Hummadi, M.A., Perera, S., Jin, X.H and Alashwal, A. 2022. Selection approaches and methods of construction industry consultant: A systematic literature review. In: Sandanayake, Y.G., Gunatilake, S. and Waidyasekara, K.G.A.S. (eds). *Proceedings of the 10th World Construction Symposium*, 24-26 June 2022, Sri Lanka. [Online]. pp. 720-730. DOI: https://doi.org/10.31705/WCS.2022.58. Available from: https://ciobwcs.com/2022-papers/

SELECTION APPROACHES AND METHODS OF CONSTRUCTION INDUSTRY CONSULTANT: A SYSTEMATIC LITERATURE REVIEW

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ABSTRACT

Selecting the most appropriate construction industry consultant (CIC) is a crucial process if projects are going to be successful. However, poor performance of CICs and failure to meet a client's needs are common, and the CIC selection process has not been adequately analysed in previous research. A systematic literature review of the CIC selection process will help to clarify the different approaches and methods. The study concluded with three common approaches for selecting the appropriate CIC: price-based selection, qualification-based selection, and qualification-price-based selection. The selection approach is conducted either by using a direct or a comparative method. The direct approach is based on reputation or past experience with the client, while the comparative selection method occurs through an evaluation process and a list of selection factors. There are two processes involved in the comparative selection method: interview-based selection process and Multi Criteria Decision-Making (MCDM)-based selection process. However, while there are different opinions about what is the best way to select a consultant, the authors assert that the ideal process depends mainly on client and project conditions. Future study is recommended on this topic. This study contributes to the literature on the CIC selection and open the door to further studies such as developing a new selection approach or method and studying factors and criteria of CIC selection.

Keywords: *Construction; Construction Consultant; Consultant Selection; Project Consultant.*

1. INTRODUCTION

Coinciding with rising complexity in projects, competent and dependable construction industry consultant (CIC) is crucial to successful construction projects (Alamiri, et al. 2014b; Ha, et al. 2015). Selection of trustworthy and competent consulting firms protects

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a business from issues related to changes in its environment and management (Jeon, et al. 2016; Razi, et al., 2020). Jeon, et al. (2016, p.1) stated that "in order to solve problems related to business environment and management changes, companies need to select competent and trustworthy consulting companies". Proper design and consultation can contribute to successful construction projects (Othman, et al., 2018). Choosing the best CIC is an important for achieving consulting results and especially project completion (Jadid and Idrees, 2006; Chow and Ng, 2007; Elbarkouky, et al. 2013; Choudhry, 2016; Jeon, et al. 2016; Razi, et al. 2020). Subsequently, CICs who have a proven good performance must be selected (Ling, 2002). Their appointment has a bearing on project accomplishment, value, quality and cost (Choudhry, 2016). When proposals are tendered, CICs must address how they will add value and benefit to the project and client (Lam, 2017). If the best CIC is not duly selected, extra time and cost will be incurred (Lam, 2016). Hence, they need to address the client's requirements in the tender proposal to increase the chance of winning the project (Lam, 2016). However, developing a useful CIC selection system is vital for both client and CIC (Kasma, 1987). It is a complex process involving both qualitative and quantitative criteria and subsequently important decisions (Razi, et al., 2020). So, retaining a CIC is important for one or more of five reasons: temporarily acquiring the necessary expertise, supplementing in-house personnel, providing absolute objectivity, performing or resolving unpleasant tasks and reducing liability.

However, although the selection of a CIC is a crucial part of the best performance for a given project, previous studies have shown that poor performance is common among construction CICs. Furthermore, the CIC selection process has not yet been considered and analysed appropriately in an independent way. There is a need for collecting and structuring the different types of CIC selection approaches and methods, to serve as the basis for further studies about the CIC such as demystifying differences and appropriate uses of each approach and/or method. With this in mind, the study aims to conduct a systematic literature review and explain the CIC selection approaches and methods.

