ABSTRACT

Considering the benefits of electronic procurement in private and government organizations, the thesis critically analyzes various aspects pertaining to e-procurement in government departments of India. These aspects include identification of factors influencing adoption of e-procurement and inter-factor relationships in government departments, assessment of IT-Readiness of government departments and objective evaluation of e-procurement, development of a centralized, multi-attribute procurement-based method for selecting and/or short-listing contractors, detection of collusion, and design of auction parameters to reduce collusion effect.

Past works helped in identifying major factors for adoption of e-procurement and their relationships. A questionnaire survey among officers of 11 government departments and an analysis of the responses by factor analysis, principal component analysis, and structural equation modeling brought out IT-Readiness and Management Policies as the most significant enabling factors and the Rural Development Department as the most IT-ready. A discrete-event simulation indicated about 70% saving in average time to award a contract in the Department compared to the prevailing manual process.

The thesis proposes both price and non-price attributes for the evaluation of technical bids. The non-price attributes are: Past performance, Unallocated physical resources, Quoted time to complete, and Quoted warranty period. A fuzzy multi-criteria decision-making approach was used to determine past performance score of contactors and a fuzzy binary goal programming method was proposed to select the contractor with high utility values. The methods were applied to the case of the Rural Development Department to illustrate its merits over the traditional method of contractor selection.

The thesis proposes rudimentary statistical analysis of winning price-to-reserve price ratios and bid price-to-reserve price ratios to divide the bids into two mutually exclusive clusters to detect collusion in government procurement auctions. The approach was validated by comparing the results with those obtained using the existing methods.

To reduce the effect of collusion, the thesis optimally selects the auction parameters values by applying the principles of design of experiments in a system dynamics framework. Medium work content, low allowable profit margin over project estimated cost, and low bid period yielded the minimum win price-to-reserve price ratio and thus reduced the effect of collusion in government procurement auctions.

Keywords: E-Procurement, IT-Readiness, Bid Evaluation, Collusion, Winning Price-to-Reserve Price Ratio, Government Procurement