



# Identification of Contractor Selection Criteria for Construction Projects in the Eastern Region of Malaysia

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**Abstract:** *This study identifies the criteria for selecting contractors for construction projects in Sarawak, Malaysia. We used the quantitative research approach and adopted the disproportionate stratified random sampling to collect data from Grade 7 contractors, housing developers, and quantity surveying firms operating within Sarawak. Out of the 336 copies of the questionnaire distributed, only 71 copies of the survey were returned representing 21.13%. We calculated the mean score and relative importance index of all the contractor selection criteria in the questionnaire. It was found that the contractors' management, technical, and financial capabilities are essential in selecting a contractor for a construction project. This study provides a basis for decision making in the selection of the right contractor for any construction project in the Eastern region of Malaysia.*

**Keywords:** *Contractor, Construct Projects, Malaysia, Sarawak, Selection Criteria*

## INTRODUCTION

Before a contractor is awarded a project under an open or selective tendering, the client or his consultant often consider specific criteria for evaluating the contractors tendering for the project. While most criteria are considered across countries, the level of importance attached to each criterion varies from place to place, and the nature of the project. In understanding the east Malaysia scenario, this paper identifies the standard criteria for selecting contractors under competitive tendering in Sarawak, Malaysia.

## Literature Review

### Contractor

According to Greenhalgh & Squires (2011) and Anyanwu (2013), a contractor is a professional builder responsible for ensuring that the final finished product of the building conforms with the intentions of both the client and the design team. The activities carried out by the contractor include managing, planning, coordinating, and supervising the site and the staff by providing accommodation for them. Besides, he is also involved in managing health and safety procedures

(Towey, 2012). Generally, the client appoints the main contractor for the execution of a building project under the building contract (Towey, 2012). Huang (2011) asserts that the client's primary area of concern in project execution is centered on the cost and quality of the works. Therefore, the main contractor has to report to the client periodically to ensure that the expenditure is not more than the budget, and the quality of workmanship maintained is within the client's expectations (Towey, 2012).

### **Types of Contractor**

There are five types of contractors involved in a construction project. Each has specialization in different construction sectors, and thus, their responsibilities are different as well.

#### **Building Contractor**

A building contractor is the one whose responsibilities entail carrying out construction works in building-related infrastructures, such as offices, factories, residential buildings, and commercial buildings (Contractors State License Board, 2014). Runner et al. (2016) further describe a building contractor as one who undertakes tasks such as bricklaying, steelwork, concrete work, plastering, to mention few.

#### **Civil Engineering Contractor**

In the United Kingdom, there is a body named the Civil Engineering Contractors Association (CECA). This body is responsible for delivering, upgrading, and maintaining the infrastructural works of the country, such as drainage systems, culvert, and retaining walls (Civil Engineering Contractors Association, 2016).

#### **Building Services Contractor**

They are responsible for the execution of building services related works that include heating, ventilating, and air conditioning (HVAC), lifting, and plumbing works (Ng & Skitmore, 1995). According to the Contractors State License Board (2014), building services contractors are also responsible for the electrical and mechanical installation in a building.

#### **Building Maintenance Contractor**

They are responsible for maintaining the facilities from its initial state and upgrading facilities when necessary. Their duties can be classified into day-to-day repairs, annual repairs, and appropriate repairs. All of these works are carried out by the building maintenance contractors (Al-Juahni, 2011).

#### **Specialist Contractor**

According to Ng & Skitmore (1995), there are two types of specialist contractors: roofing and landscaping. The specialist contractor is responsible for undertaking the works that require specialized skills which the general contractor cannot effectively carry out (Contractors State License Board, 2014).

#### **Contractor Selection Process**

According to Hatush and Skitmore (1997), the process of selecting contractors is categorized into five stages as follows: project packaging, tenderers' invitation, contractors' prequalification, shortlisting, and bid-evaluation. Morledge and Smith (2013) grouped the five processes of contractor selection into three stages. Firstly, pre-qualification, secondly, tender invitation and submission, thirdly, tender evaluation, and acceptance.

#### **Prequalification and Compilation of the Tender List**

Prequalification aims to reduce the number of less qualified contractors among the list of contractors based on laid down criteria. This process aids in eliminating less skilled contractors with little or no experience in the proposed construction work to be carried out. A list of potential contractors is then generated to inform the client the suitable contractors for a specific project (Ogunsemi & Aje, 2006). The contractor prequalification is often carried out before the issuance of tender documents to

bidders. According to Huang (2011) and Plebankiewicz (2012), if a contractor passed the pre-qualification assessment, he can execute projects for the same client without necessarily going through another round of prequalification for subsequent projects. It is unnecessary to check again when a specific project is carried out; it is only necessary to double-check that the information about the contractor is up-to-date. A list named "standing list" is produced. Besides the "standing list," prequalification can also be defined as a group of the most capable contractors who can execute every project. This process can be called "per project prequalification." In this kind of operation, a "shortlist" of contractors is prepared for the client.

#### **Tender Invitation and Submission**

In Malaysian, the local tenders must be advertised in at least one Malaysian language local newspaper, while for international tenders, one advert in the local newspapers in Malaysian language and one in the English language (Hui et al., 2011).