2. RESEARCH STRATEGY/METHOD

Conducting a systematic literature review is an important scientific activity to clarify what is already known about a topic and to more knowledge and identify potential themes for future studies to investigated (Okoli, 2015; Mostafa, et al., 2016; Xia, et al., 2018). Consistent with the approach suggested by Xia, et al. (2018), Mostafa, et al. (2016), Denyer and Tranfield (2009) and Tranfield, et al. (2003), the systematic literature review here has been implemented in three stages as shown in Figure 1.

2.1 STAGE 1: PLANNING THE REVIEW

The first stage aims to prepare a plan for searching and reviewing relevant articles, conference papers and theses that are found on different electronic databases or search engines. It has been built based on the defined purpose and objectives of this research as stated in the introduction section. The analysis relies on English-language papers from three electronic platforms and academic databases: Scopus, Library of Western Sydney University and Google Scholar. The search is performed by using keywords in the title, abstract or keywords. These are ("Consultant" AND "Construction"), ("Consultant" AND "Select") and ("Construction" AND "Select"). The search was done before 1/3/2022. This stage concluded with finding 66 studies that were then subjected to a

preliminary investigation. The best journals which have three or more studies are Construction Management and Economics, Journal of Construction Engineering & Management and Journal of Management in Engineering.

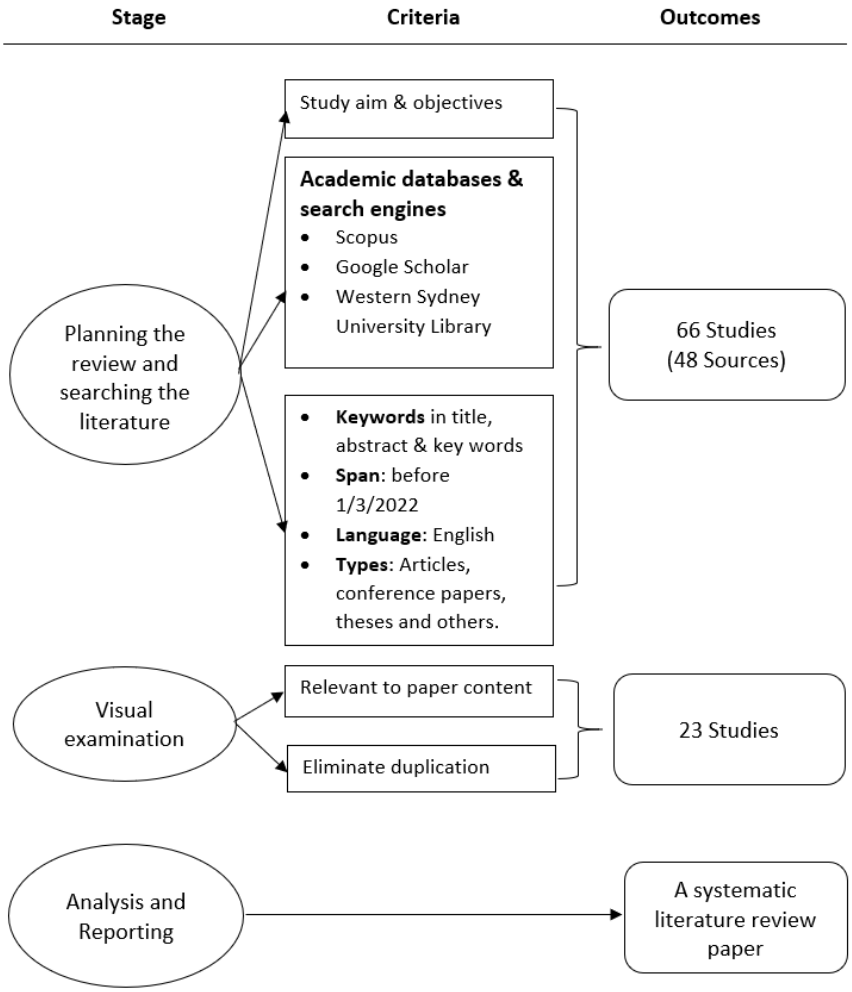

Figure 1: Plan for researching and incorporating literature into this study

2.2 STAGE 2: CONDUCTING THE REVIEW

A comprehensive and unbiased search is a vital difference between the traditional review and systematic review. During this stage, the studies have been assessed and filtered to generate a total of 23 studies that will be subjected to a systematic literature review. The distribution of the final studies in terms of the sources is outlined in Table 1.

