Chapter IX
Multi-Attribute Auctions:
Research Challenges and Opportunities

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ABSTRACT

This chapter highlights the promise and importance of reverse multi-attribute auctions (RMAA). It outlines the major benefits of RMAAs over other traditional auction mechanisms, such as reverse single attribute auctions, and then presents a structured and critical assessment of the current state of RMAA research. The intention of this chapter is not only to review both experimental and theoretical studies that have been conducted on RMAAs, but also to provide a starting point and specific recommendations for future research directions on RMAAs.

BACKGROUND

In recent years online reverse auctions have grown in prominence and in use. Both the academic community and practitioners have taken an active interest in their research and development due to the numerous benefits they offer over traditional auction mechanisms. For instance, one of the most important benefits is that they are able to automate negotiations between buyers and sellers, resulting in time and money savings. The bid-taker and bidders need not converge in a single physical location to negotiate. Rather, this can be done remotely via the Internet at any time of day. However, despite these important benefits one major limitation of many contemporary online reverse auctions is that they only automate negotiation on a single attribute—price. Thus, they are inflexible since they do not to allow bidders and bid-takers to negotiate on other aspects of a deal. Yet in many cases especially in the business-to-business (B2B) arena, buyers often wish to negotiate with sellers

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on several aspects of a deal such as warranty, delivery time, payment terms, and so on.

Online reverse multi-attribute auctions (RMAA) are a potential solution to this problem. They allow bid-takers and bidders to negotiate on multiple aspects of a deal rather than just on price alone. A bid-taker determines the attributes of an item she wants bidders to submit bids on. For instance, to purchase a truck using a RMAA, after specifying minimum required features of the truck, the bid-taker invites bidders to submit bids on various attributes such as price, warranty, and lead time. To automate the submission and evaluation of bids, the bid-taker can employ an online RMAA. The RMAA has an interface conducive for bid submission on the pre-specified attributes and a set of algorithms based on Multi-attribute Utility Theory (MAUT) for bid evaluation. Each combination of price, warranty, and lead time submitted by bidders gives the bid-taker a certain level of utility, with higher levels of utility being preferred to lower ones. After several rounds of bidding, the contract to supply the truck is awarded to the bidder who is able to submit a combination of attribute values which generates the highest level of utility for the bid-taker.

CHAPTER OBJECTIVES

Although there has been recent research activity devoted to analyzing the design and use of RMAAs, the academic literature in this area is relatively scarce compared to that found in other branches of auction literature (Bichler, 2000; Branco, 1996, 1997; Che, 1993; Laffont & Tirole, 1991; Pinker, Seidmann, & Vakrat, 2003; Teich, Wallenius, Wallenius, & Koppius, 2004). Therefore, this chapter analyzes the current state of research on multi-attribute online auctions and develops a broad research agenda for issues such as the solicitation of bid-taker preferences, bidders’ perception of auction fairness, and the influence of information architecture on auction

![Figure 1. RMAA components](image-url)

**Auction platform/environment:** The platform may either be a manual one (e.g., sealed bid auction) or one that is electronic and automated. The current chapter focuses on electronic automated mechanisms.

**Bid-taker:** A bid-taker solicits, evaluates multi-attribute bids, and decides the auction rules, procedures, and feedback to be used during bidding.

**Bidders:** Bidders submit competitive multi-attribute bids. Unlike bids in single attribute auctions where bids are single values, bids in multi-attribute auctions are vectors.