The tenderers are requested by the client to submit their quotations for the works before the closing date (Chinyio, 2011; Gorse et al., 2012). The unpriced tender is provided in the tender documents which comprise notice to tenderers, a form of solicitation, general conditions of the contract, specifications, drawings, and bills of quantities (Chinyio, 2011). In the tender document, the client's requirements and project information are clearly defined as well. Besides, the tender documents must be adequately prepared before calling for tenders (Municipal Association of Victoria, 2008). After completing the tender document, it is then returned to the client for evaluation purposes (Chinyio, 2011).

#### **Tendering**

The starting point of a building or engineering contract is for the client to invite one or more contractors to bid for the project with the price which they are willing to execute the construction work (Ogunsemi & Aje, 2006). According to Gorse et al. (2012), tendering is defined as a process of inviting the contractors for tender together with the detailed information, such as drawings, bills of quantities, specifications, and performance criteria. All of these documents, which must be returned before the tender closing date, are prepared for the contractors to quote their price. The tender then is evaluated by the consultant and client in terms of quality, time, and cost. It is one of the essential processes in the construction stage that the client must go through before embarking on project execution (Kang et al., 2015).

The varieties of tendering procedures which are used for selecting contractors are open tendering, selective tendering, and negotiation tendering (Banaitiene & Banaitis, 2006; Nieto-Morote & Ruz-Vila, 2012).

#### **Tender Evaluation and Acceptance**

After the client has received many tender documents from a large number of tenderers, an evaluation of these tender documents is done by the client's consultant (Chinyio, 2011). According to Hatush & Skitmore (1997), evaluation is defined as an assessment that is carried out on bids that are submitted by prequalified contractors. This process is similar to the prequalification process, which occurs at the pre-tender stage, but bid evaluation occurs at the post-tender stage. Besides, this bid evaluation does include not only the contractors' capabilities but also the consideration of the tender price (Ogunsemi & Aje, 2006).

Morledge and Smith (2013) stated that the tender evaluation process consists of two parts: a desk-top evaluation of the bid submission and an interview. In the process of desk-top assessment, the three elements which need to be assessed are price, technical assessment, and economic evaluation. Furthermore, the contractual terms of the tenders are checked, which may as well include a site visit process (Morledge & Smith, 2013).

The next part is the interview between the clients and the pre-qualified contractors. This interview serves as a means of evaluating the appropriate tenderer. It also provides the opportunity to have a better understanding of each other's teams and thus achieve collaboration (Morledge & Smith, 2013). Before awarding the contract to the selected contractor, a report which comprised possible risk and the identified contractual problem is prepared. Negotiation with the selected contractor can be conducted to discuss the solutions to the identified issues (Chinyio, 2011).

### **Criteria for Contractor Selection**

According to Watt et al. (2010), tender evaluation and contractor selection have become so significant for organizations because they ensure the successful delivery of the construction projects. Hence, many countries do practice prequalification and bid evaluation processes in the selection of their contractors nowadays (Ogunsemi & Aje, 2006). Besides, many studies have developed various types of models to determine and analyze the criteria for selecting contractors. These models increase the chances of appointing the most capable contractors who can carry out the construction works.

These are some of the criteria identified in previous studies.

Financial capacity of a contractor is one of the criteria that need to be considered during the contractor selection process (Hatush & Skitmore, 1997; Fong & Choi, 2000; Cheng & Li, 2004; Ogunsemi & Aje, 2006; Salama et al., 2006; Idrus et al., 2011; Nieto-Morote & Ruz-Vila, 2012; Rashvand et al., 2015). The client needs to identify and analyze the financial position of the contractor (Idrus et al., 2011). In short, the financial capacity represents the financial standing of the contractor (Enshassi et al., 2013). According to Watt et al. (2010); Idrus et al. (2011); Nieto-Morote and Ruz-Vila (2012); and Rashvand et al. (2015), technical capacity is another criterion for the selection of a contractor that should carry out the construction works. Through this criterion, the client can measure the contractor's technical ability and expertise from the qualification of personnel, construction method, or techniques. Through labour and equipment, technical capability can then be established. Ng & Skitmore (1995), Idrus et al. (2011), Nieto-Morote and Ruz-Vila (2012), and Rashvand et al. (2015) opined that the management capability of the contractor should be evaluated before acceptance of the contract. According to Rashvand et al. (2015), the management capability of the contractor involves the skills of organizing, planning, controlling, and leading to execute the works to achieve the project objectives. In short, a construction project is guaranteed a successful completion of the management capability of the contractor is high.

