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An Expert System for Construction Tendering Process

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Abstract

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This paper presents a flexible expert system for the evaluation of tenders based on overall aspects of performance. In particular, both tangible factors (such as technical parameters) and intangible factors (such as evaluation of informal relations or environmental assessment) are included in this approach. Considering the complexity of the problem, a model of hierarchical structure is expected. The pairwise comparisons method (introduced in [15]) glues together performance measurements which may take place at many levels. The consistency-driven approach (introduced in [8]) allows one to define conceptual models of tendering processes which are flexible (no fixed list of criteria is assumed) and adaptable to local environments and conform to the local building code requirements.

1 Construction tendering basics

Bridges, roads, buildings, and other civil engineering constructions are often financed by public funds. Selecting a tender (a construction company or a project design proposal) takes place, in most cases, by a public bidding. It is a complicated process which is mostly based on intuition since there is no theoretical base or consistent method of predicting the best bid. It is not uncommon for the evaluation panel to arrive in a deadlock situation when a part of the panel favours one solution because of certain criteria while the other part insists on another solution since, according to their opinion, it scores better on different criteria. The decision making process nearly always involves some kind of constituency in modern democratic societies. We have various boards of governors or directors, committees, task groups, city councils, panels of experts, and individuals, each with an agenda. Heated discussion and various ways of dispute, reasoning, and argumentation take place to arrive at certain decisions. Most constituencies have worked out precise and practical policies for running meetings in an orderly and effective way. What we lack, however, is a device for drawing solid consistent conclusions and all too often the loudest individual wins! Unfortunately loudness does not necessarily go along with wisdom. Casual thinking does not work well in predicting complex outcomes. Casual thinking is partial, fragmentary, and is not an effective way to measure intangibles. In the decision making process many factors must be considered simultaneously and with about the same degree of importance, therefore an approach with more finesse is necessary to obtain a clear and unambiguous conclusion. It has been shown by numerous examples (see Section 4 for more detailed discussion) that the pairwise comparison method can be used to draw final conclusions in a comparatively easy and elegant way. The brilliance of the pairwise comparison could be reduced to a common sense rule: consider two factors at a time if you are unable to handle more than that.

The main goal of tendering, which is usually organized by the construction investor, is the selection of the most suitable tender from the public point of view. Through a public bidding we try to achieve:

- the setting of common input constraints for potential suppliers or/and constructors,
- the selection of the best tender based on tangible and intangible but constant (during the entire bidding process) criteria which allow us to compare the proposed offers,
- a minimization of the influence of informal interests on

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