Article Title Page

The Impact of Individual Debiasing Efforts on Financial Decision Effectiveness in the Supplier Selection Process

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Structured Abstract: Purpose – The nascent behavioral supply management (BSM) research stream has raised attention to the deviations from the standard assumptions of the rational paradigm in economics. The adaptation of cognitive *heuristics*, which add vulnerability to judgment and decision-making, creates a pressing need to identify and develop mitigation strategies to debias decision-making in the supply chain management environment. This study investigates debiasing measures, corresponding contextual variables in the supplier selection process, and their implications for financial decision effectiveness.
Design/methodology/approach – The study uses a large-scale empirical survey among 306 buyers to investigate the relationships among individual and organizational contextual factors, debiasing measures in the supplier selection decision, and the financial effectiveness of the supplier selection decision.
Findings – Organizational and individual contextual factors have differing effects on the use of debiasing approaches in the supplier selection decision. Further, the debiasing tactics can have a positive (in the case of supplier selection task decomposing) or a negative (in the case of an interactional challenging of the supplier selection) impact on the financial effectiveness of the supplier selection decision. These findings suggest that supply managers must better understand the contextual factors that influence the supplier selection decision, and carefully choose the correct debiasing tactics when selecting suppliers.
Originality/value – This paper relaxes the economic assumption of rational actors and addresses the need to identify and use debiasing tactics in supply chain management contexts. The research also complements the broader-based behavioral decision-making literature, which has often relied upon experimental methodologies that use undergraduate or MBA students, by employing a survey-based approach with supply managers as key informants.

Keywords: Behavioral supply management, Decision-making, Debiasing strategies, Supplier selection, Decision effectiveness, Structural equation modelling

Article Classification: Research paper

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1. Introduction

Supplier selection is a key task which can allow the supply management function to act as a strategic contributor to the firm (Krause et al., 2001). Supplier selection decisions frequently represent important, complex and difficult decision-making problems (Huang and Keskar, 2007; Weber et al., 1991). They are complicated by the fact that varying criteria, relationship factors, and supplier performance have to be taken into account (Sarkis and Talluri, 2002). In uncertain situations like these, decision-makers are vulnerable to a variety of systematic decision *biases* (Carter et al., 2007; Das and Teng, 1999; Hodgkinson et al., 2002; Kaufmann et al., 2009). Examples of the unwarranted effects of such biases are the disregard of alternatives, acceptance of a "satisficing" (Simon, 1957, p. 204) instead of an optimal solution, and an overly-optimistic or overly-pessimistic evaluation of event probabilities.

Given that judgment and decision-making in supply management decision contexts is vulnerable to decision biases (Carter et al., 2007; Sprague and Callarman, 2010), this means there are almost inevitable deviations from the standard assumptions of the rational paradigm in economics and it elicits the need to identify and deploy *debiasing* strategies in supply chain management contexts (Kaufmann et al., 2009). While a number of scholars emphasize the need for further conceptual and empirical behavioral research (Thaler, 2000) and other scholars even ask for the development of specific decision aiding techniques that help to debias decision-making through the elimination or at least mitigation of judgment and decision biases (Arkes, 1991; Hodgkinson et al.,

2002; Kaufmann et al., 2009; Larrick, 2004), insights from behavioral research have not been widely incorporated into supply chain management research.

The behavior of decision-makers cannot be considered without also taking into account the factors that influence the behavior (Doney and Armstrong, 1996; Simon, 1945; Webster and Wind, 1972). Contextual factors at the organizational level and on the individual level can be expected to influence debiasing efforts (Tetlock, 1985). For example, it is important to investigate how factors such as accountability or incentives influence the cognitive effort of the decision-maker (Tetlock and Kim, 1987) as insufficient effort may represent a serious problem in the organizational decision-making context (Larrick, 2004). Finally, from a methodological point of view, experimental cognitive research has naturally taken a rather narrow focus in the past. While the use of laboratory experiments, and especially laboratory experiments which employ student samples, can maximize internal validity, our use of a survey methodology compliments existing studies by allowing for a much greater level of external validity (Clarkson et al., 2002; Siemsen, 2011; Stevens, 2011).

The goal of this study is to build on and extend the recent qualitative investigation of behavioral supply management by Kaufmann, Michel and Carter (2009) and to quantitatively investigate debiasing measures and corresponding contextual variables in the supplier selection process. Specifically, the research objectives of this paper are to:

(1) identify and operationalize debiasing measures for the supplier selection decision,

(2) understand how individual and organizational contextual factors influence the use of these debiasing efforts, and

(3) examine how debiasing efforts impact the effectiveness of the supplier selection decision.

The remainder of this paper is organized as follows. In the next section, we provide an overview of relevant literature, resulting in the conceptualization of the contextual drivers, debiasing measures and the decision effectiveness. Subsequently, the posited relationships between the influencing factors, debiasing measures and the financial decision effectiveness are established. We then describe the research methodology and the analysis of our data, followed by a discussion of the results. Implications, avenues for future research and managerial implications are considered at the end of the paper.

2. Literature review and construct conceptualization

Systematic decision biases, such as the disregard of alternatives or the acceptance of a "satisficing" rather than an optimal solution caused by cognitive heuristics (Kahneman and Tversky and Kahneman, 1979) can lead to unwarranted outcomes in the supplier selection context. While cognitive heuristics represent cognitive procedures to limit the amount of processed information or the complexity of combining information (Amir and Ariely, 2007), a systematic literature review revealed that most studies on supplier selection decisions focus primarily on investigating selection criteria or mathematical optimization approaches (e.g., Choi and Hartley, 1996; DeBoer, Labro and Morlacchi, 2001). A detailed overview can be found in Huang and Keskar (2007). Studies have also examined the consequences of the supplier selection process, and have shown that the supplier selection decision can significantly impact supplier performance (Sharland et al., 2003) and the buying organization's financial performance (Kannan and Tan, 2002). More recently, researchers have examined additional strategic selection

criteria such as knowledge transfer (Azadegan et al., 2008) and have begun to consider supply chain management and more specifically the supplier selection decision within a broader network paradigm (Choi and Kim, 2008; Galaskiewicz, 2011). However, despite the fact that the supplier selection process involves human decision-making, most supplier selection studies do not explicitly consider behavioral aspects such as decision biases or debiasing strategies. This gap led Kaufmann, Michel and Carter (2009) to recently call for a stronger integration of behavioral aspects into the supply chain management field.

In the general behavioral decision-making literature there are a wide range of conceptual and experimental studies which examine decision biases. The same is true for specific mitigation strategies. Furthermore, these experimental studies frequently rely on samples of undergraduate or MBA students, an approach which is not without limitations (Hodgkinson et al., 2002). Loch and Yaozhong (2007) explicitly call for empirical research in new behavioral disciplines and warn not to restrict these investigations to experiments, in order to enable the broad development of this stream of research.

