An Analysis of the Selection of Project Contractor in the Construction Management Process

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Abstract

Construction contractors have big influences upon projects and their successes. Therefore, it is quite critical to select a qualified contractor in the process of construction management. A competent construction contractor is one of the indispensable conditions of a proper process and completion of a construction project. There are several theoretical frameworks or models applied in the evaluation of contractors. And there are some practical criteria for selecting an appropriate contractor. This paper analyzed the relevant theoretical methods for contractor evaluation and examined the actual criteria for the selection of contractors.

Keywords: Construction management, Contractor selection, Criteria

1. Introduction

Project construction must be managed in an effective manner. The demands from clients, competition, and regulatory agencies have been growing rapidly (Crowley and Hancher, 1995). These challenges present a paradox: few of these demands directly contribute to the physical construction of the project, however, a failure to properly manage them can lead to problems for the entire project and construction team. The selection of a proper construction contractor increases chances of successful completion of a construction project (Alhazmi and McCaffer, 2000). It can also fulfill the client goals, and keep the schedule of the cost, time and quality. So it is extremely critical to select an appropriate contractor in the process of construction management.

The selection of construction contractors are very often conducted during tendering. Tendering indeed gives a client a choice in awarding contract a company which proposes the lowest price and short construction cycles, but usually they do not allow to precisely evaluate a tenderer. At the same time there are more and more procedures in which the decisive criterion of choosing a tender is the price. In recent years, most clients made use of such a method. On the other hand, the research results show that the cheapest tenderers often have problems with completing the project. Accepting the lowest price is the basic cause of the project completion problems because very often lowering the price means lowering the quality. It is true in some cases. The above conditions make that it is especially important to properly evaluate the contactor's capabilities. We analyzed in this paper the frameworks applied in the selection of construction project contractors, and summarized the criteria for selecting a suitable contractor.

2. Theoretical Frameworks Applied in the Selection of Construction Project Contractors

It is complicated to select a suitable contractor. Bid evaluation is one of the major challenges that face owners and consultants in the public and private sectors. Nevertheless, there are objective means to gauge the ability of a contractor to properly manage the business aspects of the construction project. Some models and frameworks have been created to evaluate contractors' bids and select the most appropriate one.

2.1 The Cost Consideration Framework

Among all factors that may affect the selection of a contractor, cost or price consideration has for a long time been the main evaluation factor. Although the lowest bidder system protects the public from improper practices, it has certain disadvantages. These include unreasonable low bids either accidentally or deliberately or unqualified contractor which cause extensive delay, cost overrun, quality problems and increased number of disputes. Over the years some modification to the lowest bidder system were made, such as reasonable bidder, public interest and prequalification list which open the door to other evaluation methods to be adopted instead of the single criterion system lowest bidder system.

2.2 The TOPSIS and SAW-G Grey Techniques

The grey theory is a new technique for performing prediction, relational analysis and decision-making in many

areas. The grey theory techniques were applied for defining the utility of an alternative. Proposed assessment model covers well known method of TOPSIS (Technique for Order Preference by Similarity to Ideal Solution), method with attributes values determined at intervals (TOPSIS-grey) and a method of Simple Additive Weighting with Grey relations (SAW-G). The methods of grey relations methodology can be implemented as an effective decision aid for tasks with uncertain data.

2.3 The Prequalification Method

To ensure the quality of contractors, the valuation can be done beforehand with a prequalification method. Facing the owner's scrutiny regarding its competency to handle the business aspects of the operation during prequalification allows the contractor to focus on the specifics of the construction project once it has passed through prequalification and been short-listed. This also allows the owner's bid evaluation team to focus only on the specific elements of the project, without being distracted by the other business considerations. In the simplest meaning prequalification is a before tendering procedure which allows to choose the most appropriate candidates from amongst those declaring willingness to participate in the tendering. Prequalification is defined by Moore (1985) as the screening of construction contractors by project owners or their representatives according to a predetermined set of criteria deemed necessary for successful project performance, in order to determine the contractor's competence or ability to participate in the project bid. Clough (1986) thinks that prequalification means that the firm which wants to participate in the tendering needs to be qualified before it can be issued bidding documents or before it can submit a proposal.