### **Contractor Reputation**

From the previous studies conducted by Ogunsemi & Aje (2006); Watt et al. (2010); Enshassi et al. (2013); and Rashvand, et al. (2015), contractor's reputation is a vital aspect in evaluating contractors during the selection process. If a reputable contractor is selected, the client could be assured that the contractor can execute the contract successfully. According to Enshassi et al. (2013), there are three sub-criteria for evaluating the contractor's reputation or image. They include the company's classification, years of experience, and contractor's capital. Previous studies identified that the management of health and safety is one of the criteria for selecting contractors in the tender evaluation process (Fong & Choi, 2000; Cheng & Li, 2004; Ogunsemi & Aje, 2006; Banaitiene & Banaitis, 2006; Idrus et al., 2011; Enshassi et al., 2013; Rashvand et al., 2015). During the tender evaluation stage, the client asks the contractor typically to submit his proposed health and safety program. Besides, relevant health and safety records of the previous project are to be forwarded to the client for evaluation purposes. According to Enshassi et al. (2013), the financial evaluation of the bid was ranked in the first position of the results. The client or the consultant should be aware of the lowest bid, unbalanced bid, and arithmetic mistakes during the evaluation stage. Besides, the financial status of the contractor can be assessed for the previous three years.

### **Completeness of Tender Documents**

Enshassi et al. (2013) observed that the completeness of tender documents is the primary criterion for selecting contractors. The required bond must be submitted. Furthermore, the shortage of contract offer is also one of the sub-criteria for this criteria. The time and effort are expended in the preparation and compilation of these documents. Therefore, sometimes, there is a shortage of information in the submitted bids. Taxed clearance is another aspect. The client or the consultant can assess the tax clearance certificate of previous projects to check whether the contractor submitted his tax clearance certification on time, or it was delayed (Enshassi et al., 2013; Ng & Skitmore 1995; Fong and Choi 2000; Cheng and Li 2004; Ogunsemi and Aje 2006; Watt et al., 2010; Idrus et al., 2011; Nieto-Morote and Ruz-Vila 2012).

### **Contractor Past Performance**

Enshassi et al. (2013) have identified that the contractor's past performance is a criterion for selection. The contractor's performance includes the timely execution of a recent project, reasonability of cost and quality level in previous projects. However, Nieto-Morote and Ruz-Vila (2012) considered failure to complete a contract, project delay, and additional expense as dimensions of a contractor's performance.

### **Experience**

Scholars have found that the experience of contractor and staff is a primary criteria for selection of proper contractor (Hatush & Skitmore, 1997; Fong & Choi, 2000; Cheng & Li, 2004; Banaitiene & Banaitis, 2006; Ogunsemi & Aje, 2006; Salama et al., 2006; Watt et al., 2010; Idrus et al., 2011; Nieto-Morote & Ruz-Vila, 2012; Enshassi et al., 2013). This kind of experience can be assessed through evidence of staff training program, the number of trained staff, the project manager's experience and past performance of the workers (Enshassi et al., 2013). If the contractor and his team are skillful and experienced, they can overcome all the challenges as well as guarantee a certain level of work quality. Hatush and Skitmore (1997); Banaitiene and Banaitis (2006); Ogunsemi and Aje (2006); and Enshassi et al. (2013) stated that quality assurance of the contractor is a criterion that should be assessed during the selection process. Usually, the contractor has to guarantee the quality of work he can execute because it is a critical part of the contract.

### **Site Management**

According to Ogunsemi and Aje (2006); and Enshassi et al. (2013), the contractor's site management is a criterion for contractor selection during the evaluation stage. A contractor with excellent site management skills and administrative skills adequately monitors the progress of the construction project. They, however, stated that during the evaluation process, it is crucial to assess the ability of the contractor to understand the tender document. This criterion determines the contractor's expertise, knowledge, and experience, and hence makes the client feel secure that the project would complete the project without any delay or cost overrun.

### **Resources**

Previous studies have shown that it is vital to know the resources within the contractor's reach (Ng & Skitmore, 1995; Fong & Choi, 2000; Cheng & Li, 2004; Banaitiene & Banaitis, 2006; Salama et al., 2006; Ogunsemi & Aje, 2006; Enshassi et al., 2013). There are two types of resources: physical resources and human resources. These criteria help to indicate whether a contractor is capable and able to satisfy the needs and requirements of the client or not (Fong & Choi, 2000). The decision of the client during the selection process may be influenced by the availability of plant and equipment which are part of the physical resources which bring significant influence to on-site productivity (Ogunsemi & Aje, 2006). Hatush and Skitmore (1997); Fong and Choi (2000); Cheng and Li (2004); Ogunsemi and Aje (2006); Watt et al. (2010); and Idrus et al. (2011) point out that it is necessary to identify the contractor's current workload for the selection. Through the examination of a

contractor's current workload, there is a high possibility of determining whether the contractor's resources are available for a particular project or not (Fong & Choi, 2000). According to Fong and Choi (2000); Cheng and Li (2004); Ogunsemi and Aje (2006); Banaitiene and Banaitis (2006); Watt et al. (2010); Idrus, et al. (2011), the tender sum offered by the contractor is also one of the essential criteria for assessing the contractor during the tender evaluation process. Many contractors quote the lowest tender price to attract a client's interest, thereby accepting the contract. However, Ogunsemi and Aje(2006) opine that the "best" tender sum falls between plus or minus 5% of the consultant estimate. The tender price quoted by the contractor is considered unrealistic and may be rejected when it is exceptionally high or ridiculously low. Hatush and Skitmore (1997); Fong and Choi (2000); Cheng and Li (2004); Ogunsemi and Aje (2006); Watt et al. (2010); and Idrus, et al. (2011) identified that the past relationship between client and contractor is vital for selecting a contractor. The relationship of the contractors with their previous client(s) speaks volumes about the attitude of the contractors in their earlier projects. It also acts as a guide to foresee the relationship between the client and a contractor in the future.