Three broad debiasing strategies can be identified in the extant literature: 1) *decomposing* (Fischhoff, 1982; Kardes et al., 2006; Kaufmann et al., 2009; Spetzler and Stael von Holstein, 1975) – a debiasing approach which focuses on the decision structure (Kaufmann et al., 2010), 2) *perspective shifting* (Faro and Rottenstreich, 2006; Galinsky and Ku, 2004) – a strategy focusing on debiasing by taking a different perspective, e.g., the supplier's perspective, and 3) *challenging* (Arkes, 1991; Hirt and Markman, 1995; Kray and Galinsky, 2003; Larrick, 2004) which focuses on decision dissent.

These streams represent strategies to relax buyers' constraints concerning a) the set-up of the task, b) an external perspective shift, or c) the involvement of others from their own company. Based on this general approach the following three debiasing constructs, described next, were conceptualized and operationalized concerning the supplier selection context: 1) *Supplier Selection Task Decomposing*, 2) *Taking the Supplier's Process Perspective*, and 3) *Interactional Challenging of Supplier Selection*.

Supplier selection task decomposing is directly linked to the decomposing research stream within the debiasing literature (Arkes, 1991; Büyükkurt and Büyükkurt, 1991; Coupey, 1994; Fischhoff, 1982; Kardes et al., 2006; Kaufmann et al., 2009; Spetzler and Stael von Holstein, 1975). This construct is defined as active structuring and segregating of the selection task, thereby adequately aligning the supplier selection task with the buyer's cognitive capabilities (Coupey, 1994; Kaufmann et al., 2010; Kaufmann et al., 2009; Selart, 1996). For this reason the definition of decomposing in the context of supplier selection is to consecutively identify, specify, and weight decision criteria before selecting suppliers; it provides potential for more appropriate overall ratings and selections (Kardes et al., 2006). Extant experimental research indicates that restructuring and decomposing significantly influence the selection and deployment of heuristics (Coupey, 1994). Furthermore, Spetzler and Stael von Holstein (1975, p. 374) state that "biases resulting from representativeness can often be reduced or eliminated by further structuring the problem." Increasingly, supplier selection decisions are dynamic and unstructured with decision variables that are often difficult to quantify (De Boer et al., 1998) and multiple criteria have to be considered during the supplier selection process (Weber et al., 1991).

The second debiasing construct – *taking the supplier's process perspective* – is based on the *perspective shifting* research stream within the debiasing and negotiations literature (Bazerman and Neale, 1982; Clarkson et al., 2002; Faro and Rottenstreich, 2006; Galinsky and Ku, 2004). Here, we integrate the negotiation literature to focus not on the substance but on the process – what is referred to as procedural rationality, which is defined by Dean and Sharfman (1993, p. 589) 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." Specifically, taking the supplier's process perspective involves activities to view the entire decision situation and the supplier selection decision process through the eyes of potential suppliers. Through a perspective shift towards suppliers during the decision-making process, the gridlocked thought patterns of the buyer can be broken, which can help to reduce the vulnerability to decision biases (Clarkson et al., 2002; Faro and Rottenstreich, 2006). As a consequence, buyers are expected to make more reasonable estimations and eventually better judgments and decisions.

The *taking the supplier's process perspective* construct includes developing an increased awareness of how the supplier might try to influence the buyer's decision and an understanding of the supplier's sales approach, and viewing the process from outside of the buyer's perspective. All of these items involve assessing the ability of the buyer to better understand the process in order to reduce cognitive biases (e.g., increase procedural rationality). Thus *taking the supplier's process perspective* is very distinct from taking the *position* of the supplier. In this paper, the construct *taking the supplier's process*

perspective is conceptualized to measure whether buyers attempt a perspective shift in the course of their supplier selection.

The third debiasing construct – *interactional challenging of supplier selection* – is based on the *drawing attention to alternative outcomes* research stream within the debiasing literature (Arkes, 1991; Fischhoff, 1982; Hirt et al., 2004; Kaufmann et al., 2009; Kennedy, 1995; Koehler, 1991; Koonce, 1992; Kray and Galinsky, 2003; Larrick, 2004; Lord et al., 1984; Mussweiler et al., 2000; Slovic and Fischhoff, 1977). This debiasing construct subsumes efforts to bring further competing supplier selection scenarios into consideration and to review the primary identified outcome by interacting with colleagues. The deployed mechanism of this approach is to engage with other members from the buying organization in order to draw attention to scenarios or possibilities that would not have been considered otherwise, as decision-makers often tend to generate mainly supportive hypotheses and explanations (Larrick, 2004). In contrast to the intrapersonal debiasing strategy of taking the supplier's process perspective, this strategy is interpersonal in nature. When colleagues voice concerns or dissent, and bring notice to alternative explanations and alternative outcomes of the supplier selection decision (Kray and Galinsky, 2003; Mussweiler et al., 2000), the cognitive inertia (Hirt et al., 2004) of a buyer can be broken and thus the vulnerability to judgment and decision biases can be reduced.

Buyers' decision-making behavior is not independent from organizational factors (Doney and Armstrong, 1996; Simon, 1945; Webster and Wind, 1972) or buyer characteristics (Sheth, 1973). In the context of debiasing research, organizational contextual factors such as accountability (Doney and Armstrong, 1996) and incentives

(Creyer et al., 1990) are particularly salient (Tetlock, 1985). They play a central role concerning the influence on decision-makers' cognitive efforts (Tetlock and Kim, 1987). For example, insufficiently incentivized individuals may be satisfied with a superficial search for and/or rating of suppliers (Larrick, 2004). Concerning buyer characteristics, the knowledge level of the decision-maker can be quite important (Simon, 1945). For example, Simon (1990, p. 7) states that "*the expert can reach solutions that are unattainable by the novice, using computations and knowledge that are simply not available to the latter*." Thus, the following three constructs were conceptualized as influencing contextual factors: 1) *Supplier Selection Accountability*, 2) *Supplier Selection Incentives* and 3) *Knowledge of Item*. In other words, debiasing supplier selections is assumed to be influenced by what the supply manager should do, wants to do, and can do.

The construct *supplier selection accountability* is conceptualized through a focus on the motivational factors and cognitive effort in the context of a supplier selection decision. Accountability influences what and how people think (Tetlock, 1985). From a theory perspective it therefore takes an important position within the contingency approach as accountability represents an important contextual variable influencing an individual's behavior. Kennedy (1993) states that "accountability, whether self-imposed or imposed by superior or by organizational structure, powerfully influences the information attended to, the complexity and type of information processing, and ultimately the decision or judgment made."