The aim of prequalification is often not only contractor competence evaluation but also limitation of potential bidders. In such a case it is necessary not only to judge whether the contractor fulfills the basic criteria, but also to what degree they are fulfilled. Not all criteria are equally important for the client. The basic issue is assigning the right weights to the criteria.

However, there is also a defect of the prequalification method. Time will necessarily pass between when the contractor is qualified and when it submits its bid. Things within the firm could change. This problem can be corrected with an update of the qualification data during the bid. The problem with performing contractor assessments during bidding is that it adds steps to the bid evaluation process. It requires evaluating both the contractor's business competency and its qualifications as a builder in the same process.

In practice, prequalification can be a form of "registering" the contractors capable of completing given tasks. Contractors are usually grouped depending on some chosen factors, like possessing specialist equipment to perform a given type of works. In effect this allows to form a "standing list", which should be updated in given periods of time. Prequalification may also mean selecting a group of contractors most suitable to execute a given project. This can be called "per project" prequalification. In this case a "short list" of contractors is formed. Prequalification, both in the "per project" and "standing list" form, is a commonly used procedure in many countries.

Russel, Hancher and Skibniewski (1992) made questionnaire surveys in the USA. They gathered data on prequalification among 173 owners, both public and private. Only 19 respondents (10%) revealed that they do not carry out prequalification of the contractors. It has to be stressed that only public owners admitted this. It means that all private clients admitted carrying out contractor prequalification.

Russel (1996) put forward some other simple contractor prequalification criteria. He distinguishes three basic groups of criteria: − Preliminary screening criteria (among others: references, reputation, past performance, − Constructor resources (financial, technical, status of current work program), − Other items (project specific criteria). Quite interesting are the criteria presented by the Palaneeswaran and Kumaraswamy (2001). The following groups of criteria have been suggested: (1) Responsiveness, promptness, realism, completeness. (2) Meeting deadlines, correctness and valid information, totality in providing information. (3) Responsibility, obeying the law and complying with local government regulations, standards and bylaws, quality system, safety system. (4) Competence, recourse (financial, machinery, plant and equipment, human resources), experience, constraints (current workload, subcontracts, guarantees).

Jennings and Holt (1998) conducted a research in the UK. They selected 80 contractor firms. The firms were divided into three categories (large, medium and small) depending on the annual turnover. Small contractors are designated as those with a turnover of less than £5M, medium sized contractors are those with a turnover £5M – 50 and large contractors exceed £50M. The respondents were asked to give the number of contracts in which they carried out prequalification. The following results were obtained: small firms – 31%, medium firms – 48%, large firms – 72%. Thus, the highest percentage of contracts preceded by prequalification was pointed by large firms. Most contractors were prequalified "per project" (63%). However, small firms show that they are more

often prequalified to the "standing list" than the "per project" one (respectively 56% and 44%). The medium firms respectively 35% and 65%, and for large firms 27% and 63%. Research results published in 1995 (Holt, Olomalaiye, Harris 1995) and concerning tendering practices in the UK show that for 63% of the clients prequalification based on "standing list" is the basis of awarding contract to a given company. It means that at the stage of tendering the contractor competence is no longer thoroughly analyzed and the cheapest tender wins. As much as 70% of public clients and 55% of private ones admitted following this practice. The method is not good because there may be quite a long gap between the company being prequalified on to the "standing list" and tendering procedure and in this period there may occur unfavorable changes in the construction company. Thus, independently of making use of a "standing list", it is advisable to prequalify contractors just for a given project.

