

Chapter 6

Improving Construction Management Through Advanced Computing and Decision Making

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ABSTRACT

This chapter proposes an algorithm to make the bidding dynamic by not only awarding tenders on basis of cost quoted in tenders (bidding cost) but also on contractor ratings. The ratings of contractors are computed using historical performance of contractor. The chapter empirically identifies the factors to rate the contractors. The historical values associated with the performance rating parameters are then combined using the “controlled values” which are assumed to be standard across the industry, to yield the overall weighted rating of firms. This rating is then combined with the bidding cost, thereby making the selection of contractor dynamic. The selected contractor is paid the bidding cost. The algorithm is executed with a hypothetical value to illustrate the approach. A web-based tool had been proposed to automate the process of making the bidding dynamic.

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INTRODUCTION

There are several civil contractors in the market who competes for a tender. Usually, the contractor who puts up the lowest cost bid gets the tender. But this sometimes reduces the quality of the product in favor of cost reduction. So, there is a need for a more refined process so that the best contractor can be selected, offering economical cost services for the project without compromising with the quality. Therefore, an optimal method is required that makes the selection of contractor not only on the basis of given cost but also on his past performance. Past performance calculation will be a dynamic & continuous process and is computed by employing historical values of various parameters, as identified empirically in this paper. This performance is the representation of the rating of the contractor, which is used to normalize bid cost to yield priority among competing contractors. The parameters used for rating the contractor varies from firm to firm. However, the various parameters are reported in (Xie, Lin, Yang, & Gao, 2008; Watt, Kavis & Willey, 2010; Hassaan, Fors & Sheata, 2013; Ibadoy, 2015; Arujo, Alencar & Mota, 2018) and could be used with the algorithm proposed in the chapter.

Proposed Algorithm

The proposed algorithm will give the ranking of a contractor. This ranking will help in reducing the cost of the project and selects the contractor whose history of work is also good i.e. has all the values that are required to complete a particular project. The parameters range with different values are set by the company that puts the project. Also, these parameters are known in the industry.

A suitable contractor would be selected on the basis of lowest bid value and highest ranking i.e. $\text{Priority of a contractor} = \text{Rating} / \text{Bidding Cost}$. There are two new terms introduced, the contractor cost which is the cost given by a contractor to win the bidding and control points which are the standard values known across the industry but unknown to a contractor. Control values are given to select the right contractor on the basis of his historical values. The rating is generated by taking various primary and secondary parameters whose values are dependent on historical records of a contractor.

In the calculation of rating, density is calculated for each parameter with the help of historical values. Density is the total number of points in a control rectangle upon the total area of the control rectangle. The steps to calculate the density for each parameter are:

1. Create a graph, Parameter (Y – axis) - Time (X- axis)
2. Plot historical values of a firm on graph.

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