Table 2: Distribution of the final studies based on their sources

Source	Source type
Journal of Management in Engineering	Journal
Journal of Construction Engineering and Project Management	Journal
Joint International Conference on Computing and Decision Making in Civil and Building Engineering	Conference
IOP Conference Series: Materials Science and Engineering	Conference

Source	Source type
International Journal of Research in Engineering and Technology	Journal
International Journal of Engineering & Technology	Journal
The International Conference on Civil and Architecture Engineering	Conference
Industrial Marketing Management	Journal
School of Civil Engineering and Built Environment, Queensland University of Technology	College
Faculty of The College of Graduate Studies, King Fahd University of Petroleum and Minerals	College
Engineering Your Future: The Professional Practice of Engineering	Book
Construction Management and Economics	Journal
Australasian Journal of Construction Economics and Building	Journal
Annual Conference of the Canadian Society for Civil Engineering	Conference
College of Environmental Design, King Fahd University of Petroleum & Minerals	College
Leadership and Management in Engineering	Journal
International Symposium on Construction in Developing Economies: Commonalities Among Diversities	Conference
Fourth International Conference on Cooperation and Promotion of Information Resources in Science and Technology	Conference
Civil and Environmental Engineering, Massachusetts Institute of Technology	College
The 5th International Conference and Workshop on Built Environment in Developing Countries	Conference
The American Public Works Association and The American Council of Engineering Companies	Private Study

2.3 STAGE 3: REPORTING AND DISSEMINATION

This stage consists of descriptive and thematic aspects according to Xia, et al. (2018) and Tranfield, et al. (2003). Descriptive analysis focuses on essential information of the selected studies which are closely linked to the construction industry and research topic based on a developed codebook as shown in Table 2. The thematic analysis was done utilizing a mix of aggregative and interpretative approaches, and clarifying the extent of consensus and argument across diverse themes.

Table 5: Codebook of the selected studies

Code	Description
Authors	Author(s) name(s)
Year	Year of publication
Title	Title of the research
Journal	Title and ranking of the journal
Research method	Questionnaire, case study, literature review or other
Project Type	Building, road, infrastructure projects

Code	Description
Consultancy Service	Architect, design, project management, supervision, others
Research aim and objectives	The stated aim and objectives in the research
Contribution	The contribution stated in the research

3. RESULT

3.1 CIC SELECTION APPROACHES

Clients of construction projects spend their money on getting the best quality and experienced project management team to achieve the desired objectives within determined time and cost. Therefore, the process of CIC selection is essentially driven by the natural tension between the quality and the total cost of that service (Walesh, 2012). There are three common approaches for selecting the appropriate CIC. The first approach is a price-based selection which depends on price rather than non-price factors (Omar, et al., 2009; Walesh, 2012; Elbarkouky, et al., 2013). The second approach is qualification-based selection which considers the quality and abilities of the CIC rather than proposed fees (Omar, et al., 2009; Walesh, 2012; Elbarkouky, et al., 2013). The third approach is qualification-and-price-based selection, which is a mixed of these two methods, starting with the technical evaluation and followed by the cost. Here, value for money is not necessarily based on the lowest price but instead reflects a balance between price, quality and performance (Omar, et al., 2009; Elbarkouky, et al., 2013).

3.1.1 Price-based Selection Approach

Price-based selection approach is the oldest approach used. Generally, and for many decades, project clients chose their preferred CIC based on financial proposal (Basham, 1983; Kasma, 1987). Ideally, clients should select the CIC based on the goal of minimizing total costs (Walesh, 2012). The advantage of this approach is that it is transparency and objectively (Cheung, et al., 2002). Walesh (2012) asserted that it tends to wield excessive influence. Low price selection does not mean that the actual job will be completed satisfactorily (Elbarkouky, et al., 2013) and does not guarantee the actual cost of the overall project once it is finished (Walesh, 2007; Sporrong, 2011). As stated by Walesh (2012, p. 389), “even much larger savings in up-front consulting fees will tend to result in only small savings in total project costs”.

