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Reducing uncertainty in supplier selection decisions: Antecedents and outcomes of procedural rationality

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ABSTRACT

Supplier selection decisions are characterized by a high degree of uncertainty. We draw upon the behavioral operations management and decision-making literatures to examine factors that lead to the adoption of procedural rationality as a decision strategy. In addition, we emphasize the effect of procedural rationality on decision-makers' perceived uncertainty and subsequent supplier decision performance. Our structural equation model with cross-country survey data from 461 respondents in the United States and China reveals that (i) organizational, situational, and personal antecedents significantly influence the use of procedural rationality, (ii) procedural rationality is effective in reducing uncertainty in supplier selection decisions, and (iii) the reduction in decision uncertainty improves supplier decision performance. We also emphasize contextual idiosyncrasies between China and the United States.

1. Introduction

The operations management literature emphasizes that high perceived uncertainty is prevalent in industrial buying decisions in general (Puto et al., 1985; Gao et al., 2005) and in supplier selection decisions in particular (Talluri et al., 2006; Carter et al., 2007). Supplier selection uncertainty is defined as decision-makers' perceived difficulty in predicting the outcomes with respect to supplier performance (Wouters et al., 2009). The importance of uncertainty in operations management is highlighted by, for example, Gao et al. (2005, p. 397) who state that "given its negative effects on purchase behaviors, organizational buyers' decision-making uncertainty [. . .] needs to be reduced" and Koufteros et al. (2002, p. 348), who argue that "[f]irms that are facing high uncertainty or high equivocality in the environment and have low levels of [. . .] integrative practices should exhibit lower performance." In this study, we focus on decision-makers' perceived residual uncertainty in the moment of choice, which is defined as the uncertainty that remains after information search and processing has been completed (Ireland et al., 2002).

The literature emphasizes that one important avenue for reducing uncertainty relates to information processing (Lipshitz and Strauss, 1997; Wouters et al., 2009). For example, uncertainty can be reduced by the collection of additional information (Lipshitz and Strauss, 1997). However, the literature also underlines that decision-makers' cognitive constraints limit their ability to process available information (Simon, 1990; Kahneman, 2003a). Decision-makers that face uncertainty may, hence, respond by reducing their effort if the required information processing demand is perceived to be beyond their cognitive capacity (Koufteros et al., 2002). Consequently, the question of how decision-makers process information under uncertainty has received increasing interest in the behavioral operations management literature. However, few studies investigate the information processing and decision strategies that are used to reduce uncertainty in industrial buying decisions (e.g., Barclay and Bunn, 2006; Kaufmann et al., 2009) and even fewer studies empirically examine the usefulness of these strategies (e.g., Gao et al., 2005; Wouters et al., 2009).

Procedural rationality has been identified in prior literature as an important information processing and decision-making approach (Simon, 1990; Dean and Sharfman, 1996). Procedural rationality is "[p]roblem solving by recognition, by heuristic search, and by pattern recognition and extrapolation [...]. They are not optimizing techniques, but methods for arriving at satisfactory solutions with modest amounts of computation" (Simon, 1990, p. 11). Dean and Sharfman (1993a, p. 589) later redefine procedural rationality as "the extent to which the decision process involves the collection of information relevant to the decision, and the reliance upon analysis of this information in making the choice." While

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prior literature has examined the effect of procedural rationality on, for example, strategic decision effectiveness (e.g., Dean and Sharfman, 1996), this literature has, to our knowledge, not empirically examined the effect of procedural rationality on perceived residual uncertainty and whether perceived residual uncertainty affects supplier decision performance. Given the importance of uncertainty reduction in industrial buying decisions, we propose to fill this void and examine the relationship between procedural rationality and uncertainty, and whether uncertainty subsequently impacts supplier decision performance.

Due to the relevance of procedural rationality for decision-making in general and, as we suggest, decision uncertainty in particular, it is important to understand how different antecedents impact the use of procedurally rational decision approaches (Dean and Sharfman, 1993a). While prior studies have examined a selective set of drivers of procedural rationality, such as firm size (Elbanna and Child, 2007a), decision importance (Hickson et al., 1986), competitive threat, or stakeholder influence (Dean and Sharfman, 1993a), this research has only found support for a limited number of antecedents. Given the importance of understanding drivers of procedural rationality, we develop a more comprehensive model of factors that affect the use of procedurally rational decision approaches.

