

# Decision Making in Contractor Selection: AHP and Expert Choice Approach

Najla .M<sup>1</sup>, Shajina<sup>2</sup>

<sup>1</sup>Cochin College of Engineering and Technology, Athippatta, Edayur (PO), Valanchery, Malappuram Dist., Kerala -676552, India

<sup>2</sup>Assistant Professor, Department of Civil Engineering, Cochin College of Engineering and Technology, Athippatta, Edayur (PO), Valanchery, Malappuram Dist.,Kerala -676552, India

**Abstract:** *One of the most important tasks in construction management is selection of the right contractor. Literature survey is carried out in this area. In dealing with the large projects, it is important to select a proper contractor, which could influence the quality of the constructed building. The model for decision making in construction management by using multi-criteria methods created and applied to real case study. AHP method and "Expert Choice" computer program was employed for calculations.*

**Keywords:** Contractor selection criteria, Multi criteria decision making (MCDM) system, Analytical Hierarchy Process (AHP). Consistency

## 1. Introduction

A construction project is developed considering the goals and requirements of a client and the talents of a contractor and suppliers success. Choosing the best contractor from numerous applicants that are available today in our area is a complicated problem for project managers. This paper suggests AHP technique for contractor selection problem, this paper is organized as follows: It provides a review of some relevant literature on contractor selection and literature is utilized to review contractor evaluation methodology and criteria, appropriate investigation issues. It is composed of the investigation objectives and tasks. It provides conclusions.

## 2. Literature review

**Thomas L. Saaty (1980)** built AHP seeking a Systematic practice to define priorities and support Complex decision making. **Rosaria de F. S .M .Russo, Roberto Camano defined** AHP as a method of 'measurement through pairwise comparisons and Relies on the judgment of experts to derive priority Scales

## 3. Research Objectives

This study, factors helps to understand the nature of Contractor selection approaches practiced by various Contractor. Also helps for the to develop theoretical model that represents the appropriate contractor selection based on AHP process.

## 4. Methodology

A questionnaire was developed to participate of General Manager, Project Manager, Supervisor, Site Engineer to Rank the criteria according to importance and their effect. The questionnaire has been conducted around of main 9 main criteria which affect the selection of contractor in construction projects. .The selection of a construction

contractor is a decision characterized by multiple objectives. Based on these main aspects, a list of sub criteria can be generated. Choice of contractor for construction project works depends on many different factors. The major criteria and sub criteria are given Table 1

**Table 1:** Main criteria and sub criteria's

Criteria	Subcriteria
Technical experience	Civil works Electrical Mechanical Landscaping Site works
Performance record	Completing project on schedule Effectiveness of quality control system Effectiveness of cost control system Quality of finished products
Financial stability	Profitability Availability of credit Department volume
Management and employees qualification	No. of projects that experienced failure in last 10 years Experience of manager Labor force
Capacity	No. of projects contractor works on now Capacity to add this project Status of current projects
Safety record	Strengths of safety program No. of accidents in the last 5 years Availability of safety training for new employees
Operation and equipment	Capabilities of technical field personal Suitable equipment resources

## 5. Analytical Heirarchy Process (AHP)

The Expert Choice software is a multi-objective decision support tool based on the Analytic Hierarchy Process (AHP), designed to facilitate sound decision making by using both empirical data as well as subjective judgment.

Following are the steps used in AHP and Expert Choice:

- Brainstorm and structure a decision problem as a hierarchical model
- Set the type and mode of pair wise comparisons or data grid functions
- If applicable, pair wise compare the alternatives for their preference with respect to the objectives, or assess them using one of ratings or step functions,
- Pair wise compares the objectives and sub-objectives for their importance to the decision
- Synthesize to determine the best alternative
- Perform sensitivity analysis

### 5.1 Assessments / pair wise comparisons

One of the major strengths of the AHP and Expert Choice is the use of pair wise comparisons to derive ratio scale priorities, as opposed to using traditional approaches of assigning weights. The pairwise comparison of main goal is shown in figure 1

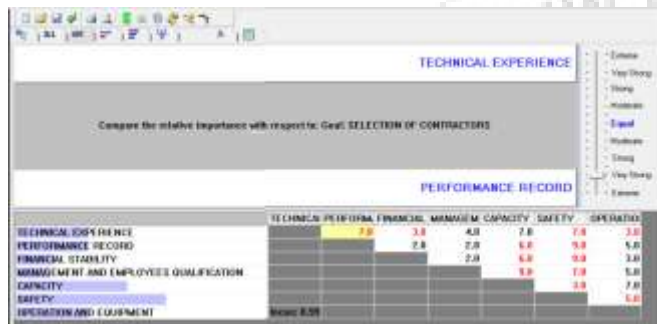


Figure 1: Pairwise comparison of main goal

After the judgments have been entered, it is possible to request suggestions for reducing the inconsistency. This can be done from any comparison mode. The priority values of each criterion are shown in figure 2



Figure 2: The priority values of each criteria

In the 'Data Grid' it is possible to use the 'Ratings' function which specifies intensities, that can be assigned to the alternatives under the criteria. The figure 3 shows the rating of each alternative



Figure 3: Rating of each alternatives

Sensitivity analyses from the 'Goal' node will show the sensitivity of the alternatives with respect to all the objectives below the goal. It can also be performed from the nodes under the goal if the model has more than three levels to show the sensitivity of the alternatives with respect to an objective or sub objective. The final obtained 4 types graphs are shown in figure 4



Figure 4: Final graphs of selection

## 6. Conclusion

The proposed model was used to choose contractor for construction of apartment. After analyzing all alternatives, the best contractor been chosen. The AHP process is simplifies using a decision support system.

## References

- [1] Saaty, T.L. (1980) The Analytical Hierarchy Process McGraw-Hill, New York.
- [2] Saaty, T.L. (1994) How To Make a Decision: The Analytical Hierarchy Process, 24(6), Palaneeaswaran 19-43.
- [3] R.F. Aziz, S.M. Hafez, Applying lean thinking in construction and performance improvement, Alexandria Engineering Journal 52(4) (2013) 679–695
- [4] J. Whyte, A. Stasis, C. Lindkvist, Managing change in the delivery of complex projects: Configuration management, asset information and 'big data', International Journal of Project Management 34(2) (2015) 339–351

## Author Profile

**Najla. M** M.Tech. in Construction Engineering & Management (Cochin College of Engineering and Technology) from Kerala Technological University.