According to Hatush and Skitmore (1997), the contractor's local knowledge is an important criterion when selecting the most capable contractor. Regarding the contractor's knowledge, the client can observe whether the contractor is suitable or capable of executing the given project or task. Hatush and Skitmore (1997) state that the contractor's attitude towards the work and the roles to be played from the inception to the completion of the project could be easily evaluated during the selection process. The reason is that a contractor must be able to handle all of the construction works responsibly. The previous study conducted by Ogunsemi and Aje (2006) in Nigeria revealed that it is necessary to evaluate the contractors' previous project complexity or involvedness. According to the Department of Housing and Public Works (2001), the complexity of a project mainly depends on its size, duration, scope, stakeholders involved, the technology required, the requirements of the client and market conditions. Ogunsemi and Aje (2006); and Idrus et al. (2011) also state that the contractors normally quote the unrealistic completion period when they are tendering for the project. This situation is due to being overconfident and over-optimistic towards the works. Therefore, during the contractor selection process, the client or the consultant must pay attention to the completion period quoted by each tenderer. (Ogunsemi & Aje, 2006). Watt et al. (2010) opine that project management expertise is one of the criteria that can be used in the selection process. A contractor who has experts in project management may achieve better results in the project outcome than a contractor with no experts (Watt et al., 2010). Ogunsemi and Aje (2006) identified that the client must select a contractor who responds to every instruction. In the tender document, there is a clause that emphasizes that the contractor must follow the architect's instructions for the private projects and superintending officer's instructions for public projects.

Furthermore, the main task of the contractor is to transform a structure from two-dimensional to physical form. Hence, the contractor cannot make assumptions or decisions by himself; he has to inform the consultant and exhibit the spirit of teamwork in problem-solving (Ogunsemi & Aje, 2006). According to Ogunsemi and Aje (2006); and Banaitiene and Banaitis (2006), the contractor should be selected based on the size and type of the previous projects successfully executed. The contractor's technical and management skills could be assessed based on the size and type of previously completed projects. Using this criterion is important because different kinds of projects require different technical skills.

Salama et al. (2006); and Banaitiene and Banaitis (2006) observed that a firm's history of claims is one of the criteria that the client should be aware of during the selection process. The client should be careful to avoid those contractors that are always failing to perform their responsibilities under the building contract. A previous study conducted by Ogunsemi and Aje (2006) found that the length

of time of the contractor in the business is also one of the criteria for selecting the contractor. This criterion interlinks with the experience, technical skills, and resources of the contractor. The longer the contractor is involved in construction works, the more knowledge is being gained. Many of the previous studies included the progress of the existing project carried out by the contractor as one of the criteria during the selection process (Ng & Skitmore, 1995; Salama et al., 2006; Idrus et al., 2011). Currently, an example of the various progress monitoring systems is the Critical Path Method (CPM). It is involved in investigating whether the project's development is ahead of or has deviated from the stipulated time, or has deviated from the projected cost at the early stage (Ng & Skitmore, 1995). By assessing the progress of the existing projects carried out by the contractor, the client can have a clearer picture of the contractor's performance (Idrus et al., 2011). Banaitiene and Banaitis (2006) opine that the number of previous contracts that the contractors failed to handle correctly is a criterion that can be used for identifying the most capable contractor. A contractor with less or no failed contract shall be selected, as a failed contract means the contractor is incapable of completing the construction project.

The previous study conducted by Ogunsemi and Aje (2006) revealed that the procurement system is another criterion that is considered during the selection process. According to Ng and Skitmore (1995), this criterion is particularly essential to designing and building of management contracting procurement system. It may be a challenge for a contractor who had never undertaken any designing and building works in the past. It is crucial to evaluate the possibilities of the client becoming bankrupt while selecting contractors to execute any proposed project (Banaitiene & Banaitis, 2006). When the contractor is insolvent, it puts the client in trouble. The project may come to an abrupt stop without any advance notice. From the previous study conducted by Banaitiene and Banaitis (2006), environmental protection by the contractor was established as one of the criteria for selecting contractors. It includes oil and chemical spill prevention, waste management, and prevention of pollution (Great Lakes Power, 2016).

## **Methodology**

To ensure that the research objectives are achieved, a quantitative method was adopted for this study. The stratified simple random sampling technique was used to select samples from the population. The population for this research consisted of the surveyors working in various consulting firms, contractors working in Grade 7 firms, and housing developers. The questionnaire was divided into two sections. The first section was designed to gather the biodata of respondents. The second section was also designed to elicit information regarding respondents' perception of the various criteria for selecting contractors. A five-point Likert scale was used in this research, where five signifies very important, and one is unimportant.

