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Effective response to RFQs and supplier development: A supplier's perspective

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ABSTRACT

Considering multiple attributes while evaluating request for quotes (RFQs) responses from suppliers is gaining significant importance in industrial procurement. While price has traditionally been the most important factor in evaluating RFQ responses, incorporation of non-price attributes such as quality and delivery performance is becoming essential and critical. Research on multi-attribute RFQs has received significant attention in an auction format with models addressing issues relating to auction mechanism design, winner determination, and auction dynamics, primarily from a buyer's perspective. There have been few approaches, if any, that have investigated the issue of response to multi-attribute RFQs from a *supplier's perspective*, which is the focus of this paper. Such an approach will assist a supplier in effectively responding to RFQs, thereby maximizing the likelihood of winning future contracts. It also indirectly assists in supplier development and helps foster competition among suppliers, which benefits both the buyers and the suppliers. We develop mathematical models that address this important issue and demonstrate their usefulness through an illustrative dataset.

1. Introduction

Evaluating multidimensional request for quotes (RFQs) is an important aspect of industrial procurement. Incorporating multiple dimensions into an RFQ is replacing the traditional price-based procurement. While price-driven procurement strategies may be appropriate for commodity-related transactions, procurement of complex products and systems requires consideration of attributes in addition to price. Some of the non-price attributes considered by industrial firms while selecting suppliers are delivery, quality, design and worldwide supply capability, and cost reduction performance. Vijayan (2000) discusses the importance of considering multiple attributes for procuring custom-engineered products. Companies such as Whirlpool, Arvin Meritor, Boeing, and Northern Telecom use both price and non-price attributes in their RFQs. Wise and Morrison (2000) observe that price-based selection hinders participation of high-quality, innovative suppliers in the procurement process. These studies suggest that *both* the buyers and the suppliers need decision support systems that consider a variety of product- and supply-related attributes for effectively engaging in RFQ-based procurement.

The problems of RFQ-based procurement have primarily been analyzed from a reverse auction perspective, in which a buyer selects one or more suppliers who meet certain price and non-price requirements (Teich et al., 2004, 2006). The related literature in this area has mainly focused on auction mechanism design, auction dynamics, and winner determination (in auctions) from a buyer's

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perspective. The supplier's problem of effectively responding to multi-attribute RFQ has not been adequately addressed in the extant literature. Addressing the supplier's perspective is important for both the buyers and the suppliers for the following reasons. First, suppliers can benefit immensely from an approach that identifies how to respond to multi-attribute RFQs so as to maximize the likelihood of winning future contracts. Second, it assists the buyer to foster competition among suppliers, which indirectly helps in supplier development. A buyer can provide *feedback* to suppliers by sharing the information on attribute values for past winning quotes, which can help the suppliers to discern the buyer's requirements and to develop the necessary capabilities to successfully respond to future RFQs. We posit that in an RFQ-based procurement context, such an indirect "indicative mechanism," i.e., sharing information on past winning quotes with the suppliers, entails little or no direct investments by the buyer compared to the traditional supplier development initiatives in a supply chain involving investments for cost reduction, quality improvement, lead-time reduction. Thus, by inducing the suppliers to participate in the RFQ-based procurement process, the buyer can pursue the goals of continuous supplier development without direct investments.

Hax and Majluf (1988) describe strategy as "a pattern of actions that emerge from the past decisions of the firm that purposefully manages change." Thus, historical pattern of winning quotes across multiple attributes can reflect the sourcing strategy of the buyer, which the supplier can and should attempt to *infer and use* to reconfigure future quotes. And, it is in the interest of the buyer to provide information on the winning quotes to the suppliers. It can be expected to foster competition among suppliers, potentially leading to higher levels of performance across the attributes of interest to the buyer, since the suppliers impelled by self-interest can be expected to actively engage in performance improvement efforts.

This discussion underpins the problem studied in this paper. We develop mathematical models that address a supplier's problem of effectively responding to multiple-attribute RFQ in industrial procurement contexts in durable goods industry. The main contributions of the suggested models are developing a composite measure of attributes that represents the delivered value per dollar to the buyer, identifying alternative levels for various attributes (price, quality, and delivery) that a supplier can quote to maximize the likelihood of winning future contracts, and effectively integrating *inexact and inferred* buyer's preferences into the decision process for both single- and multiple-winner cases.

It is observed that reverse auction models typically require the buyer to specify the exact preference function a *priori* to potential suppliers (Bichler, 2000). In industrial procurement, especially in durable goods industry, it is an arduous task for the buyer to specify the exact relative preferences for each attribute because procurement decisions often involve a group of procurement managers. Identifying a precise 'group preference function' is impracticable as the group membership often varies across procurement cycles. Due to these and other issues, it is often more practical for the buyer to specify acceptable threshold levels for various attributes and inexact preferences pattern that capture the relative importance among attributes and not the exact weights. This is the approach that we use in our model development. We next discuss the problem setting, proposed models, and the practical usefulness of the models.

2. Problem setting

We consider a multi-attribute procurement scenario in which a buyer such as Whirlpool or Arvin Meritor buys an industrial product (e.g., electric motors, automotive brake components, etc.) through a *single round*, *sealed bid*, *RFQ-based procurement* periodically, and sends the RFQs to an approved list of suppliers in each procurement cycle. The approved list of vendors is prepared on the basis of the suppliers' ability to fulfill demand and meet requirements relating to price, quality, and delivery performance attributes for the product. In addition to buying the product of interest, the buyer wants to minimize the supply risk and improve supplier capabilities. Pursuant to these objectives, the buyer intends to have multiple suppliers in the supply base who continuously improve cost, quality, and delivery performance. Toward this end, the buyer does share the attribute levels for past winning quotes, minimum threshold levels of non-price attributes, and the inexact preferences that represent relative importance of attributes. A number of potential suppliers respond to RFQs and submit quotes on the basis of buyer specified minimum threshold levels and information on winning quotes in previous periods. Each supplier submits only one quote in response to RFQs in each procurement cycle and no further negotiation after a submission is undertaken, thereby precluding the possibility of modifying the quotes in the same procurement cycle. This RFQ-based procurement process is common among firms in the durable goods industry (e.g., Whirlpool and Northern Telecom).

The buyer evaluates the quotes in each procurement cycle and awards the contract to one or more suppliers. An unselected supplier in a procurement cycle has the opportunity to submit a new quote and win in the next cycle. The above procurement practices of the buyer compel the suppliers to submit their most competitive quotes in the current procurement cycle as there is no opportunity for further modifying the submitted quote in a cycle; these necessitate the vendors to improve their operations before submitting their competitive quotes in a procurement cycle.

In this context an unselected supplier intending to be successful in the next procurement cycle must decide on the appropriate combination of price and non-price attributes to maximize the likelihood of winning. The unselected supplier must compare its unsuccessful quotes with the winning quotes over the past procurement cycles in order to infer the buyer's preference pattern and use it