3.1.2 Qualification-based Selection Approach

The qualification-based selection approach has become an essential part of CIC selection. Chinowsky and Kingsley (2009) stated that using this approach for procuring CIC will help to achieve a high degree of project satisfaction and control project cost. According to Cheung, et al. (2002), it is the most promising and the most widely recognized way for selecting a design CIC by overseas public clients. As well, it is recommended by the American Public Works Association, the Architects Council of Europe (ACE), the Australian Council of Building Design, the Association of Japanese Consulting Engineers and various other organizations around the world (Cheung, et al., 2002). Some examples of the qualifications are: general experience (Basham, 1983; Kasma, 1987; Al-Besher,

1998; Assaf, et al., 2002; Jadid and Idrees, 2006; Sporrong, 2011; Omar, 2012; Alamiri, et al., 2014a; Omar, et al., 2018), quality certificates (Alamiri, et al., 2014a, 2014b; Razi, et al., 2020) and manpower availability (Kasma, 1987; Al-Besher, 1998; Cheung, et al., 2002; Alamiri, et al., 2014a, 2014b; Razi, et al., 2020). Chinowsky and Kingsley (2009) and Walesh (2012) assessed the impact of this method on project outcomes and found the following: it ensures cost-effectiveness, results in better projects and highly satisfied clients, lowers risk for complex projects, encourages innovation, protects intellectual property, takes account of emerging societal issues, and supports client capacity-building.

3.1.3 Qualification-and-price-based Selection Approach

This method considers the financial proposal and CIC qualification and experience. The process of CIC selection is driven explicitly or implicitly by the natural tensions that occur between service quality and the total cost of that service (Walesh, 2012). Basham (1983) considered the two-envelope bidding approach of CIC selection, where the candidate CIC submits its proposals in two envelopes. The first one is the technical proposal which contains the firm's qualifications, experiences, teamwork involved in project execution and the technical approaches. The second envelope covers financial matters. Basham (1983) contended that the most important considerations of CIC selection for government projects, in particular, are the equities among all candidates, trying to avoid selecting the lowest bidder if there is a factor in selection other than price, and understanding that more competition is certainly in the public interest.

3.1.4 What is the Best Selection Approach?

There are many opinions and conflicts of interest about different selection approaches. The World Bank in 2004 recommended that construction CIC selection factors should focus on financial matters, whereas FIDIC in 2011 recommended that the selection should be more skewed to technical qualifications (Elbarkouky, et al., 2013). According to Basham (1983), in Canada, the Ministry of Transportation and Highways strives to avoid poor quality, while the Treasury Board put value-for-money as the highest priority. Some CICs felt that it would be unethical to provide a cost estimate for an unknown scope of work, while some CICs had no objections to selection based on cost, although they know that financial proposals would be the same due to the similarity in salary rates or fees that the market pays. Using Saudi Arabia as an example, Mohamed, et al. (2016) concluded in their research that 60% of respondents disagreed about selecting the CIC based on offered prices. In another study conducted by Cheung, et al. (2002), they found that CIC fee factor is the least important to for the selection of architectural CICs. Basham (1983) discovered in his study that selection can justly be based on a successful working relationship. In a study conducted by Sporrong (2011), local practices in the US vary widely and selecting the CIC is generally based on qualifications. However, Sporrong (2011) argued that it is difficult to specify and evaluate non-price-related criteria. Kasma (1987) and Sporrong (2011) noted that adequate fee is crucial for high-quality services so that the CIC has the ability to assign qualified staff properly. This consideration on the balance between the fee and qualification reinforces the mixed selection method, especially in light of the high competition and diversity of construction project types and sizes, and the rapid improvements in technology and tools employed in the construction industry.