## **Data Analysis, Results and Findings**

Relative Importance Index of the criteria was calculated to determine the most critical factors for selecting contractors in the Sarawak construction companies. The data collected were transformed into Relative Importance Index (RII) using the formula:

$$RII = \frac{\sum W}{A * N}$$

Where,

W is the weighting given to each factor by the respondents (ranging from 1 to 5),

A is the highest weight (i.e., 5 in this case), and

N is the total number of respondents.

A total of 336 questionnaires were distributed to the target respondents. The target respondents comprised 25 respondents from the quantity survey consulting firms, 201 respondents from Grade 7 contractor firms, and 110 respondents from the housing developer firms. However, only 71 copies of the questionnaire were returned, yielding a 21.13% response rate. Table 1 presents the demographic profiles of the respondents.

**Table 1: Profile of Respondents**

<b>General Information</b>	<b>Frequency</b>	<b>%</b>	<b>Cumulative %</b>
<b><u>Types of firm</u></b>			
Consultant	10	14.08%	14.08%
Contractor	37	52.11%	66.20%
Developer	24	33.80%	100.00%
<b><u>Gender</u></b>			
Male	32	45.07%	45.07%
Female	39	54.93%	100.00%
<b><u>Ethnicity</u></b>			
Malay	9	12.68%	12.68%
Chinese	51	71.83%	84.51%
Others	11	15.49%	100.00%
<b><u>Education Level</u></b>			
Diploma	21	29.58%	29.58%
Degree	47	66.20%	95.77%
Masters	1	1.41%	97.18%
Others	2	2.82%	100.00%
<b><u>Working Experience</u></b>			
Less than two years	13	18.31%	18.31%
2 to 4 years	8	11.27%	29.58%
4 to 6 years	17	23.94%	53.52%
More than six years	33	46.48%	100.00%

**Table 2: Mean scores and relative importance index of contractor selection criteria**

<b>Criteria</b>	<b>Mean</b>	<b>Relative Importance Index (RII)</b>	<b>Rank (RII)</b>	<b>Rank</b>
Management capability of the contractor	4.56	0.9127	1	1
Technical capacity of the contractor	4.55	0.9099	2	2
Financial capacity of the contractor	4.54	0.9070	3	3
Past performance of the contractor	4.38	0.8761	4	4
Resources under the contractors	4.34	0.8676	5	5
Project management expertise	4.32	0.8648	6	6



Responsible attitude towards the work	4.31	0.8620	7	7
Health and safety management of the contractor	4.30	0.8592	8	8
Bankruptcy possibilities	4.28	0.8563	9	9
Progress of the existing project	4.24	0.8479	10	10
Response to instruction	4.23	0.8451	11	11
Length of time in business	4.23	0.8451	11	11
Environmental protection	4.21	0.8423	13	12
Bid understanding	4.20	0.8394	14	13
Contractor's current workload	4.20	0.8394	14	13
Tender sum	4.15	0.8310	16	14
Contractor's local knowledge	4.14	0.8282	17	15
Completeness of tender document	4.13	0.8254	18	16
Quality assurance	4.13	0.8254	18	16
Contract period	4.13	0.8254	18	16
Failed contracts	4.11	0.8225	21	17
Contractor and staffs' experience	4.10	0.8197	22	18
Financial evaluation of the bid	4.08	0.8169	23	19
Contractor's reputation or image	4.07	0.8141	24	20
Project complexity	4.07	0.8141	24	20
Past client and contractor relationship	4.03	0.8056	26	21
Procurement system	3.99	0.7972	27	22
Contractor site management capability	3.97	0.7944	28	23
Firm's history of claims	3.97	0.7944	28	23
Project size and type	3.94	0.7887	30	24

Table 2 presents the mean score, the relative importance index, and the ranking of all the twenty-four criteria examined in this research. Table 3 shows the top ten criteria, which were the most important during the selection of contractors in Sarawak.

**Table 3:** The top ten criteria with the higher mean scores and RII

Criteria	Mean	Relative Importance Index (RII)	Rank (RII)	Rank
Management capability of the contractor	4.56	0.9127	1	1
Technical capacity of the contractor	4.55	0.9099	2	2
The financial position of the contractor	4.54	0.9070	3	3
Past performance of the contractor	4.38	0.8761	4	4
Resources under the contractors	4.34	0.8676	5	5
Project management expertise	4.32	0.8648	6	6
Responsible attitude towards the work	4.31	0.8620	7	7

Health and safety management of the contractor	4.30	0.8592	8	8
Bankruptcy possibilities	4.28	0.8563	9	9
Progress of the existing project	4.24	0.8479	10	10

As shown in Table 3, "Management capability of the contractor" was ranked number one among the criteria for the selection of contractors in Sarawak. It has the highest mean (4.56) and the Relative Importance Index (0.9127). The contractors' organizing, planning, controlling, and leading skills were part of the management capability of the contractors. To evaluate the management capability of the contractors, their performances throughout the project should be monitored. This status increases the motivation of contractors to do their works properly to maintain a good reputation. They are thus increasing the chances of winning the tender of future development projects. The technical capacity of the contractor was the next most crucial criterion for selecting contractors in Sarawak with a mean of 4.55 and Relative Importance Index of 0.9099, as shown in Table 2. The ranking of this criterion is not surprising as the contractors with inadequate technical capacity have significant effects on the project in terms of cost, time, and scope.