Additionally, operations management research has started to direct its attention towards China (e.g., Zhao et al., 2006b). China has come particularly into focus since a variety of firms and even economies have shifted parts of their manufacturing value chains towards China. Zhao et al. (2006b, p. 622) note in this respect that "China's transformation from a centrally planned economy to a market economy presents unique problems and opportunities in the management of manufacturing activities, and makes China an interesting research setting for academics, practitioners and investors." Tsui et al. (2004, p. 133), further comment that "China's dramatic growth [. . .] presents an exciting intellectual puzzle." The literature also frequently emphasizes the necessity for further generalizability across countries within operations research (e.g., Ahmad and Schroeder, 2003). Hence, comparative research involving the two largest world economies, USA and China, is important and frequently asked for in future research sections (e.g., Elbanna and Child, 2007b; Campbell et al., 2012).

2. Research model

Fig. 1 provides the conceptual model linking procedural rationality (PRA) with its antecedents and with residual uncertainty and supplier decision performance as outcome variables. In the following sections we develop the hypotheses of our conceptual model.

2.1. Organizational antecedents of procedural rationality

We focus on two organizational variables, accountability (ACC) and incentives (INC), following their importance in shaping industrial buying decisions (Cunningham and White, 1974) and decision-making behavior (Creyer et al., 1990).

Compared to the majority of consumer-buying decisions, organizational buying usually requires more thorough analysis and formal justification. This pressure to justify a decision is referred to as accountability (Doney and Armstrong, 1996). We follow Lerner and Tetlock (1999, p. 255) and define accountability as "the implicit and explicit expectation that one may be called on to justify one's beliefs, feelings, and actions." Studies of accountability in an organizational context suggest that individuals are highly vigilant and thorough information processors when they need to justify their decisions to others (e.g., Wouters et al., 2009). They also intensify their data information acquisition (e.g., Siegel-Jacobs and Yates, 1996) and overall search effort (e.g., Doney and Armstrong, 1996). Moreover, decision-makers, who feel accountable for decision outcomes use more analytical and complex decision strategies (Selart, 1996; Kaufmann et al., 2009), such as procedural rationality, when such strategies are perceived to yield better decision outcomes (Beach and Mitchell, 1978). In addition to yielding better outcomes, the use of more rational processes often symbolizes capable decision-making (Langley, 1989), which facilitates an easier justification of decisions. Thus, we hypothesize:

H1a. Accountability is positively related to procedural rationality.

We base our definition of incentives on Tosi et al. (1997, p. 588), who argue that "[a]lignment of an agent's and a principal's interests can be achieved through contracts that make the agent's compensation contingent on outcomes of his or her performance that are desired by the principal." We specifically define incentives in the purchasing context as the decision-makers' rewards in return for performing well in the supplier selection decision. The literature argues that incentives increase (i) the amount of attention and effort that people invest in their decisions (Stone and Ziebart, 1995; Camerer and Hogarth, 1999) and (ii) the use of more cognitively demanding decision strategies (Stone and Ziebart, 1995). However, empirical research that examines the role of incentives on the use of analytical and complex decision strategies is less developed. Payne et al. (1992) propose that incentives can change entire decision strategies and philosophies. Larrick (2004) later suggests that increased incentives and stakes lead not only to increased effort and reflection, but also to the use of more analytical methods in the decision process. Since procedural rationality is an analytical decision strategy, we hypothesize:

H1b. Incentives are positively related to procedural rationality.

2.2. Situational antecedents of procedural rationality

In addition to organizational antecedents, decisions are also influenced by situational variables (Tabatabaei, 2002; Barclay and Bunn, 2006). Research identifies product dynamism as an important situational variable to consider when studying industrial buying behavior (Kaufmann and Carter, 2006). In addition to product dynamism, Tabatabaei (2002) emphasizes the important anteceding role of time pressure on the selection of decision strategies. Due to their relevance as determinants of decision-making behavior in industrial buying, we therefore examine product dynamism and time pressure as situational antecedents of procedural rationality.

Product dynamism is characterized by the change in purchase item specifications or the underlying technology (Weiss and Heide, 1993; Kaufmann and Carter, 2006). This dynamism alters the purchase situation and process (Dholakia et al., 1993). More specifically, rapid technological change creates an information-processing problem (Ensley et al., 2006) that increases the perceived information processing load of the decision-maker (Tushman, 1979). Weiss and Heide (1993) show that decision-makers respond to such increased information processing load by intensifying their effort in information search and analysis. Similarly, Bourgeois and Eisenhardt (1988) find that decision-makers react to change by using more thorough and analytical decision processes. Dean and Sharfman (1993a, p. 590) summarize this by highlighting that as "a mistake in a threatening environment could be disastrous for the firm, we would expect to find highly rational decision procedures used in such environments." Emphasizing that procedural rationality is a thorough, rationally oriented, analytical decision approach, we hypothesize:

H2a. Product dynamism is positively related to procedural rationality.