Keywords: claim negotiation, multi agent systems, argumentation

Claim negotiation entails exchanges between project participants to reconcile their differences with the aim of reaching a settlement. In construction management literature, among the automated systems for claim negotiation, multi agent systems (MAS) appear to have a significant contribution towards helping participants to save both time and human resources during this long and energy consuming process (Ren et al., 2001). MAS aim to create a network of problem solvers (agents) that have ability to interact with each other and work together to solve problems that are beyond the individual capabilities and do it on behalf of humans.

Within the context of this research, the ultimate aim is to develop a multi agent system (MAS) to simulate the claim negotiation process between project parties to achieve an acceptable degree of risk and cost sharing. The risk paths emerged throughout the project, sources of vulnerability and contract conditions will form the basis of the negotiations in addition to the expectations and attitudes of the parties. The deep examination of the related literature, which will be the subject of this paper, will guide the design of the conceptual framework and process model. The main factors directing the claim negotiation process, properties of MAS and its main applications in claim negotiation will be reviewed and by combining the findings of motivating interviews, the argumentation based approach to negotiation will be proposed as a key strategy to enhance the performance of previously proposed systems.

Within the existing attempts to develop multi agent negotiation systems, CONVINCER developed by Pena-Mora and Wang (1998), MASCOT developed by Ren et al. (2001) and MASCOR developed by El-adaway and Kandil (2009) appear to be the most advanced studies that focus on the construction claim resolution. To better comprehend claim negotiation process and to figure out the advantages and limitations of the previous studies, interviews are carried out with five experts, having excessive experience as negotiator and arbitrator in international construction projects.

The main conclusions, derived from the interviews and literature reviews, point out some major shortcomings of previous studies and hence, recommend strategies to improve their performance: Negotiation is the initial attempt to solve the conflicts and it is the mostly preferred conflict resolution mechanism by all project parties. Therefore, within this study, the intended system will focus on negotiation instead of alternative mechanisms.

The core of the claim negotiation process is to provide objective proofs supporting the offers. All the experts mentioned the absolute necessity of using related contract clauses and facts to solve these claims in a fair and realistic way. Therefore, this study recommends the usage of information sources related with contract clauses, causes of the claims and the claim amount, in addition to the issues related with strategy of the parties.

Both CONVINCER and MASCOT have an analytical approach to claim negotiation by using game
theoretic techniques and they are mostly based on the exchange of offers according to some interaction rule. Besides, the agents are allowed to exchange only proposals related with the claim amount. The ability of making proposals, accepting and rejecting offers are the basics of negotiation process; but they are insufficient when agents need to defend their proposals (Jennings et al., 2001), like the situation in construction claim negotiation practices. Therefore; in this study, argument based approach is proposed to have a potential to increase the performance of MAS applications in construction claim negotiation by allowing exchange of arguments.

For claim negotiation process, argument generation and evaluation activities should be based on contract clauses and risk events happened throughout the project, as recommended by the experts. Therefore, within the designed system, there will be agents acting as Case Administrator (for the analysis of risk events happened and the cost increase) and Contract Administrator (for the analysis of contract clauses and determination of responsibilities of project participants) in addition to negotiating parties (contractor and client). The communication between agents and information sharing will be performed through the usage of an ontology which is developed in previous stages of this study (Fidan et al., 2010). Figure 1 shows the IDEF diagram summarizing this negotiation framework.

Figure 1: General Negotiation Framework

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References