In the present study, the financial capacity of the contractor was ranked third with a mean of 4.54 and Relative Importance Index of 0.9070. Assessing the financial capability of a contractor enables the employer to determine the contractor's ability to overcome any financial constraints during the execution of the project. Nowadays, employers wish to get a high-profit return from their development projects. However, the high-profit return projects at the same time mean that the contractor is subjected to a risky situation. If the contractor does not have enough financial capacity for getting into such a case, this may lead to the late completion of the project or failure to deliver the completed project to the employer. The past performance of the contractor ranked number four with an average of 4.38 and Relative Importance Index of 0.8761 out of the most crucial criteria. The investors are looking for high profit from their investment, which is often very risky. Hence, it is necessary to evaluate the past performances of the contractors. Through the assessment of their recent performances, employers can predict the contractors' ability to execute the bided project.

In Table 3, the respondents assigned an average of 4.34 and Relative Importance Index of 0.8676 to resources under the contractors. This criterion was ranked fifth. There are two different types of resources, namely physical resources such as plant and machinery, equipment and human resources such as the number of skilled workers and unskilled workers. Based on the total number of available resources, either physical or human resources, the employers then can identify whether the contractor is capable of executing the works or not. If the funds under the contractor's possession are limited, this may hamper the progress of work and thus incur additional cost on plant and machinery as well as human resources. Project management expertise is one of the criteria that need to be considered during the selection of any contractors. This criterion was ranked number six, with a mean score of 4.32 and the Relative Importance Index of 0.8648 in this study. Selecting a contractor with project management skills will increase the chances of completing the construction project successfully because the contractor plays an essential role in the construction industry. If the contractor is unable to manage the site well, the delivery of unwanted materials to the site, project cost overrun, project delays, and suspension of works may occur. The conscientious attitude of the contractors is one of the essential criteria to be considered for contractor selection. Table 3 shows the mean and Relative Importance Index of this criterion, which was 4.31 and 0.8620, respectively; this criterion was ranked seventh among other criteria for selecting contractors. A responsible contractor manages the construction project appropriately, ensure quality materials, timely completion of a project, and a fixed cost.

In contrast, an irresponsible contractor may abandon the site halfway into the project, thus leading to abandonment. This event may incur losses to the employer and lead to the end of the contract. Furthermore, the health and safety management of the contractor was ranked in the eighth position with an average of 4.30 and Relative Importance Index of 0.8592. When carrying out the prequalification and bid evaluation process, the contractors usually are required to submit their previous safety records and also their proposed health and safety program. It is vital to assess the contractor's safety records of past projects. This endeavor assures the employers that the contractors have safety precautions for the construction project in case of any form of accidents on site. Generally, contractors with good safety records portray an excellent reputation or image of themselves and their companies. It is necessary to ask the contractor to propose a health and safety program to ensure the safety of the workers while working on a site. Hence, the threat of litigation is reduced or prevented in case of any form of accidents on site.

Evaluating the bankruptcy possibilities of the contractor is one of the most critical criteria in contractor selection. This criterion was ranked in the ninth position with a mean score of 4.28 and the Relative Importance Index of 0.8563, as shown in Table 3. Because the construction industry is the riskiest business activity among other sectors, it is essential to select a contractor with a low level of bankruptcy for undertaking construction works. Poor financial management and limited working capital may lead to the insolvency of the contractor. For the large projects, employers must ensure that the contractor has excellent financial support with which he can execute the construction project. The assessment of the progress of the contractors' existing projects is one of the essential criteria in selecting contractors. In Table 3, this criterion was ranked in the tenth position with a mean of 4.24 and Relative Importance Index of 0.8479. By assessing the progress of past projects of the contractors, the employer can predict whether the contractor can effectively manage the project work or not. If the contractor is handling too many ongoing projects, it is not advisable to award the project to such contractors. The reason is that the contractor may not be able to handle all the sites simultaneously effectively. This situation may lead to inadequate availability of either human or physical resources for the execution of the project, thereby causing severe delays and additional cost.

## **Discussion**

### **Management Capability of the Contractor**

The contractors' organizing, planning, controlling, and leading skills are part of the management capability. Compared to previous studies conducted by Idrus et al. (2011); and Rashvand et al. (2015), this criterion was ranked sixth and third in their studies but had different ranking in the present study. The little difference in ranking between these three studies is due to the different working environment of the respondents. Most of the respondents of the two previous studies are mainly from West Malaysia, while the respondents from the present study are selected within Kuching, Sarawak. Therefore, the working environment of different locations has caused a different point of views from the respondents.

