AHP MODEL FOR QUALITY ASSESSMENT OF ARHITECTURAL DESIGN

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ABSTRACT

Public procurement process is strictly regulated in order to obtain best value for public money and protect the interests of all stakeholders. The paper shows how the evaluation of bids for the preliminary design project can be made, based on AHP method. It also describes the scenario of a complex procurement process in whose preliminary stage is used a heuristics elimination by aspects to reduce the set of all bids, and then the remaining bids are compared directly using the AHP model.

Key words: Public procurement, tender assessment, Analytic Hierarchy Process (AHP), multi criteria decision making.

1. Introduction

Public procurement in construction projects is specific because in various stages of the project, various service providers are involved. Final project is the result of a complex process during which impose a series of decisions, but a key role in the overall quality of the project lies in the initial phase, in which the decision to preliminary design project is made. Many value drivers present in all phases of the project are the source of the complexity of the procurement process, and this complexity can be reduced by proper tender assessment based on multi criteria modeling. Another aspect of the complexity arises from the fact that in this procurement procedure various stakeholders are involved, and the process is strictly regulated in order to protect their interests. These regulations impose some constraints on the decision-making process related to tender assessment, but the paper shows that the AHP method is fully compatible with these constraints. The quality of architectural design can be decomposed in several aspects. Because of large number of those aspects, it is useful to create proper hierarchical structure.

In this paper, AHP model with the two level of hierarchy is created for assessment of the quality of preliminary project design tender.

2. Literature Review

In Achieving Excellence in Construction Procurement Guide 09 (2004), three main aspects of the quality of architectural design are discussed; impact, build quality and functionality. All of them are decomposed into sub aspects, altogether ten of them. Best Practices for Use of Best Value Selections (2006) offers guidance on when to use a Best Value Selection for construction services, and on how to conduct a Best Value Selection once a public owner has chosen to use it. In Hunjak (2010), the current procurement practice in Croatia was criticized and the main obstacles for transferring knowledge and good practices from EU into Croatian reality were identified. The paper Oezsariyildiz at all (2006) focuses on connection between requirements specifications and design in construction projects. The suitability of the AHP method as a tool for clarification and overhalming uncertainty, imprecision and subjectivity involved in procurement decision process are also considered. In Saaty (1990) the AHP method is explained both from theoretical and practical point of view. In T, Harputlugil at all (2011) the main goal was to find and adopt proper MCDM methodology for assessment of design quality. Several methods were compared, and their advantages and disadvantages for this task were discussed.

3. Objectives

The overall objective is to prove that even so complex decision making problem as tender assessment in public procurement can be improved by AHP modelling. More specific objective is to demonstrate how to fulfill this intention by facilitating the group decision making process for best value modelling.

4. Research Design/Methodology

Current practice of the Association of Croatian Architects for assessment of tender for preliminary design project was critically reviewed and some weaknesses are identified. A proposal for improvement of this practice based on AHP methodology was created and the compliance of modified process for tender assessment with the legal framework was verified. This proposal consists from two stage hybrid process: in first step, the initial set of bids is reduced by heuristic elimination by aspects and in second step, the remaining bids (six of them) are directly compared by AHP model. The usability of proposed procedure was tested and proved in real case of public procurement for student dorm with supporting facilities.
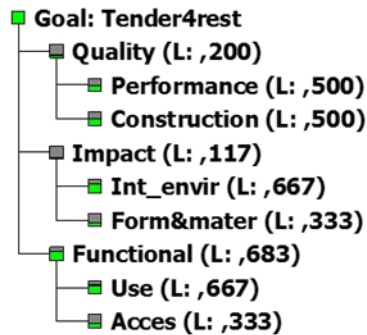
5. AHP model for assessment of tender

AHP model for assessment of tender for preliminary design of student restaurant facilities was developed on the basis of design quality indicator (Achieving Excellence in Construction Procurement Guide 09):

Main group of indicators	indicators
Build quality	Performance
These refer to the building's ability to create a sense of	Engineering system

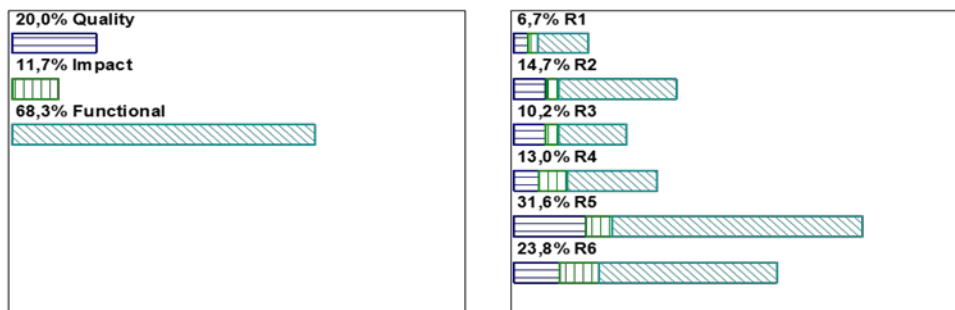|	
place and to have a positive effect on the local community and environment.	Construction
Impact These relate to the engineering performance of a building.	Urban&social integration Internal environment Form&material Character&inovation
Functionality These are concerned with the arrangement, quality and interrelationship of spaces.	Use Acces Space

Table 1: Design quality indicators

Because of lack of information and some other constraints only part of this quality indicators were used as criteria in AHP model for tender assessment. The model, criteria weights and priorities of alternatives are presented here

```
■ Goal: Tender4rest
├─■ Quality (L: ,200)
│  ├─■ Performance (L: ,500)
│  └─■ Construction (L: ,500)
├─■ Impact (L: ,117)
│  ├─■ Int_envir (L: ,667)
│  └─■ Form&mater (L: ,333)
└─■ Functional (L: ,683)
   ├─■ Use (L: ,667)
   └─■ Acces (L: ,333)
```

Alternatives

R1	,068
R2	,157
R3	,108
R4	,130
R5	,301
R6	,236

On the next picture the Dynamic Sensitivity graph of priorities is shown:

20,0% Quality

11,7% Impact

68,3% Functional

6,7% R1

14,7% R2

10,2% R3

13,0% R4

31,6% R5

23,8% R6

6. Conclusions

The procurement process of preliminary project design can be improved by AHP methodology. The main benefit of this attitude lies in better exploitation of expert knowledge during the value modeling and priority setting. The experts for problem domain, architects, have recognized the advantages of this attitude in a short time and the facilitation process was successfully done. The real problem was successfully solved and the solution developed though the group decision conference was accepted.

7. Key References

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