysis and synthesis to be undertaken (Hart, 1998). It aims to progressively reduce the large data extracted from the analytical evaluation and identifies the main abstractions in the argument (Hart, 1998). In relation to the research underpinning this paper, this step helps by reducing data accumulated from the review and organising the content into sections that contain meaningful connections.

The extracted data was then organised into a featured map (Hart, 1998). This involved developing a table which contain predefined criteria following the object of the review. According to Booth, *et al.* (2012), criteria for mapping a review can be developed following the specific purpose of the review. It is a form of classification and should focus in identifying concerns highlighted in previous researches (Booth, *et al.*, 2012). In relation to the research underpinning this paper, the developed criteria were devised for the purpose of framing issues concerning the use of the BQ. This requires predefined criteria of issues, authors and leading concepts to be inculcated in the mapping process. The developed criteria helped the review to remain objective in its stride and subsequently discloses the leading concepts from the materials reviewed. Further, this aid in exploring the thoughts behind the leading concepts and help to combine sources with similar argument. The outcome from this step is shown in Table 1. This follows the second process shown in Figure 1.

Table 1 shows that the analysis of the identified issues took place by reflecting the words (or terms) used from the extracted data. These were portrayed as the features of the phenomena (Hart, 1998) and were defined in the overall context of the issues. The approach allows leading concepts to be noted and recognised. It discloses the gist of the issues and provides an appreciation on the category of issues embodied in the literature (Bryman, 2008). This acts as the basic structure of the issues and exposes the headings in preparation for the next process in literature review – synthesis.

#### 5. Synthesis

Synthesis is the act of making connections between the parts identified in the analysis (Hart, 1998, p. 110). Hart (1998, pp. 128-131) stated that this may be aggregative, comparative, replicative or interpretive. Synthesis is subjected to either quantitative or qualitative approach. It could apply to both quantitative and qualitative data (Booth, *et al.*, 2012, p. 127).

Synthesis was carried out in the research underpinning this paper by way of aggregative. This follows from the reflection of the words (or terms) used in identifying the issues. Some levels of interpretations were also exercised to group the evidences from the analysis. It reflects that quantitative approach has been adopted in the synthesis.

The quantitative approach applied in the synthesis followed the method outlined by Bryman (2008). This involved counting the frequency of certain concepts. The objective was to reveal the predilection that exaggerates certain number of concepts prompted from the analysis. Further, it helps by espousing the weightage that the concepts have and provide first evidence on the concept's structure. For this purpose, the qualitative analysis software – NVivo was used. The process was performed by invoking the 'Word Frequency Query' command available in the software. This command generates a model that represents the frequency of the leading concepts shown in Figure 2.

The 'Word Frequency Query' command helped in transiting the featured map (Table 1) to the generated model. It also helped to minimise error which prone to occur with manual analysis and assisted in suggesting the connections among parts identified in the analysis. This showed that clarity was incorporated by using the software, hence increasing the credibility of the structure developed from the literature review.

The model developed from the software shows that 'information',

‘format’ and ‘methods’ are the three most occurring concepts identified from the analysis. This implies that these are the main concepts underlying the identified issues in its broadest continuum. The emphasis of the model has also been on the weightage of the concepts. It is clear that ‘information’ contain the most number of issues followed by ‘format’ and ‘methods’ respectively. This implies

that issues related to BQ can be structured into three main categories. Hence, this helped to suggest discerning pattern from the data gathered from the review.

As synthesis is about making connections, it seems imperative to incorporate the issues presented in Table 1 back in the categories

Table 1: The mapping of ideas and analysis of issues identified from the literature review