The study by Puto (1987) found that supply managers who have to justify the selected supplier have an increased receptivity for additional information. This might

influence the final reference point of their decision. Furthermore, the study by Doney and Armstrong (1996) concludes that buyers who are held accountable for their decision process will conduct a more extensive information analysis. They state that, "there is evidence to suggest that under certain conditions, decision accountability results in more cognitively complex judgment and decision strategies," (p. 60).

The conceptualization of the construct *supplier selection incentives* as an influencing decision factor is in line with Creyer, Bettman and Payne (1990) who state that the future investigation of, "incentives […] can make a major contribution to our understanding of effort/accuracy approaches to decision-making." From a theory perspective, incentives take a central position in the extant research. For example, Barnard (1938) emphasized the need for incentives for the functioning of a formal organization. Later in this research stream, March and Simon (1958) introduced their adaptive-motivated behavior model of intra-organizational decisions which explains reward expectancy in the context of search behavior and aspiration level. In the existing research many studies have shown that higher incentives improve decision performance (Camerer and Hogarth, 1999). In particular, certain judgment tasks are expected to be responsive to incentives (Camerer and Hogarth, 1999). Incentives are expected to increase the effort of supply managers in the decision-making process. Furthermore, incentives increase the extent of attention dedicated to a task (Stone and Ziebart, 1995).

The conceptualization of the construct *knowledge of item* focuses on the advanced approaches that experts apply in a decision-making situation compared to those applied by inexperienced decision-makers. From a theory perspective, this construct is tightly linked to Simon's concept of bounded rationality (Simon, 1945), which is strongly

associated with the in-/completeness of knowledge. The level of a decision-maker's relevant knowledge influences the processing of new and topic-related information (Johnson and Russo, 1984). Extant research has shown that knowledge helps decision-makers to encode and later to remember new information (Johnson and Russo, 1984). The decision-making capacity depends highly on the relevant product knowledge (Alba and Hutchinson, 1987). In addition, inexperienced decision-makers may use their capacity incorrectly. One example could be that they spend too much time on the evaluation of attributes in their attempt to develop decision criteria (Bettman and Park, 1980).

One main objective of the development of decision aids can be seen in the improvement of decision effectiveness (Dean and Sharfman, 1996; Stabell, 1983). For this reason, a *financial decision effectiveness* construct was established to investigate the impact of the specific debiasing measures on the decision outcome. In accordance with Dean and Sharfman (1996, p. 372), decision effectiveness is conceptualized as the "extent to which a decision achieves the objectives established by management". The resulting performance of the supplier has to be set in relation to the defined requirements of the specific supplier selection decision, as the effectiveness perceived by an external constituency might differ from the decision-maker's perception (Dean and Sharfman, 1996; Friedlander and Pickle, 1968). Financial decision effectiveness has a strong focus on cost as it is often seen as the most important supplier assessment criterion (Dickson, 1966). We further conceptualize financial decision effectiveness to include the financially quantifiable effects of a supplier decision as perceived by the buyer. While companies usually include cost components beyond the price of a purchased item or

service, they do not regularly calculate the true Total Cost of Ownership (TCO). Therefore, our construct financial decision effectiveness is just *one* effectiveness measure. Non-financial decision effectiveness would surely be a necessary complement which would have to reflect item characteristics and supplier capabilities which affect the buyers' competitive advantage beyond cost (Kaufmann and Carter, 2006).

3. The research model and hypothesis development

Figure 1 displays the contextual variables, the debiasing measures, and the financial decision effectiveness construct. The relationships displayed in this figure suggest that the contextual variables described in the prior section (supplier selection accountability, supplier selection incentives, and knowledge of item) affect the ability of supply managers to utilize debiasing measures associated with supplier selection (supplier selection task decomposing, taking the supplier's perspective, and interactional challenging of supplier selection), which then ultimately impact financial decision effectiveness. Ours is a first step in refining and applying behavioral decision theory to the supplier selection decision. In the remainder of this section we develop and present the hypotheses shown in Figure 1.

Insert Figure 1 about here

3.1. Supplier selection accountability

According to Simon (1945), the organization can influence the behavior of an individual who is part of the organization by deploying accountability and authority and thereby actively supporting the transmission of decisions within organizations. The inclusion of accountability into the decision process automatically increases a decision-

maker's effort-level (Lerner and Tetlock, 1999; Libby et al., 2004; Tetlock, 1985), including the information collected and included in decision-making and the extent of information processing (Kennedy, 1993). Accountability invokes a more effortful and complete decision-making process (Libby et al., 2004). Specifically, accountability is expected to have a strong influence on restructuring activities (Selart, 1996; Simonson, 1989). Extant studies have shown that accountable decision-makers are more thorough and vigilant in processing information. In the supply management related study by Doney and Armstrong (1996), it is reported that buyers accountable for their decision-process conduct a more extensive analysis of information.

By checking for flaws within their own argumentation, decision-makers will automatically shift their own perspective and will take the perspective of other stakeholders in anticipation of their argumentation and evaluations (Simonson, 1989). Additionally, prior behavioral decision theory research has shown that accountability leads to perspective-taking (Tetlock et al., 1989). Anticipating techniques which the potential suppliers may use to influence the buyer's decision-making process not only creates a general awareness in the buying organization, but may lead to changes in the decision-making process initiated by the buyer. It can also be assumed that accountable decision-makers, showing high decision effort, will not only anticipate the argumentation of other stakeholders but will also actively approach them to get more information.

According to Larrick (2004), accountability leads to higher decision-making effort (e.g., time spent on the task and the manner in which information is processed). Moreover, Larrick states that accountable decision-makers "in preparation for justifying their decisions to others […] anticipate the flaws in their own arguments, thereby improving

their decision process and outcomes," (p. 322). Thus, the decision-maker will interact more in preparation of the final decision to identify and avoid potential flaws.

Summarizing the theoretical and empirical considerations, the following relationships between supplier selection accountability and the three respective debiasing efforts are expected:

H1a: Supplier selection accountability is positively related to supplier selection task decomposing.

H1b: Supplier selection accountability is positively related to taking the supplier's process perspective.

H1c: Supplier selection accountability is positively related to interactional challenging of supplier selection.