3.2 CIC SELECTION METHODS

Processes concerning CIC selection methods were proposed by different authors, but no standard method emerged. The Architectural Institute of British Columbia divided these selection processes into two methods: direct selection method and comparative selection method. In the direct selection method, a single CIC is considered based on reputation, recommendation or personal acquaintance or past experience with the client (Assaf, et al., 2002; Cheung, et al., 2002). Moreover, Mohamed, et al. (2016) mentioned that political influence is one of the important factors for awarding a project to a specific CIC in some cases. However, this method is inappropriate if there are two or more CICs having virtually the same factors which subsequently requires a comparative selection method to be undertaken. In the comparative selection method, several CICs are considered and evaluated (Cheung, et al., 2002). Al-Besher (1998) and Assaf, et al. (2002) preferred to further divide this method into two types: competitive selection based on fee proposal, and/or design criteria, and competitive selection based on an objective evaluation of CIC qualifications and technical experiences. These two types are based on the same concept but employ different approaches as explained in the previous section.

Based on the literature review, there are two processes of comparative selection method: interview-based comparative selection process and Multi Criteria Decision Making (MCDM)-based comparative selection process. Awarding a contract that results from an interview is based on recommendations of the selection committee (Basham, 1983; Kasma, 1987). It is executed in three main steps as shown by Kasma (1987), Avila (1997) and Alamiri, et al. (2014a). These are highlighted in more detail below.

Step 1: Request for qualifications (RFQ) - where CICs provide information on their qualifications and capabilities to complete the works of a proposed project.

Step 2: Submit a proposal - the qualified CICs are asked to submit their proposals including project approach, proposed staff, resources and equipment, quality assurance program and project management techniques.

Step 3: Interview - this step involves conducting interviews with three or four chosen CICs from the previous step to present their abilities for completing the project successfully. What they present is then evaluated and scored by the evaluation committee based on certain criteria.

The MCDM-based comparative selection process is applied based on a list of criteria using MCDM methods. Ha, et al. (2015) used the Fuzzy Analytical Hierarchy Process (FAHP) in their study to devise a model for selecting construction project management CIC in Vietnam. They stated that the selection process of CIC should contain two stages: prequalification stage - based on a set of predetermined criteria; and selection stage - selecting the most appropriate CIC from the prequalified list. The process could be done in different and detailed ways. Al-Besher (1998) and Assaf, et al. (2002) proposed a procedure for selecting the CIC using the Analytical Hierarchy Process (AHP) and it consists the following steps: (1) list selection criteria; (2) check for major and common criteria; (3) add and modify criteria; (4) list prospective CICs; (5) prequalify for a shortlist; (6) apply the AHP model; (7) test for consistency; (8) conduct pairwise comparison; (9) synthesize findings for an overall result; (10) rank CICs; (11) select CIC;

(12) negotiate and agree with CIC; and (13) sign a contract. Razi, et al. (2020) studied the CIC selection issues in Malaysia and implemented the same method. Figure 2 outlines the hierarchical structure of CIC selection based on the literature review.