No.	Issues identified from the literature review process	Authors
1.	BQ <i>does not provide</i> ( <b>*information</b> ) on the ( <b>time</b> ) and quantity schedule for the on-site delivery of materials required for the works.	Hamimah <i>et al.</i> (2011); Smith and Hoong (1985)
2.	BQ ( <b>*information</b> ) provide <i>no assistance</i> to anyone drawing up a pre tender programme ( <b>*time</b> ).	Contributed (1964)
3.	BQ ( <b>*information</b> ) only represent cost breakdown structure with <i>no link</i> to actual project schedule ( <b>*time</b> ).	Mohd Hisham and Azman (2008)
4.	SMM based BQ ( <b>*information</b> ) <i>unable to provide</i> a useful basis for contractor's work programme ( <b>*time</b> ).	Jaggar <i>et al.</i> (2001); Smith and Hoong (1985)
5.	<i>Preliminaries bill and specification</i> ( <b>*information</b> ) documents <i>contain many unnecessary</i> ( <b>*insufficient/ inadequate</b> ) items as a result of direct copy and 'standardised' document.	Hamimah, <i>et al.</i> (2011)
6.	BQ <i>quantities and descriptions</i> ( <b>*information</b> ) <i>do not accurately</i> provide information on work sequence and <i>contractor's methods</i> of operation ( <b>*working methods and planning</b> ).	Hamimah, <i>et al.</i> (2011); Leon (1966)
7.	The specialist trades contractors consider that the <i>tasks of planning</i> ( <b>*time</b> ) <i>could not be achieved</i> by using the bills ( <b>*information</b> ).	Morledge and Kings (2006)
8.	BQ ( <b>*information</b> ) is <i>unnecessary</i> for <i>compiling</i> ( <b>*format</b> ) sub-contractor's quotations and is <i>inadequate</i> for reviewing materials quotations from potential supplier as <i>quality of materials</i> ( <b>*specification</b> ) are <i>not clearly stated</i> .	Hamimah, <i>et al.</i> (2011); Kinlay (1984b)
9.	( <b>*Information</b> ) in BQ are <i>uncoordinated, aggregation on similar materials</i> rather than <i>operation</i> ( <b>*format and working methods</b> ).	Kodikara <i>et al.</i> (1993)
10.	BQ ( <b>*format</b> ) is <i>not in final forms</i> for direct use by site personnel.	Kodikara and McCaffer (1993); Kodikara, <i>et al.</i> (1993)
11.	BQ ( <b>*information</b> ) <i>requires sub-processes</i> as the information are <i>not presented</i> in a standardised ( <b>*format</b> ).	Cornick and Osbon (1994)
12.	BQ <i>fail to become a mechanism</i> to determine <i>construction processes</i> ( <b>*working methods</b> ). It does <i>not consider input</i> ( <b>*information</b> ) to the construction process ( <b>*working methods</b> ) but only identifies the end result or product of construction.	Holes (1990); Jaggar, <i>et al.</i> (2001)
13.	BQ <i>only present</i> ( <b>*information</b> ) <i>that have been processed and in final form</i> ( <b>*format</b> ). Detail ( <b>*information</b> ) such as supporting details on <i>quantities measured, work location and types of operations</i> ( <b>*working methods</b> ) the contractors have to employ are of use by estimators should access is given.	Hamimah, <i>et al.</i> (2011); Turner (1983); Wood and Kenley (2004)
14.	BQ ( <b>*information</b> ) had <i>inadequacies for utilisation</i> by contractors. ( <b>*Quantities</b> ) <i>Location of quantified information</i> was <i>not adequate</i> for its purpose.	Baccarini and Davis (2002); Wood and Kenley (2004)
15.	BQ do <i>not indicate</i> ( <b>*information</b> ) as <i>where the quantity is located</i> ( <b>*location</b> ) and therefore <i>difficult to get a feel</i> for the projects from the bill.	Slattery (1994)
16.	BQ <i>disregard potential</i> further value of reanalysing the ( <b>*information</b> ) into activities, operations or elements ( <b>*format</b> ).	Kinlay (1984a)
17.	BQ ( <b>*format</b> ) is <i>not adequate</i> as it <i>hinder effective use</i> of ( <b>*information</b> ) contained.	Rosli <i>et al.</i> (2006); Smith and Hoong (1985)
18.	BQ <i>fails to convey</i> details ( <b>*information</b> ) of <i>materials</i> ( <b>*specification</b> ), <i>plants and temporary works</i> required for <i>proper work execution</i> ( <b>*working methods and planning</b> ) and to enable those resources to be identified, quantified and valued by contractor's estimator.	Ahenkorah (1993); Hamimah, <i>et al.</i> (2011); Holes (1990)
19.	BQ only useful for tendering and financial control but <i>not used extensively</i> for <i>contractor's site operation</i> ( <b>*working methods and planning</b> ).	Smith and Hoong (1985)
20.	BQ <i>do not support</i> contractor's management function. BQ ( <b>*information</b> ) <i>disregard</i> resource requirements and <i>only measures</i> ( <b>*quantity and units</b> ) <i>fixed in place measurement</i> .	Baccarini and Davis (2002)
21.	<i>Nett quantities and inaccurate quantities</i> ( <b>*information</b> ) are <i>major dissatisfaction</i> among contractors in the way ( <b>*quantities</b> ) are provided in BQ.	Hamimah, <i>et al.</i> (2011)
22.	BQ ( <b>*format</b> ) other than trade <i>fails to facilitate</i> contractor's pricing ( <b>*unsuitable format</b> ).	The BOQ Working Group (1995)
23.	BQ ( <b>*format</b> ) <i>do not indicate</i> project's buildability, work sequence and control of work ( <b>*inflexible format</b> ).	Skoyles (1968)
24.	BQ ( <b>*format</b> ) <i>do not adequately reflect the interaction</i> ( <b>*inflexible format</b> ) between the design of a building and the production process ( <b>*working methods and planning</b> ).	Skoyles (1964)
25.	BQ ( <b>*format</b> ) is <i>not adequate</i> to fulfil its maximum functions ( <b>*unsuitable format</b> ).	Hughes (1978)
26.	BQ ( <b>*format</b> ) and <i>data presentation</i> ( <b>*unsuitable format</b> ) are the <i>major cause for inefficient</i> flow of estimating data.	Kodikara and McCaffer (1993)
27.	BQ data ( <b>*information</b> ) <i>fail to provide</i> contractors with information they need for <i>proper planning, organising and managing</i> of their work ( <b>*working methods and planning</b> ).	Contributed (1964); Holes (1990); Leon (1966); Waterworth and Weddle (1978)
28.	BQ ( <b>*information</b> ) <i>requires sub-processes</i> by site QS as the information are <i>not presented</i> in a standardised format ( <b>*unsuitable format</b> ).	Cornick and Osbon (1994)
29.	BQ ( <b>*information</b> ) produced is <i>inaccurate</i> in terms of its <i>quantities and descriptions</i> . Inaccuracy is caused from an omission of important cost items, disparity between drawing details and quantity list and over and under measurement of cost items.	Abdul Rashid and Normah (2004); Rosli <i>et al.</i> (2008)