3.2. Supplier selection incentives

Incentives are not able to fully prevent departures from rationality but they do tend to reduce laziness and carelessness (Jolls and Sunstein, 2006). Specifically, incentives increase the decision effort of decision-makers (Larrick, 2004) and can increase the extent of attention that decision-makers dedicate to a decision (Stone and Ziebart, 1995). As a result, more cognitive effort is invested, e.g., shifting perspective more consciously and more intensely to detect swaying moves and other decision-making process influencing activities by suppliers in advance. Highly incentivized decision-makers are also expected to strive for more than just superficial solutions: In a high incentive environment more sophisticated decision strategies like supplier task decomposing are applied (Creyer et al., 1990). According to Kennedy (1995), incentives have a positive influence on judgment quality. In particular, judgment and evaluation tasks are expected to be responsive to incentives (Camerer and Hogarth, 1999). Thus, during the supplier selection process, the quality of judgments in the course of evaluating potential suppliers is expected to be improved via incentives.

In conclusion, we posit the following relationships between incentives as antecedents and the three respective debiasing efforts:

H2a: Supplier selection incentives are positively related to supplier selection task decomposing.

H2b: Supplier selection incentives are positively related to taking the supplier's process perspective.

H2c: Supplier selection incentives are positively related to interactional challenging of supplier selection.

3.3. Knowledge of item

The decision-maker's knowledge takes a central position within behavioral research and is closely linked to Simon's concept of bounded rationality (1945). Simon describes the incompleteness of knowledge as a key driver of bounded rationality. As a consequence, the knowledge-restricted decision-maker will develop simplifying decision procedures. Thus, Simon (1990) concludes that an inexperienced decision-maker with little relevant knowledge deploys different computations and is not able to attain solutions achievable by an expert. Knowledgeable decision-makers can benefit from a greater decision-making capacity (Alba and Hutchinson, 1987). By taking the perspective of other involved stakeholders, they are able to better analyze new information as well as the decision situation as a whole (Johnson and Russo, 1984). Buyers can then account better and earlier for sales approaches of suppliers which have the potential to put the buying organization at a disadvantage.

Comprehensive decision knowledge can help to make a decision task more familiar and less complex (Kennedy, 1995). Research from behavioral decision theory suggests that knowledgeable decision-makers can better identify attributes that are relevant for evaluating different options of a choice set (Alba and Hutchinson, 1987). By contrast, a decision-maker with little product knowledge may face difficulties in

deploying an adequate decision strategy like supplier task decomposing (Heitmann et al., 2007).

Moreover, behavioral research suggests that organizational decision-makers with in-depth knowledge are more likely to adopt their internal suppliers' perspectives. (Sharon and Axtell, 2001). This supposition is in line with research suggesting that individuals who possess a more differentiated and integrated knowledge are better able to take others' perspectives (Devine, 1989).

In addition, decision-makers who are perceived as experts will be less frequently challenged by others during the decision-making process. Complying with an expert is frequently perceived as leading to better decisions (Kohli, 1989). Furthermore, self-perceived experts tend to engage only selectively in interpersonal information gathering processes (Alba and Hutchinson, 1987). In the context of a supplier selection decision, a knowledgeable decision-maker might fall prey to over-confidence based on prior experience. As a consequence, the expert does not promote the exchange with others himself during the decision process and thereby ignores potentially valid alternatives.

Summarizing these theoretical and empirical considerations, we put forth the following relationships between knowledge of item and the three respective debiasing efforts:

H3a: Knowledge of item is positively related to supplier selection task decomposing.

H3b: Knowledge of item is positively related to taking the supplier's process perspective.

H3c: Knowledge of item is negatively related to interactional challenging of supplier selection.

3.4. Financial decision effectiveness

Finally, we consider the relationship between the debiasing measures and the financial effectiveness of the decision-making process – what we refer to as financial decision effectiveness. Dean and Sharfman (1996) found in their empirical results that the application of analytical techniques will lead to more effective decisions compared to decisions made without such techniques. Transferred to the supplier selection process, the structuring of supplier information and decomposing of the task might increase decision effectiveness.

The rationality of a decision process is reflected by the decision-maker's intention and effort to achieve the best decision possible under the existing conditions (Das and Teng, 1999; Simon, 1978). Thus, high cognitive effort represented by a high perspective shifting intensity is associated with higher decision effectiveness and better decision outcomes (Dean and Sharfman, 1996). If suppliers' sales approaches are preemptively countered through a more rational design of the decision-making process, this may have a positive financial effect for the buying organization. Kray and Galinsky's (2003) experimental study shows that counterfactual thoughts, e.g., induced by challenging, increase the search for disconfirmatory information and in the end increase decision accuracy. Furthermore, Hirt, Kardes and Markman (2004) find that bringing new alternatives into play (e.g., in the form of challenging) can break the inertia resulting in a more thorough selection process and a higher quality judgment process.

In conclusion, the following relationships are expected between the three debiasing measures and decision effectiveness:

H4a: Supplier selection task decomposing is positively related to financial decision effectiveness.

H4b: Taking the supplier's process perspective is positively related to financial decision effectiveness.

H4c: Interactional challenging of supplier selection is positively related to financial decision effectiveness.

In summary, we posit that the effects of each contextual variable on the debiasing measures are all positive with the exception of knowledge of item on interactional challenging of supplier selection, as shown in Figure 1. Furthermore, all effects of the debiasing measures on the outcome variable financial decision effectiveness are expected to be positive.

4. Research methodology

Due to length limitations of manuscripts published in the *Journal*, we present an abbreviated description of the study's methodology in this section of the paper. A full description of the methodology was included in the originally submitted manuscript, was provided to and reviewed by the reviewers and editors during the course of the *Journal*'s double-blind review process, and is available from the paper's first author upon request.

A large-scale empirical survey approach was utilized in this study. The questionnaire was developed in accordance with established guidelines, and was pretested to assess the clarity of question wording and face and content validity. An initial sample of 2,100 prospective respondents was randomly selected from the membership of the German Association of Materials Management, Purchasing and Logistics which is the equivalent of the U.S. Institute for Supply Management (ISM). In total, 337 buyers and purchasing managers participated in the online survey until it was closed. This led to an effective response rate of 17.4 percent (337 responses/(2100 potential responses minus 175 bouncebacks)). This response rate is on par or higher than response rates found in recently published articles in the *International Journal of Physical Distribution and Logistics Management* and other top supply chain management

journals (e.g., (Nyaga et al., 2010; Paulraj, 2011). The corresponding respondents' demographics are shown in Table I.

Insert Table I about here

A confirmatory factor analysis (CFA) was used to assess the study's measurement model and construct validity. The results of the CFA, which are displayed in Tables II and III, indicate an excellent fit between the data and the theoretical measurement model.

