A Simulation Model for Optimal Bidding Decisions

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ABSTRACT

The lowest bid approach is the most used technique in the US construction procurement environment since competitive bidding is a legal requirement in the public sector. Despite that many research studies were directed to help contractors in taking different bidding decisions, there is still insufficient research efforts that equipped contractors with decision-support tools to decide on optimal bid values. Hence, this paper takes previous research works a step further by developing a simulation model that can be adopted to determine the bid decision that would result in winning more projects. To this end, a methodology composed of multiple steps was utilized. First, a simulation model was developed to model the competitive bidding environment. Second, the modified Roth-Erev learning algorithm was used to determine optimal bidding decisions. Finally, the applicability and usefulness of the proposed simulation model was validated through a real-world set-up by relying on data from 503 actual public transportation projects in the US. The results reflected that the developed simulation framework can increase the winning percentage of contractors from 36.98% to 68.59%. In addition, the results showed that projects' owners would also profit when contractors use the developed simulation model. Ultimately, this research adds to the body of knowledge by equipping contractors with a pragmatic decision-support tool that helps in winning more projects by determining optimal bid values.