Note: (**\*bold**) refers to the reflection of the word (or concept) being the outcome from the analysis. The reflected objects (as words or terms) come before (**\*bold**) with details of the framed issues highlighted in *bold-italic*. Source: Shamsulhadi (2015); Shamsulhadi, *et al.* (2014).

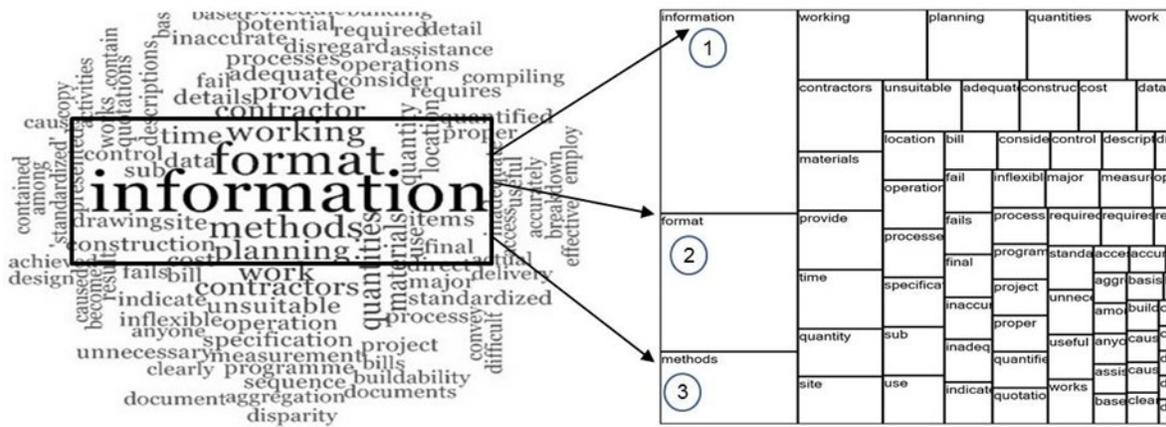


Figure 2: The generated model for representing the frequency of concepts underlying the issues - categories of the most occurring concepts are shown. Source: Shamsulhadi (2015); Shamsulhadi, et al. (2014) based on NVivo Software.

developed in Figure 2. This would enable details of the respective categories to be identified and facilitated in recapitulating the issues aimed in the research which supports this paper. For this purpose, the synthesis proceeded by revisiting the array of issues presented in Table 1. The intention is to collect and re-associate the details into the developed categories. The context in which this was carried out was interpretative. It aimed to establish as much connection between the categories and the details from the literature review. The outcome from this process is shown in Table 2.