Insert Tables II and III about here

The study's hypotheses were tested via a structural question model. This also yielded a highly satisfactory model fit (Figure 2). All of the hypotheses are supported with the exception of H2a, H4b and H4c. No significant relationships were found for H2a and H4b; a significant, but negative relationship was found for H4c. Table IV shows an overview of these results. We discuss the results from the testing of these hypotheses in detail in the next section. The discussion is organized along the debiasing measures in this study.

Insert Figure 2 about here

Insert Table IV about here

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5. Discussion

5.1. Supplier selection task decomposing

The empirical analysis supported three of the four hypotheses – H1a ($p<0.001$), H3a ($p<0.001$) and H4a ($p<0.001$) – with no support for H2a. These results confirm the expected high impact of accountability in the supplier selection decision-making context. The induced pressure of accountability to be correct leads to manifold changes in the decision-maker's behavior, such as an increased restructuring of the decision-making process itself. Although the experimental results by Creyer, Bettman and Payne (1990) predict a strong positive relationship between incentives and supplier selection task decomposing, the resulting insignificance of H2a might be explained by looking at the behavioral mechanism of incentives. In contrast to the rather process-oriented pressure that is induced by accountability, incentives, as operationalized here, are related to achieving a good result (i.e., selecting the right supplier), not necessarily a good process. Accordingly, decision-makers might rely on other techniques to identify the best option in the choice set. Another explanation might be that the pressure induced by incentives is not high enough compared to the effort induced by accountability to make changes in the decision-maker's behavior.

The positive incentive to come to the right decision seems to be perceived as looming smaller than the perceived negative consequences induced by accountability (Puto, 1987). The anticipated negative consequences might be perceived as potential loss, while incentives might be perceived as a gain. In line with prospect theory considerations, the potential loss connected to accountability might influence the behavior of the decision-maker more than the potential gain connected to incentives (Kahneman and Tversky, 1979).

Furthermore, the results for H3a confirm the important position of knowledge in the context of decision-making behavior in a supply management context, as suggested by Simon (1945; 1990). In addition, the results are in line with the experimental findings of Johnson and Russo (1984), which suggest that knowledgeable decision-makers are better able to structure and analyze information and thus, better decompose the selection task. Looking at the relationship to financial decision effectiveness, the empirical results confirm that the application of an analytical process in supplier selection decisions where various criteria have to be considered (Weber et al., 1991) positively impact financial decision effectiveness. For example, through structuring supplier information, the different potential suppliers become more comparable to the decision-maker and the vulnerability to a potential decision bias, e.g., caused by differently framed price information, is reduced.

5.2. Taking the supplier's process perspective

The empirical analysis supports three of the four hypotheses: H1b ($p<0.001$), H2b ($p<0.01$), and H3b ($p<0.001$) – with no support for H4b. These results again confirm the expected impact of accountability in the investigated decision-making context which is in line with the general findings by Doney and Armstrong (1996), who showed that decision accountability drives the application of more complex cognitive judgments and decision strategies. Even more, it can be reasoned that accountability leads to improved self-insight of the supply manager. This confirms Johnson and Kaplan's (1991) experimental results. They found evidence that accountable individuals are more aware of their own decision-process, which leads to higher anticipation and preparation activities. Furthermore, incentives increase the attention dedicated to a sourcing decision, as

expected (Stone and Ziebart, 1995). This increased attention becomes apparent with the high statistical significance of H2b. However, prospect theory might provide an explanation as to why the effect of accountability on perspective-taking is stronger than the influence of incentives (Kahneman and Tversky, 1979). Specifically, the anticipated loss connected to accountability might influence the behavior of the decision-maker more strongly than the anticipated gain connected to incentives.

The supply manager invests a higher cognitive effort by taking a perspective shift. Furthermore, the result for H3b confirms the important position of knowledge in the context of sourcing decision-making behavior. A positive impact becomes evident by looking at the specific effects of knowledge: it directly impacts the bounds of rationality (Simon, 1945) and the increased knowledge helps supply managers to shift their perspective due to their increased ability to anticipate (Alba and Hutchinson, 1987).
Looking at the relationship between taking the supplier's process perspective and financial decision effectiveness, the empirical results do not support the extant findings in the literature. Based on an intensive perspective shift towards the potential supplier(s), more information is considered, which is expected to lead to a more accurate and realistic perception of the decision situation (Bourgeois III, 1985), which in the end leads to higher decision effectiveness.

One explanation for the insignificance of H4b may be that 'Taking the Supplier's Process Perspective', which focuses on the buyer putting her/himself in the shoes of the supplier to understand the supplier's efforts during the sales and negotiation/selection process, affects important decision effectiveness aspects other than cost and price stability following the initiation of the transaction. It might instead be that this process-

related construct affects non-financial aspects, such as the buyer-supplier-relationship quality or the efficiency of the buying process. Also, our notion of financial decision effectiveness is rather holistic, including cost effects which potentially go beyond item price, and it does so relative to objectives established by management at the beginning of the transaction (Dean and Sharfman, 1993; Dean and Sharfman, 1996). More simple financial performance measures, like pure one-time price reductions, that relate more directly to the pre-contractual interaction phase with the supplier, may therefore not be captured in our case.

5.3. Interactional challenging of supplier selection

The results shown in Figure 2 support three out of the four hypotheses related to interactional challenging of supplier selection: H1c ($p<0.001$), H2c ($p<0.05$), and H3c ($p<0.05$). A significant relationship was found for H4C ($p<0.01$) but in the opposite direction as was posited. Again, the results for H1c confirm the high impact of accountability in the supplier selection context. The induced effort and pressure by accountability to make good decisions leads the supply manager to interact with colleagues. Furthermore, the result for H2c is in line with the deeply rooted position that incentives take in the 'behavioral theory of the firm' research stream. The increased effort induced by incentives becomes visible through more intense interactions with colleagues with the intention to exchange information about potential supplier alternatives. Similar to our discussion of supplier evaluation task decomposing and taking the supplier's process perspective, prospect theory might provide an explanation as to why the effect of accountability on interactional challenging of supplier selection is stronger than the influence of incentives (Kahneman and Tversky, 1979).

The results for H3c indicate that knowledgeable supply managers may fall prey to over-confidence, and as a result do not actively initiate an exchange process with others by conducting only a shallow information search (Alba and Hutchinson, 1987). Moreover, supplier selection decisions by experts are not often challenged by others (Kohli, 1989), as complying with an expert is often perceived as leading to better decisions.