2.4 The Construction Management at Risk Method

In the 1980s, the Construction Management at Risk (CMAR) method was introduced. Construction management at risk as a project delivery method was created to provide input to the designer to increase constructability of designs and to decrease schedule duration through overlapping of the design and construction phases. Kknocher and Sanvido (1998) emphasized that the contractor usually has a significant input in the design process. In general, CMAR creates a collaborative and non-adversarial environment that uses the wisdom, experience, and creativity of the architect and the CM. The CM has the opportunity to review the design as it progresses and to offer suggestions based on his experience and expertise. The procedure is more interactive with all key project players than the low-bid system. Construction Management at Risk or CMAR is gaining popularity, especially in the construction of the large projects such as schools, airports, and sports arenas.

The CMAR method aims to reduce the risk of cost overrun and schedule creep and to expedite the construction process without compromising quality. The construction manager works with the designer as a team during the design phase. Then continue to be the project main contractor beside to initial construction management role. There are some advantages to the owner from using the CMAR delivery method: (1) Risk is reduced for the architect and owner. (2) Produce a more manageable and predictable project cost and schedule outcomes. (3) Centralizes responsibilities. (4) The owner benefits from the CM's experience both during design and construction. (5) Allow for an early start to construction by phasing the work. (6) Results in better quality construction because the selection of the CM is based on record of performance in the same type work.

2.5 The Multi Criteria Evaluation Models

In most cases, it can be stated that contractor's selection problem is a multi-criteria problem. Many multi-criteria techniques are proposed and applied (Goicoechea et al. 1992, Zavadskas et al. 2008). Skibniewski and Chao (1992), Banaitis and Banaitiene (2006), Mitkus and Trinkuniene (2006), Ginevicius and Podvezko (2008), Turskis (2008) and Zavadskas et al. (2008), Plebankiewicz (2009) investigated assessment of construction firms and contractors evaluation problems. There is a Multi Criteria Bidding System which is an evaluation method that considers not only the cost as the awarding reason, but also considers other important attributes. The key of Multi attributes system is that the selection process of the contractors is based on more attributes such as, bid price or cost, time, quality, managerial safety accountability, competence and sufficiency of contractors (Liu et al., 2000). The main concept of the Multi Attributes Bidding System is that the selection process of the contractors will be based on more attributes than just the price, and the successful bidder will be the one who has the highest combined bidding value of the multiple attributes. The scores of those attributes are transformed into values and those values of all the attributes are totaled to give the combined bidding value.

One Multi Criteria model is the performance predicting system for contractor selection, proposed by Alarcon and Mourgues (2002). The proposed system utilizes a methodology that predicts the potential performance of the contractors under analysis. The model takes into account the most important characteristics of the contractors and projects that influence project performance such as contractor organization chart, contractor resources, project location, project type, and others. Similar framework was introduced by Alsugair (1999). This framework proposed a bid evaluation framework by identifying 36 evaluation factors which grouped into main 9 classes such as financial evaluation of the bid, bid understanding, completeness of bid documents and others. Those factors were presented in question forms where the evaluating score results from the score given against each question.

Russell (1996) created another model. In his model, valuation is done in two steps. Step one is contractor screening using the dimension – wide strategy method, while the second step is evaluating the remaining contractors using the dimensional weighting method. Also prequalification formulas are used to determine a contractor's capabilities based on certain variables or characteristics such as contractor previous experience in

similar projects, contractor financial standing, and others. Russell and Skibniewski (1990) have developed a computer program that uses the dimensional weighting method which involves identifying a relative importance (weight) for each factor. Contractors' bids are then rated based on these weights. Relative importance can also be applied to a composite decision factor (group of related factors) and to factor within a composite decision factor. Russell et al (1990) has developed an expert system prototype based on the dimension – wide strategy method. This involves defining certain value for each factor as a threshold in which the contractor will be excluded if he/she does not meet the threshold in at least one of the factors.

3. Some Actual Criteria for the Selection of Construction Project Contractors

In actuality, contractor evaluation is often performed by industry professionals using their accumulated experience and judgment. There are variations in the amount of effort expended in the process, often without an understanding of how such variations influence the project outcome. An important step in evaluation is to examine the contractor's system for handling project information regarding work tasks. Only if a soundly based project information management system is employed should the safety record be examined. The contractor's approach to safety and what actions it takes to achieve desired results should be closely scrutinized.