As shown in Table 2, the numbers of recapitulated issues were in tandem with the frequency model presented in Figure 2. Issues related to BQ ‘information’ were recorded to have the highest number of details followed by details from issues related to BQ ‘format’ and contractor’s ‘method of working’. The synthesis carried out has been able to weave the details with the categories. It shows meaningful connection has been made. This is the essence of the synthesis process carried out. The next process in the literature review is the mapping of the outcome as explained in the following section.

Table 2: Categories and details of issues reincorporated

Category of issues	Issues keyword	Detail of Categories	Recapitulated issues
Issues related to BQ information	Inaccurate	Quantities	1. Inaccurate (*and wrong) quantities.
		Descriptions	2. Inaccurate descriptions.
	Inadequate	Material specifications	3. Inadequate material specifications.
	Insufficient	Information on the location of the quantities	4. Insufficient information on quantities, for instance the location.
		Duration/ Time	5. Insufficient information on *duration/time.
		Preliminaries	6. Insufficient information on preliminaries.
	Information on temporary works	7. Insufficient information on temporary works.	
Inappropriate	Quantity units	8. Inappropriate quantity units.	
Issues related to BQ format	Unsuitable	Format	9. Unsuitable format (*and presentation).
	Inflexible	Format	10. Inflexible format (*and presentation).
Issues related to contractor’s method of working	Insufficient	Working method	11. Insufficient (*clarification) on working methods.

Note: (\*) added in context from the revisited issues (presented in Table 1)

Source: Shamsulhadi (2015); Shamsulhadi, et al. (2014).

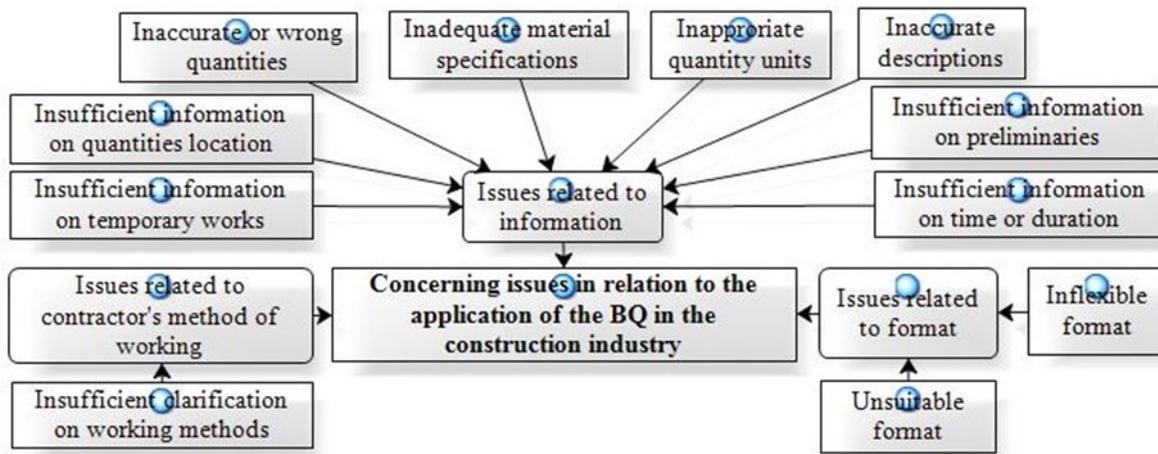


Figure 3: The generated model for mapping the literature review outcome  
 Source: Shamsulhadi (2015) and Shamsulhadi, et al. (2014) based on NVivo Software .

## 6. Mapping the Outcomes

Mapping of outcome is about establishing the geography of thinking and presenting the outcome from the literature review (Hart, 1998). The process seeks to organise the ideas into some kind of arrangements, aim to establish what Hart (1998) refers as declarative and procedural knowledge. It focuses at isolating the structure and point of arguments, hence creating the focal nodes for further elaboration to take place. The research underpinning this paper has taken on this by a model generated from NVivo. This is presented in Figure 3. The model presents the main findings from the review and a geographical map linking the outcome gained from the process.

## 7. Significant Insights

The documented processes provide insights on how literature review was carried out in the research underpinning this paper. Essentially, this paper has outlined five relevant processes in literature review. It starts by searching the literature followed by mapping of ideas, analysis, synthesis and mapping out the literature review outcome. These are the important processes to be comprehended before a proper review is written on any subject.