Finally, the relationship between interactional challenging of supplier selection and financial decision effectiveness is in contrast to existing experimental research by Kray and Galinsky (2003): they found that counterfactual thoughts, e.g., induced by challenging, lead to increased decision effectiveness. Furthermore, Hirt and Markman (1995) and Hirt, Kardes and Markman (2004) have shown in their experimental studies that the consideration of new alternatives can break the inertia leading to a more thorough evaluation process and higher quality of the judgment process. One explanation for the contrary results may be the fact that most extant research has utilized experimental designs. Within the context of an experimental setting involving a relatively simple decision task, the additional impulse through challenging can help to improve decision-making. Yet, in a real world scenario the added decision complexity might overburden the decision-maker and thus negatively impact decision effectiveness. Being confronted with too many (additional) alternatives might make the decision-maker believe that the originally identified best alternative was not the best solution after all (Larrick, 2004) and thereby lead to lower decision effectiveness.

6. Limitations and future research

This study has investigated supplier selection decisions from a behavioral perspective with a sample from Germany. As such it responded to the call for more behavioral research in the supply chain management discipline (Kaufmann et al., 2009). In the next steps of this research stream, samples from other countries are needed to improve generalizability. A promising research approach might be, for example, to also leave the context of developed countries/regions such as the U.S. and Europe and to venture into emerging economies like Brazil, Russia, India, and China. Such countries are expected to provide supply management conditions significantly different from typical Western supply markets. Studies with such an approach would lay the foundation for a stronger investigation of personal and cultural characteristics of buyers involved in supplier selection decisions. Furthermore, it is necessary to extend the focus to group decision-making mechanisms and how biases can be overcome, e.g., by further investigating the interactive challenging, in what is often a team decision, via the use of multiple informants. Future research might also more explicitly capture the perspectives of internal customers, engineering, and other internal stakeholders in the supplier selection process.

Our study focused on the financial aspects of decision effectiveness because achieving a competitive cost position is still a dominant theme in many buying companies (Lemke et al., 2003). This, however, presents a limitation to our study, as the buying firm's competitive advantage and performance also rests on the non-financial capabilities of its suppliers (Nyaga et al., 2010). These suppliers' capabilities are a major reason why firms want to establish cooperatively-oriented, long-term supplier relationships that can be advantageous over discrete market transactions and vertical

integration (Choi and Hartley, 1996; Williamson, 2008). Thus, incorporating the supplier's full strategic capability endowment might enable future studies to draw a more comprehensive and long-term picture of decision effectiveness (Lemke et al., 2003). This would also help to rule out that our current findings based on real world data deviate from those based on experimental designs for reasons of methodological differences. In any case, the fact that only one of the three debiasing strategies had the expected relationship with our measure of financial decision effectiveness clearly calls for a more differentiated analysis of decision effectiveness constructs.

In general, the survey methodology used in this research leads to certain limitations, although this is true in the case of any single methodology (McGrath, 1982). The methodological approach in the current study relies on a person's perception of events. The self-concept of the respondent determines important factors such as the attitude of decision-makers, and influences how human beings think towards objects around them.

Cost-benefit and performance centered aspects of debiasing activities are another fruitful direction for future research. The organizational barriers (e.g., low levels of adoption from employees) and corresponding implementation costs of debiasing strategies, and the subsequent question of the trade-off between debiasing activities and economizing factors such as personnel resources and time, create an interesting avenue for further research. In the same context, a further differentiation of the identified debiasing measures, such as interactional challenging of supplier selection, might be necessary in order to identify the most effective set-up.

Lastly, the differential impact of particular debiasing measures on supplier selection decision effectiveness, especially the conflicting research results of interactional challenging of supplier selection, represent another challenging area of high relevance for both academia and practice.

7. Managerial implications

One finding of this study was that active decomposing of the decision task has a significant, positive impact on, in our case, financial decision effectiveness. Specifically applied to the supplier selection context, the following guidelines can be derived:

- Specific decision criteria should be determined prior to the start of the information search and the supplier selection.
- The corresponding weighting of the decision criteria should be conducted before the supplier information is processed.
- Supplier information should be structured and made comparable, e.g., in terms of discounts, in order to avoid judgment and decision biases based on different framing of information.

While these guidelines may seem to be "common sense", recent case-based research has shown that supply management decision-making processes do not always occur in a rational fashion (Kaufmann et al., 2009). Further, this kind of approach will help to focus the attention and the effort invested in a supplier selection decision. In addition, it reduces the danger of manipulation attempts by the supplier. A structured decision process lays the foundation to achieve a better perception of the decision situation that will lead to a better choice of suppliers in the end.

Moreover, two factors were empirically identified that foster decision task decomposing: on the one hand, a knowledgeable decision-maker, and on the other hand organizational structures that hold decision-makers accountable for their selection. This

has direct consequences for the staffing of personnel responsible for supplier selection and for the formal design of the supplier selection process:

- Decision-makers have to be familiar with the purchase item but it is also necessary that they feel accountable for the decision approach. In this context it is important that decision-makers know from the beginning that they are being held accountable. Otherwise, unexpected accountability after the decision might only lead to defending bad decisions.
- One way to actively induce accountability into the process is to require detailed documentation of all activities. Furthermore, if decision-makers know that they have to explain their decision, accountability is further induced.

Concerning interactional challenging by organizational members, we still cannot give new recommendations as we found conflicting evidence for the relationship between investigative review of the supplier choice and financial decision effectiveness. Nevertheless, we can caution practitioners in following previous recommendations based on evidence gathered through experimental laboratory studies in this context.

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Table I.
Respondent demographics

	Frequency	Percentage
Respondent Level		
Buyer	39	12.7%
Senior Buyer	54	17.6%
Team Manager	46	15.1%
Department Head/Purchasing Director	152	49.7%
Other/Unspecified	15	4.9%
Total	306	100%
Industry		
Automotive	15	4.9%
Machinery	62	20.3%
Chemicals/Pharmaceuticals	53	17.3%
Electronic/IT	46	15.0%
Fabricated metals	56	18.3%
Paper/Packaging	16	5.2%
Food/Beverages	15	4.9%
Other/Unspecified	43	14.1%
Total	306	100%
Firm Size[Turnover in mill. Euro]		
Less than 25 mill. EUR	25	8.1%
25 - 50 mill. EUR	19	6.1%
50 - 100 mill. EUR	28	9.2%
100 - 500 mill. EUR	98	31.9%
500 - 1,000 mill. EUR	30	9.8%
1,000 - 5,000 mill. EUR	63	20.7%
More than 5,000 mill. EUR	43	14.2%
Total	306	100%

Control variables :
Purchase complexity, number of buying firm personnel involved in the decision, job position of the key informant, industry, and *firm size*.