### **Technical Capacity of the Contractor**

The previous studies conducted in Malaysia by Idrus et al. (2011) showed that this criterion was in the third position in the ranking. However, other previous studies conducted by Watt et al. (2010) in Australia and Rashvand et al. (2015) in Malaysia had the same ranking of this criterion as the present study. Hence the finding in this research is similar to previous related studies (Watt et al., 2010; and Rashvand et al., 2015)

### **Financial Capacity of the Contractor**

This result was supported by previous studies conducted by Idrus et al. (2011); and Rashvand et al. (2015). This criterion was ranked in the second position of the previous study conducted by Idrus et al. (2011) with a severity index of 93.07% and ranked in the first position with a relative importance index of 97.00% in another previous study conducted by Rashvand et al. (2015). However, this criterion was ranked number 12 in the past research conducted in Nigeria (Ogunsemi & Aje, 2006). The findings of the current study differ from studies in other countries. This result is mainly due to the diverse culture and working environment between the countries.

### **Past Performance of the Contractor**

It is necessary to evaluate the past performance of the contractors. The finding of this research is similar to previous studies (Ogunsemi and Aje, 2006; Watt et al., 2010; and Idrus et al., 2011). In other words, the past performance of a contractor was also ranked first. Besides, the previous findings carried out by Enshassi et al. (2013) in Gaza Strip ranked this criterion in the third position. This ranking suggests that the respondents from Nigeria, Australia, and Malaysia emphasized on the past performance of the contractors.

### **Resources Under the Contractors**

The previous findings conducted in Nigeria (Ogunsemi & Aje, 2006) had the same ranking as the present study with a mean score of 4.31, which was much closer to this study. However, other similar previous findings that were carried out by Enshassi et al. (2013) in Gaza Strip ranked this criterion in the ninth position. This ranking shows that the local projects are small in size and simple. Therefore, it is not necessary to use too many massive plants and machinery for the execution of the projects. Besides, the local contractors may not have their plant and equipment because they can rent the plants and machines from the specialized subcontractors easily (Enshassi et al., 2013).

### **Project Management Expertise**

This result was supported by the previous findings in a study conducted by Watt et al. (2010) in Australia. The relative importance weighting of this criterion in previous results was 11.12 percent and was ranked number four. This ranking shows that both respondents from Sarawak and Australia emphasize the past project performance and technical ability of the contractors.

### **Responsible Attitude Towards the Work**

This criterion was also included in the previous study conducted by Hatush and Skitmore (1997) in the northwest of England. Therefore, the researchers observed that the result is reliable because it supports Hatush and Skitmore (1997)'s previous findings.

### **Health and Safety Management of the Contractor**

The previous study conducted by Idrus et al. (2011) ranked this criterion the same as the present study with the severity index of 82.93 percent. Besides, this criterion was also stated in the previous studies by Ogunsemi and Aje (2006); and Enshassi, Mohamed, and Modough (2013) which was ranked eleventh (mean = 3.86) and tenth (average weight = 4.34%). This finding suggests that relevant authorities, such as local authority, and the professional parties involved in the construction companies, have poor safety awareness.

### **Bankruptcy Possibilities**

The finding in the present study is supported by Lithuania (Banaitiene & Banaitis, 2006). This criterion was ranked in the seventh position in the previous research, with an average weight of 0.067. The difference between the present study and previous research findings may be due to the differences in the mindset and location-related factors.

### **Progress of Existing Project**

Two previous studies supported the result of the present study. The earlier researches are Egypt (Salama et al., 2006) and Malaysia (Idrus et al., 2011). Both studies considered this criterion as one

of the most crucial criteria in the selection of the most capable contractor. In a previous study, this criterion was ranked the fifth position with a relative weight of 13.00 percent. While the earlier findings carried out in Malaysia were ranked in ninth place with a severity index of 82.80 percent.

### Conclusion and Implication of Findings

A total of 30 criteria for selecting contractors in Sarawak, Malaysia, have been identified. These 30 criteria have been ranked from highest to lowest of their mean and based on the Relative Importance Index. Moreover, the top ten highest-ranked were explained in detail. The top ten criteria with the highest-ranking include management capability, technical capacity, financial capacity, past performance, contractors' resources, project management expertise, conscientious attitude towards the work, health and safety management, possibilities of bankruptcy and progress reports of an existing project(s) of the contractors. These ten criteria are the most important criteria that need to be considered for the selection of contractors in Sarawak.

The findings of this study have provided a clear cut guide for stakeholders in selecting contractors in the Sarawak construction companies. The top ten criteria are essential for the selection of contractors in Sarawak. It is desirable for both the client and consultant to have the guidelines to select the most capable contractor for any construction works. The contractors can also update themselves by going through the findings of this study to be aware of the criteria that clients are more concerned about during the selection of contractors. Finally, this study has been able to give an update of knowledge regarding the criteria for the selection of contractors to enhance stakeholders' understanding.