Though the details to the processes are quite extensive, it was shown that there is freedom to opt for the most appropriate approaches in the processes. This basically applies in mapping and synthesis. In this respect, researchers are encouraged to choose judiciously following the nature of the evidence, objectives and research questions that need to be answered (Hart, 1998; Saunders, et al., 2007). This was explained in the respective sections based from the research underpinning this paper.

In relation to the research underpinning this paper, the documented processes have allowed issues concerning the use of the BQ to be recapitulated and subsequently structured. The processes learnt and applied have enabled this to be performed effectively. It also indicates that the outcome contain the right amount of quality. Quality in this instance means that an 'appropriate breadth and depth, rigor and consistency, clarity and brevity, and effective analysis and synthesis' was considered (Hart, 1998). Hence, this indicates that the available methodological foundation was adhered to and followed in the whole process of reviewing the literature.

Overall, this paper showed that literature review was a structured process. It has a clear methodological foundation and this applies to the research which supports this paper. It showed that literature review was about understanding the arguments presented in the earlier studies and reflecting how these arguments can be connected. Literature review is not always about finding the similarities among the previous studies. Rather, it is a stride to provide a clear and balanced picture of leading concepts and use it to justify a gap or node in an inquiry. This is an important concept in every review, hence differentiates it from a mere summary of literature.

## 8. Conclusion

The aim of this paper was to document the process in reviewing the literature. This was accomplished by documenting the process carried out in research on identifying issues concerning the application of the BQ. Through the documentation process, information on important steps to literature review was gathered. This improves understanding and substantially adds to the material concerning the subject.

The research which supports this paper aimed at restructuring issues concerning the application of the BQ. It essentially sought to identify the issues from past studies thus requiring background knowledge on the applicable method for review. For this reason, important method and steps were gathered from various sources. Extracts from the references have been thoroughly reviewed and presented as the background for this paper.

Succinct understanding on the process enabled the steps to be applied and documented in this paper. To add, the application of NVivo has facilitated in the synthesis through models generated by the software. The application of NVivo had further reduced the chance for error. This was important for increasing the credibility towards the review.

Lessons gained from the explanation given in this paper have contributed by framing literature review from the perspective of quantity surveying research. It is a set of process that must be thoroughly understood before the theoretical validity or pattern characterising a research subject is formulated. Hence, it asserts that literature review could function more than a gateway but a dedicated knowledge base should proper process is followed.