Table II.
Questionnaire scale items

Constructs and Scale Items [a]	Std. Factor Loading[b]	Mean	Std. Dev.[c]
Supplier Selection Task Decomposing (internal consistency = 0.84)			
I determined a set of relevant decision criteria prior to the supplier selection.	0.60	5.66	1.57
I prioritized relevant evaluation criteria before requesting information from suppliers.	0.83	5.03	1.80
Weights were assigned to the evaluation criteria prior to supplier evaluation.	0.86	4.93	1.92
I structured supplier information in order to evaluate their relevance one after another.	0.73	5.11	1.78
Taking the Supplier's Process Perspective (internal consistency = 0.83)			
During this specific supplier selection, I put myself in the shoes of the supplier in order to …			
…understand his sales approach.	0.74	4.67	1.70
…anticipate how he would try to influence my decision.	0.84	4.87	1.71
…view our selection process from a different perspective.	0.77	4.47	1.74
Interactional challenging of supplier selection (internal consistency = 0.71)			
Discussions with other colleagues made me take a second look at my supplier evaluations.	0.68	3.15	1.65
Colleagues encouraged me to consider alternative suppliers.	0.45	3.51	1.85
Feedback from my colleagues caused me to re-evaluate my supplier choice.	0.92	3.00	1.78
Supplier Selection Accountability (internal consistency = 0.87)			
I was required to justify my supplier choice to others.	0.81	5.16	1.92
I was held accountable for my supplier choice.	0.84	4.58	2.12
I had to explain my decision-making approach after having chosen a supplier.	0.72	4.07	2.13
I had to document the decison-making process because I had to justify my decision to others.	0.73	4.54	2.17
I was held accountable for the quality of the supplier selection process.	0.68	4.42	2.05
Supplier Selection Incentives (internal consistency = 0.82)			
Regarding my expectations in this supplier selection, I knew from the beginning that I could …			
… improve my chances of a higher bonus in return for good performance.	0.74	2.38	1.86
… increase promotion opportunities in return for high quality work.	0.80	2.49	1.75
… increase my chances of receiving a higher salary in return for high quality work.	0.80	3.04	1.89
… receive a financial reward in return for a well-conducted supplier selection.	0.62	1.65	1.26
Knowledge of Item (internal consistency = 0.97)			
I had a lot of experience with this item prior to the supplier selection.	0.92	5.05	1.83

My previous knowledge about this item was substantial.	0.95	5.03	1.73
I was familiar with this item.	0.94	5.16	1.66
I consider myself an expert for purchasing this item.	0.88	4.76	1.83
I knew a lot about this item.	0.96	4.96	1.73
Financial Decision Effectiveness (internal consistency = 0.86)			
Total cost relative to expectations at the beginning of the transaction.	0.74	5.62	1.13
Actual cost relative to agreed upon cost at the time of the supplier selection.	0.87	5.71	1.15
Price stability since the beginning of the transaction.	0.71	5.81	1.20
Meeting target costs (the actual cost of the purchase item compared with the target cost).	0.78	5.81	1.13

[a] The items were measured on a 7-point Likert-type scale with 1= strongly disagree to 7= strongly agree

[b] Standardized Factor Loadings [c] Standard Deviation

Fit indices of the overall measurement model: CFI = 0.96; TLI = 0.95; RMSEA = 0.047; SRMR = 0.043; χ^2/df = 1.70

Table III.
Inter-construct correlations and average variance extracted

		(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	Supplier Selection Accountability	**0.58**	**0.04**	**0.01**	**0.14**	**0.13**	**0.14**	**0.00**
(2)	Supplier Selection Incentives	0.19**	**0.55**	**0.00**	**0.01**	**0.06**	**0.04**	**0.00**
(3)	Knowledge of Item	0.08	-0.04	**0.87**	**0.06**	**0.07**	**0.01**	**0.04**
(4)	Supplier Selection Task Decomposing	0.38***	0.10	0.25***	**0.58**	**0.18**	**0.04**	**0.06**
(5)	Taking the Supplier's Process Perspective	0.36***	0.25***	0.27***	0.42***	**0.61**	**0.10**	**0.02**
(6)	Interactional Challenging of Supplier Selection	0.38***	0.21**	-0.11	0.20**	0.31***	**0.51**	**0.01**
(7)	Financial Decision Effectiveness	0.03	-0.05	0.19**	0.24***	0.14*	-0.10	**0.61**

Note: Diagonal values represent **AVE**.
Below diagonal: **correlation coefficients**; *p<0.05, ** p<0.01, ***p<0.001
Above diagonal: **squared correlations**

Figure 1.

Model and hypotheses

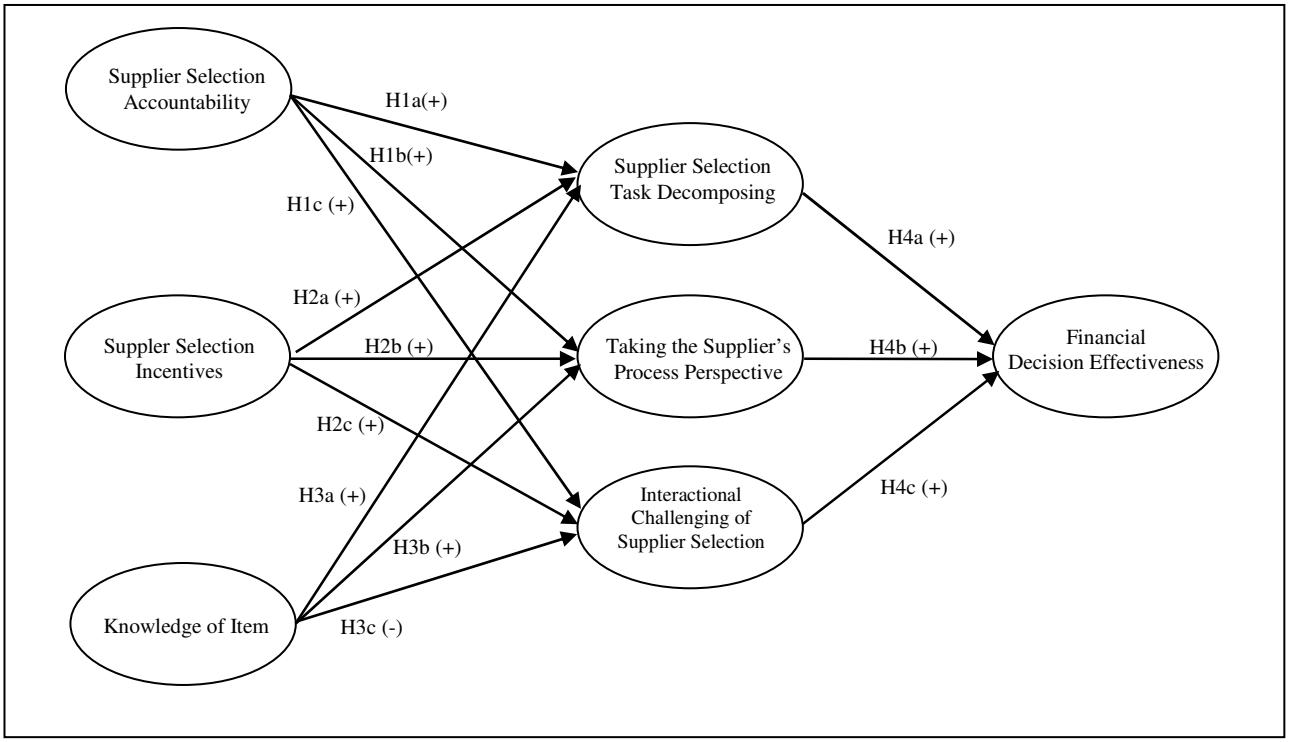

Figure 2.

