OPTIMIZING TRADE IN TRANSPORTATION PROCUREMENT: IS COMBINATORIAL DOUBLE AUCTION APPROACH TRULY BETTER?

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Abstract. *This paper provides a critique on double auction (DA) and combinatorial auction (CA), respectively; and develops an alternative model of combinatorial double auction (CDA) for transportation procurement. Asset repositioning costs that have been a bane in the context of transportation procurement cannot be alleviated by a solution mechanism that purely caters to either the increase in the number of lane options by virtue of supporting multiple shippers (i.e. DA), or one that solely focuses on allowing a combination of lanes to be packaged for only a single shipper (i.e. CA). To achieve economies of scale as well as scope, this study proposes the combinatorial double auction model where multiple shippers and multiple carriers can specify and transact combination of lanes of their interest in packaged bids through a middle agent which can be termed as the electronic transportation marketplace. The superiority of CDA over CA is illustrated with the devise of a new test procedure, where we show that the former generates greater revenue as a result of minimizing free disposal costs. In addition, revenue for the CA model deteriorates as market clearing flexibility reduces, while the solutions of CDA remained relatively stable and were not affected by the treatment.*
Keywords: Combinatorial double auction, Transportation services, Transportation procurement, Online auction, Shipper collaboration

1. **Introduction.** To attract serious buyers or sellers, one often relies on an auction mechanism to support business transaction. In auction of transportation procurement services, we define participants as shippers (buyers) and carriers (sellers) that attend to an electronic transportation market (ETM). Based on this definition, we can note a few variations of auction designs, depending on the composition of shippers and carriers, and the nature of the submitted bids. A one-shipper to multi-carrier network can be considered to be a combinatorial auction (CA) if the carriers are allowed to submit a combination of lanes as a package. When shippers collaborate, this forms a multi-shipper to multi-carrier network that can further be classified as double auction (DA) for simple