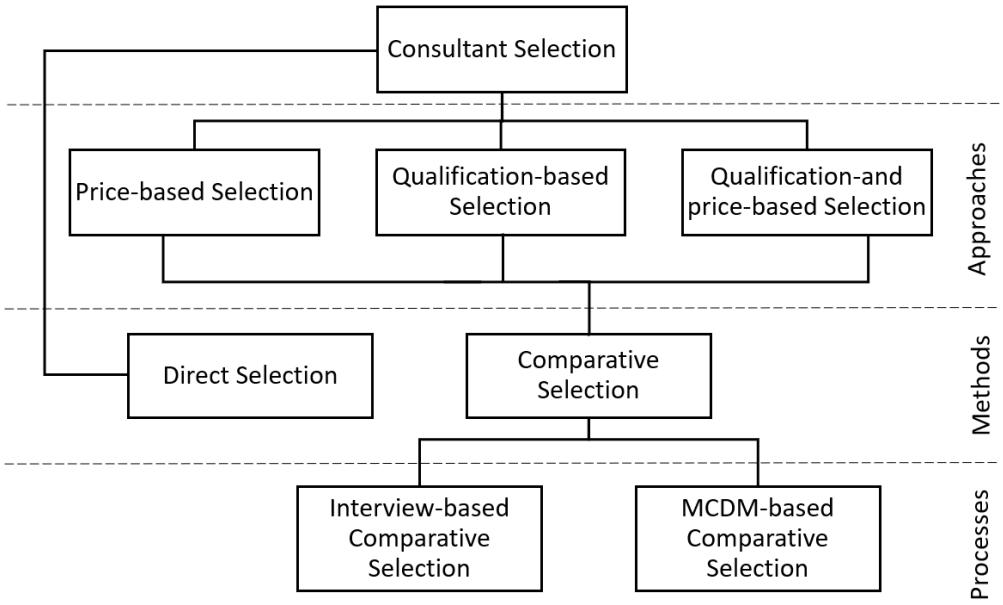

Figure 2: Hierarchical structure of CIC selection

Some studies devised their own selection processes using information technology as a key objective. For instance, Cheung, et al. (2002) developed a multicriteria evaluation model using AHP to tackle interpreting subjective judgements in a systematic and logical way. They developed software called the 'architectural CIC selection system' and written in Delphi 4.0. The software aims to provide an efficient, objective and consistent method for selecting architects in Hong Kong. The selection process using the developed software comprises four steps: (1) determination of project particulars, (2) fee comparison, (3) performance assessment, and (4) computation of the score. In the first step, the client has to take into account the nature of the client, the client's firm size, project type, and contract sum. The second step is comparing the proposed CIC fee by measuring the ratio of the actual amount of the lowest fee to the proposed fee by the candidate CIC. The third step involves evaluating the past performance of the CIC using a five-point rating scale - outstanding, good, average, fair and poor with respective ratings of 1.000, 0.500, 0.250, 0.125 and 0.063. The last step is calculating the scores automatically by adding the normalized weights for the selected ratings of each criterion multiplied by the global priority weight of the criteria.

However, although the authors could tailor the process to take into consideration client and project types and sizes, this method was tailored specifically for the Hong Kong market. Yet it failed to consider internal attributes of the client such as communication skills, commitments, ability to make decisions, and project conditions such as geographical conditions and market variables. Jadid and Idrees (2006) remarked that the selection of CICs is based on their experience, commitment, communications and availability. They presented a strategy for collecting and evaluating information of the CICs through four main steps: data collection, data evaluation, a web designed interface,

and transferring information to a neural network model. Omar, et al. (2009) proposed a decision support system to support selection of the CIC using web technology, which consists of a database comprising three modules. The first is the *Operational module* - a simple web searching recommender aims to present few good candidates from the database. The second is the *Managerial module* where every candidate will be reviewed in the managerial module using Hierarchical Fuzzy TOPSIS for prioritizing the CICs. The third is the *Strategic module* which will evaluate and select the best CIC through a technical committee.

4. CONCLUSION

This study conducted a systematic literature review to integrate and analyse existing knowledge derived from various studies on the CIC selection process. Screening of the literature resulted in 23 studies for this study. Information was extracted from them and analysed and specifically these were descriptive and thematic analyses. It has been observed that limited and partial consideration was paid to the CIC selection process. The study concluded with a hierarchical structure of CIC selection as shown in Figure 2. It consisted of three approaches for selecting the CIC: price-based selection approach, qualification-based selection approach and qualification-and-price-based selection approach. These approaches are applied to the comparative selection method, wherein CICs are considered and evaluated based on one of two process types: Interview-based comparative selection process and MCDM-based comparative selection process. The other CIC selection method occurs through direct selection and it involves a single CIC being considered based on reputation, recommendation, personal acquaintance or past experience with the client. However, while there are different opinions and conflicts of interest about what is the most appropriate approach and method, the authors conclude that choosing the appropriate CIC selection approach, method and process depends on client and project conditions. Studies on the CIC selection process and factors are rare. Future study is recommended on factors and criteria of CIC selection.

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