Structural model

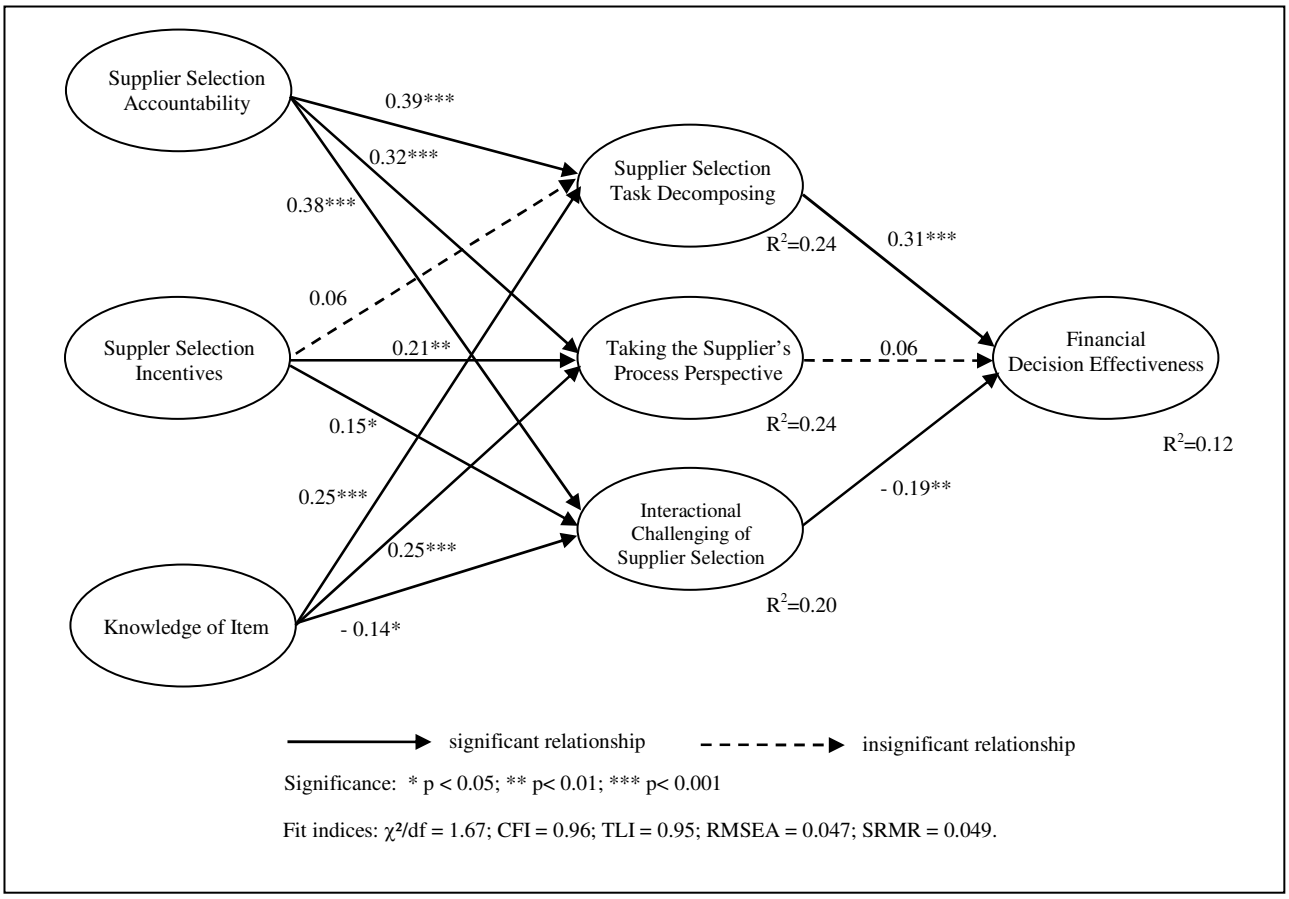

Table IV.
Results Overview

Hypo-thesis	Exogenous Variable	Endogenous Variable	Expected Relation	Empirical Result		Comment
H1a	Supplier Selection Accountability	Supplier Selection Task Decomposing	+	0.39***	✓	Accountability and expertise are positively related to buyer's clearly structuring their decision processes.
H2a	Suppler Selection Incentives	Supplier Selection Task Decomposing	+	0.06	×	
H3a	Knowledge of Item	Supplier Selection Task Decomposing	+	0.25***	✓	
H1b	Supplier Selection Accountability	Taking the Supplier's Process Perspective	+	0.32***	✓	Accountability, incentives, and expertise are positively related to the buyer's viewing the selection process from a supplier's perspective.
H2b	Suppler Selection Incentives	Taking the Supplier's Process Perspective	+	0.21**	✓	
H3b	Knowledge of Item	Taking the Supplier's Process Perspective	+	0.25***	✓	
H1c	Supplier Selection Accountability	Interactional Challenging of Supplier Selection	+	0.38***	✓	Accountability and incentives are positively related to having colleagues challenge the buyer; item expertise of the buyer is negatively related to generating decision dissent.
H2c	Suppler Selection Incentives	Interactional Challenging of Supplier Selection	+	0.15*	✓	
H3c	Knowledge of Item	Interactional Challenging of Supplier Selection	-	-0.14*	✓	
H4a	Supplier Selection Task Decomposing	Financial Decision Effectiveness	+	0.31***	✓	Structuring selection processes is positively related to financially sound decisions; interactional challenging of buyers is negatively related to financial decision effectiveness.
H4b	Taking the Supplier's Process Perspective	Financial Decision Effectiveness	+	0.06	×	
H4c	Interactional Challenging of Supplier Selection	Financial Decision Effectiveness	+	-0.19**	(✓)[a]	

[a] Significant, but in the opposite direction as hypothesized.