Many factors should be considered during the contractors' qualification screening. The following list includes most of the key components that should be examined when conducting a contractor qualification. (1) Financial standing, such as financial stability, turnover, profit, obligations, amounts due, and owned financial funds. (2) Technical ability, such as experience, plant and equipment, and personnel. (3) Management capability, such as past performance and quality, quality control policy, quality management system, project management system, experience of technical personnel, and management knowledge. (4) Quality, safety, senior management, including experience, tenure with firm, and division of responsibilities. (5) Current projects/backlog, including number, size, and location of projects, percent of capacity being utilized, and status and expected completion, past failures in completed projects, number of years in construction, past client relationships and cooperation with contactors.

One way to collecting the data necessary to perform contractor evaluations is to conduct questionnaires. But in this way, contractors will be tempted to answer in a way that puts them in the best light. For instance, one commonly used questionnaire asks contractors if safety is a priority in their business. A review of several hundred responses to this question revealed that not a single contractor answered "No", while actual work performance indicated that for many, "No" would have been the more accurate response. Thus, this type of question is of no value. The key to a successful methodology is to develop an objective form, from which a database can be built that allows for fair comparisons of contractors. The form should be easy to use. Anyone on the bid evaluation team should be able to conduct the assessment and compare the results. Furthermore, owners must carefully analyze the data submitted by contractors. It is not prudent to ask the contractor to provide answers about the viability and completeness of its program and then simply rely on those answers when drawing conclusions about the effectiveness of its efforts. Objective information needs to be obtained and, more importantly, mechanisms for verifying the accuracy of the data need to be developed before any conclusions can be drawn.

It is important to obtain criteria ranking which clients take into consideration when evaluating a contractor's competence. Plebankiewicz (2010) took into account five basic criteria and twenty one subcriteria which further characterized the basic ones. The proposed factors were established on the basis of literature - among others: Wong (2004), Khosrowshahi (1999), Hatush and Skitmore (1997), Holt (1996), Bubshalt and Al-Gobali (1996), Topcu (2004). Hatush and Skitmore (2009) conducted a Delphic study investigating the perceived relationship between twenty contractor selection criteria (CSC) currently in use and project success factors (PSFs) in terms of time, cost and quality is described involving a sample of eight experienced construction personnel, including two validators. A consensus of the likely impact of each criterion on time, cost and quality is established in terms of pessimistic, average and optimistic values, which are then converted into expected means and variances via the PERT approach. The ten most and ten least important CSCs are identified and examined for differences and similarities between PSFs. The results show that past failures, financial status, financial stability, credit ratings, experience, ability, management personnel and management knowledge are perceived to be the dominant CSCs affecting all three PSFs, with safety criteria (safety, experience modification rate, OSHA incidence rate, management safety accountability) and the length of time in business being perceived to have the least effect overall.

4. Conclusions

This paper analyzed the criteria for construction contractor selection. The goal of construction is to deliver a

completed project that serves the intended function. Anything in the construction process that does not contribute to this goal is a potential obstacle and adds unnecessary risk to the project. Some clients may choose to use just one of the criteria used to qualify a candidate to the stage of tendering procedure and it is usually the contractor's experience. Majority of studied clients evaluate contractor companies after having completed their cooperation, they keep their data and also declare giving preferences for those companies with which their cooperation was successful. This proves that they pay great attention to reliability and competence of the contractors. One important step that can be taken to ensure project success in safety is to prequalify and select only those contractors who are fully qualified by virtue of their safety programs and performance. A good safety record reduces the cost of construction and helps to support the desired attitude toward quality and productivity. By assessing the capability and capacity of a potential contractor through a methodical evaluation process, potential issues that could cause trouble on a project can be identified or eliminated. Comprehensive contractor evaluations conducted prior to selection can significantly reduce the risks faced by a construction project.

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