### References

1. Al-Juahni, S. G. (2011). *Contractor's Performance in Building Maintenance: A Case Study*. Saudi Arabia: Department of Construction Engineering and Management.
2. Anyanwu, C. I. (2013). The role of building construction project team members in building projects delivery. *Journal of Business and Management*, 14(1), 30-34.
3. Banaitiene, N., & Banaitis, A. (2006). Analysis of criteria for contractors' qualification evaluation. *Technological and Economic Development of Economy*, 12(4), 276-282.
4. Cheng, E. W., & Li, H. (2004). Contractor Selection Using the Analytic Network Process. *Construction Management and Economics*, 22, 1021-1032.
5. Chinyio, E. (2011). *The Cost of Tendering*. *Engineering Project Organizations Conference* (pp. 1-19). Colorado: Engineering Project Organizations Society.
6. Civil Engineering Contractors Association. (2016). About CECA. Retrieved May 22, 2016, from Civil Engineering Contractors Association Web Site: <http://www.ceca.co.uk/about-ceca.aspx>
7. Contractors State License Board. (2014). CSLB Licensing Classifications. Retrieved May 22, 2016, from Contractors State License Board: [http://www.cslb.ca.gov/About\\_Us/Library/Licensing\\_Classifications/](http://www.cslb.ca.gov/About_Us/Library/Licensing_Classifications/)
8. Department of Housing and Public Works. (2001). *Capital Works Management Framework: Procurement Strategy and Contract Selection* (2<sup>nd</sup> ed.). Queensland: Queensland Government.
9. Enshassi, A., Mohamed, S., & Modough, Z. (2013). Contractors' Selection Criteria: Opinions of Palestinian Construction Professionals. *The International Journal of Construction Management*, 13(1), 19-37.
10. Fong, P. S., & Choi, S. K.-Y. (2000). Final Contractor Selection Using the Analytical Hierarchy Process. *Construction Management and Economics*, 18, 547-557.

11. Gorse, C., Johnston, D., & Pritchard, M. (2012). *A Dictionary of Construction, Surveying and Civil Engineering*. United Kingdom: Oxford University.
12. Great Lakes Power. (2016). *Contractor's Environmental Obligations*. Canada: Great Lakes Power.
13. Greenhalgh, B., & Squires, G. (2011). *Introduction to Building Procurement*. Oxon: Spon Press.
14. Hatush, Z., & Skitmore, M. (1997). Criteria for Contractor Selection. *Construction Management and Economics*, 15(1), 19-38.
15. Huang, X. (2011). An Analysis of the Selection of Project Contractor in the Construction Management Process. *International Journal of Business and Management*, 6(3), 184-189.
16. Hui, W. S., Othman, R., Omar, N. H., Rahman, R. A., & Haron, N. H. (2011). Procurement Issues in Malaysia. *International Journal of Public Sector Management*, 24(6), 567-593.
17. Idrus, A., Sodangi, M., & Amran, M. A. (2011). Decision Criteria for Selecting Main Contractors in Malaysia. *Research Journal of Applied Sciences, Engineering, and Technology*, 3(12), 1358-1365.
18. Kang, B. G., Elbashier, M. M., Goh, B. H., & Song, M. K. (2015). A Comparative Study between Clients and Contractors on Competitive Tendering in the Sudan Construction Industry. *Open Journal of Social Science*, 3, 67-73.
19. Morledge, R., & Smith, A. (2013). *Building Procurement* (2<sup>nd</sup> ed.). United Kingdom: Wiley Blackwell.
20. Municipal Association of Victoria; Institute of Public Works Engineering Australia; Civil Contractor Federation. (2008, May). Best Practice Guide for Tendering and Contract Management. *Victorian Civil Construction Industry*, 2-31.
21. Ng, S. T., & Skitmore, R. M. (1995). CP-DSS: Decision Support System for Contractor Prequalification. *Civil Engineering System*, 12(2), 133-159.
22. Nieto-Morote, A., & Ruz-Vila, F. (2012). A Fuzzy Multi-criteria Decision-making Model for Construction Contractor Prequalification. *Automation in Construction*, 8-19.
23. Ogunsemi, D., & Aje, I. (2006). A Model for Contractors' Selection in Nigeria. *Journal of Financial Management of Property and Construction*, 11(1), 33-43.
24. Plebankiewicz, E. (2012). A Fuzzy Sets Based Contractor Prequalification Procedure. *Automation in Construction*, 22, 433-443.
25. Rashvand, P., Majid, M. Z., Baniahmedi, M., & Ghavamirad, F. (2015). Contractor Selection at Prequalification Stage: Current Evaluation and Shortcomings. *Journal Teknologi*, 77(16), 81-89.
26. Runner, S. G., Ma, F., Horton, J. E., Harkey, D. L., & Yee, B. T. (2016). *Construction and Building Contractors*. California: California State Board of Equalization.
27. Salama, M., Aziz, H. A., Sawah, H. E., & Samadony, A. E. (2006). Investigating the Criteria for Contractors' Selection and Bid Evaluation in Egypt. Boyd, D (Ed) Procs 22<sup>nd</sup> Annual ARCOM Conference (pp. 531-540). Birmingham: Association of Researchers in Construction Management.
28. Towey, D. (2012). *Construction Quantity Surveying: A Practical Guide for the Contractor's QS*. United Kingdom: John Wiley & Sons. Limited.
29. Watt, D., Kayis, B., & Willey, K. (2010). The Relative Importance of Tender Evaluation and Contractor Selection Criteria. *International Journal of Project Management*, 28, 51-60.