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## References

- Abdul Rashid, A. A. and Normah, A. (2004). Outsourcing and quality performance: Malaysia's public works department. *Structural Survey*, 22(1), 53-60.
- Ahenkorah, K. (1993). Exploring the Bills of Quantities. *The Building Economist*, Dec., 23-25.
- Baccarini, D. and Davis, P. (2002). Bills of Quantities - A Literature Review. *The Building Economist*, Sept.(2002), 10-16.
- Booth, A., Papaioannou, D. and Sutton, A. (2012). Systematic approaches to a successful literature review. London: SAGE Publications Limited.
- Bryman, A. (2008). Social research methods - 3rd ed. New York: Oxford University Press.
- Contributed. (1964). Operational Bills of Quantities. *The Quantity Surveyor*, 21 (1), 13-14.
- Cornick, T. and Osbon, K. (1994). A study of the contractor's quantity surveying practice during the construction process. *Construction Management and Economics*, 12, 107-111.
- Creswell, J. W. (2003). Research Design - Qualitative, Quantitative and Mixed Methods Approaches (2nd ed.). Lincoln: SAGE Publications.
- Denyer, D. and Neely, A. (2004). Introduction to special issue: innovation and productivity performance in the UK. *International Journal of Management Reviews*, 5/6(3&4), 131-135.
- Fellows, R. and Liu, A. (2008). Research Methods for Construction (3rd. ed.). Oxford: Wiley-Blackwell.
- Grix, J. (2004). The foundations of research. Basingstoke: Palgrave macmilan.
- Hamimah, A., Abdul Hadi, M. N., Siti Maimunah, M. A., Azizan, S. and Chong, H. Y. (2011). Bills of Quantities: Perspectives of Contractors in Malaysia. *Australian Journal of Basic and Applied Sciences*, 5(11), 863-873.
- Hart, C. (1998). Doing a literature review - releasing the social science research imagination. London: SAGE Publications Limited.
- Holes, L. (1990). Finding an alternative. *Chartered Quantity Surveyors* (May 1990), 10-11.
- Hughes, G. A. (1978). The Anatomy of Quantity Surveying. Lancaster, England: The Construction Press Ltd.
- Jaggar, D., Ross, A., Love, P. E. D. and Smith, J. (2001). Overcoming information opacity in construction: A commentary. *Logistics Information Management*, 14(5/6), 413 - 420.
- Kinlay, G. (1984a). Bills of Quantities - "Form follows function" or does it? *The Building Economist*, 23(3), 2-3.
- Kinlay, G. (1984b). Bills of Quantities - You pay the piper - Why not call the tune! *The Building Economist*, 23(1), 5-6.
- Kodikara, G. W. and McCaffer, R. (1993). Flow of estimating data in Sri Lankan building contractor organizations. *Construction Management and Economics*, 11, 341 - 346.
- Kodikara, G. W., Thorpe, A. and McCaffer, R. (1993). The use of bills of quantities in building contractor organizations. *Construction Management and Economics*, 11, 261-269.
- Leon, G. (1966). Tendering documents and final costs. *The Quantity Surveyor*, 23 (3), 65-67.
- Mohd Hisham, A. and Azman, W. N. (2008). Bringing back the dead: Operationalizing the Bills of Quantities. Paper presented at the International Conference for Project Management (18-20 November 2008), Universiti Malaya.
- Morledge, R. and Kings, S. (2006). Bills of Quantities - A time for change? Paper presented at the International Conference in the Built Environment in the 21st Century (ICiBE 2006), Mara University of Technology, Shah Alam.
- Ridley, D. (2008). The literature review - a step by step guide for students. London: SAGE Publications Limited.
- Rosli, A. R., Muzani, M. and Siti Nurhuda, A. W. (2006). Bills of quantities - are they still useful and relevant today? Paper presented at the International conference on construction industry (21 - 25 June 2006), Padang, Indonesia.
- Rosli, A. R., Muzani, M. and Siti Nurhuda, A. W. (2008). Bills of Quantities - Are they still useful and relevant today? *The Building Economist*, March, 16-23.
- Saunders, M., Lewis, P. and Thornhill, A. (2007). Research methods for business students (4th ed.). Essex: Prentice Hall.
- Sekaran, U. and Bougie, R. (2010). Research methods for business - a skill building approach (5th ed.). Sussex: John Wiley and Sons.
- Shamsulhadi, B. (2015). Framework development of bills of quantities accuracy in construction organisations. Unpublished Ph.D thesis, Universiti Teknologi Malaysia, Skudai.
- Shamsulhadi, B., Fadhliln, A. and Roslan, A. (2014). Recapitulating the issues concerning the application of the bills of quantities. *International Journal of Built Environment and Sustainability*, 1(1), 63-70.
- Skoyles, E. (1964). Introduction to Operational Bills. *The Quantity Surveyor*, 21 (2), 27-32.
- Skoyles, E. (1968). Introducing Bills of Quantities (Operational Format). *The Quantity Surveyor*, 24(6), 139-146.
- Slattery, P. (1994). Bills of Quantities - The Builder's View. *The Building Economist*, June(1994), 13-14.
- Smith, J. and Hoong, W. K. (1985). Bills of Quantities in Singapore - A survey of their use and application. *The Building Economist*, 24(2), 18-22.
- The BOQ Working Group. (1995). ACT (Australian Capital Territory) Bills of Quantities Working Group - Special report. *The Building Economist*, Dec., 5-7.
- Tranfield, D., Denyer, D. and Smart, P. (2003). Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, 14(3), 207-222.
- Turner, D. (1983). Quantity Surveying - Practice and administration (3rd Ed.). New York: George Godwin.
- Waterworth, H. W. and Weddle, A. E. (1978). Bills of Quantities for landscape works. *The Quantity Surveyor*, 35(1), 244-245.
- Webster, J. and Watson, R. T. (2002). Analysing the past to prepare for the future: writing a literature review. *MIS Quarterly*, 26(2), 1-11.
- Welman, C., Kruger, F. and Mitchell, B. (2005). Research methodology (3rd ed.). Cape Town: Oxford Southern Africa.
- Wood, B. and Kenley, R. (2004). The effectiveness of the bills of quantities in Australia. *Journal of Construction Research*, 5(2), 291 - 309.