An empirical study of electronic reverse auction project outcomes

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A R T I C L E   I N F O

Article history:
Received 11 June 2014
Received in revised form 8 December 2014
Accepted 8 December 2014
Available online 13 December 2014

Keywords:
Buyer satisfaction
Electronic reverse auctions
Electronic sourcing
Global field study
Project outcomes

A B S T R A C T

We extend the conceptual model developed by Amelinckx et al. (2008) by relating electronic reverse auction (ERA) project outcomes to ERA project satisfaction. We formulate hypotheses about the relationships among organizational and project antecedents, a set of financial, operational, and strategic ERA project outcomes, and ERA project satisfaction. We empirically test the extended model with a sample of 180 buying professionals from ERA project teams at large global companies. Our results show that operational and strategic outcomes are positively related to ERA project satisfaction, while price savings are not. We also find positive relationships between financial outcomes and project team expertise; operational outcomes and organizational commitment, cross-functional project team composition, and procedural fairness; and strategic outcomes and top management support, organizational commitment, and procedural fairness.

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1. Introduction

An electronic reverse auction (ERA) is “an online, real-time dynamic auction between a buying organization and a group of pre-qualified suppliers who compete against each other to win the business to supply goods or services that have clearly defined terms and conditions. These suppliers compete by bidding against each other online over the Internet using specialized software by submitting successively lower priced bids during a scheduled time period” (Beall et al. 2003). Over the past two decades, ERAs have been used in various industries, including aerospace, automotive, aviation, chemicals, construction, defense, electronics, machinery, packaged goods, petroleum, and retail (Beall et al. 2003, Ray et al. 2011, Wang et al. 2013). ERAs are increasingly popular among buying organizations, although their use sparks controversy and ethical concerns in the sourcing world (Charki et al. 2010). Indeed, the one-sided focus on price savings in ERAs is considered to be at odds with the benefits of long-term cooperative buyer–supplier relationships (Beall et al. 2003, Hunt et al. 2006). However, several researchers have declared that ERAs are here to stay, as they are relatively easy to install and use and have resulted in positive outcomes across a range of offerings and contexts (Beall et al. 2003, Hur et al. 2006).

In prior research work on ERAs, Amelinckx et al. (2008) developed a conceptual model based on an extensive review of the electronic sourcing literature and exploratory research involving multiple case studies. The authors identified operational and strategic outcomes that buying organizations can obtain in ERAs, in addition to financial gains. Furthermore, the authors asserted that the different outcomes can be obtained jointly, through the implementation of important organizational and project antecedents, and as such alleviate the traditional trade-offs between price savings and quality outcomes.

The current article extends electronic sourcing theory with two contributions: (1) it integrates satisfaction of the buying organization's project team with the ERA project in the conceptual model of Amelinckx et al. (2008), and (2) it empirically tests this model in a large field study. While prior electronic sourcing studies have explored satisfaction of the buyer with the price savings resulting from an ERA, the buyer–supplier relationships, and the ERA tools and processes (Hartley et al. 2005, Jap 2002), there is a dearth of research that examines the relationship between multiple ERA project outcomes and ERA project satisfaction. ERA project satisfaction involves a comparison of the actual ERA project outcomes with the expectations of the buying organization's project team prior to the ERA project (Hawkins et al. 2010, Oliver 1980). It is important to understand how ERA project satisfaction relates to a broad set of ERA project outcomes, as the main expectations of project teams at buying organizations from ERAs may well go beyond price savings, and may alter when conducting ERAs at a more mature stage (e.g., from a focus on price savings to a focus on cycle...
time improvement) (Jap 2002). Hence, we formulate hypotheses that relate multiple ERA project outcomes to ERA project satisfaction. In addition, we develop hypotheses for the antecedent–outcome relationships, and empirically test the conceptual model, based on input from 180 buying professionals around the world.

The balance of this article is laid out as follows. In the next section, we present the model and develop the hypotheses, drawing from the electronic sourcing literature on ERAs. In Section 3, we describe our research method, and we present our results in Section 4. We discuss findings, implications, and limitations of our study in Section 5.

2. Model and hypotheses

We will extend the conceptual model developed by Amelinckx et al. (2008), as shown in Fig. 1. The model is extended with ERA project satisfaction, and a set of hypotheses is developed. Based on a review of studies of the relationships between ERA outcomes and antecedents, which is presented in Appendix 1, we first discuss ERA project satisfaction and hypothesize a positive relationship between ERA project outcomes and ERA project satisfaction (H1). We then formulate hypotheses relating the antecedent factors to these outcomes (H2–H6). For reasons of clarity, the hypothesized relationships between ERA project outcomes and ERA project satisfaction, and between ERA project outcomes and antecedents, are visually combined in Fig. 1.

2.1. ERA project satisfaction and ERA project outcomes

ERA project satisfaction is the extent to which the expectations of the project team, in terms of the ERA project outcomes, are met (Hawkins et al. 2010, Oliver 1980). Although buyer satisfaction with an ERA project is considered key in a buyer’s evaluation of an ERA (Jap 2002), there is a dearth of research that has investigated this. Notable exceptions include Jap (2002), Hartley et al. (2005), and Hawkins et al. (2010).

Jap (2002) reviewed when, how, and why ERAs are used and explored satisfaction of the buyer with the auction tool and with the suppliers. Based on an exploratory survey completed by 38 sourcing managers from four buying organizations, Jap (2002) found no significant difference among satisfaction of the buyer with the winning supplier across open- and sealed-bid auctions. However, buyer’s satisfaction with the losing suppliers was higher for sealed auctions than for open auctions. In addition, a correlational analysis indicated that buyer’s satisfaction with the auction tool was negatively associated with the number of invited suppliers, and positively with the extent to which there is competition due to new international entrants in the supply base.

While Jap (2002) explored buyer satisfaction with the supplier and the auction tool, the author did not study satisfaction with a broader set of ERA outcomes and ERA project satisfaction in general. Likewise, Hartley et al. (2005) explored three areas of buyer satisfaction with ERAs: satisfaction with the purchase price, satisfaction with the supplier relationship, and satisfaction with the purchasing process (i.e., the planning and bidding process stages). Based on an inquiry of 47 purchasing managers, the authors stated that buyers are more satisfied with the purchase price than with the supplier relationship and the process. Unlike Jap (2002) and Hartley et al. (2005), Hawkins et al. (2010) considered satisfaction in general. In particular, the authors identify, based on case study research, prior ERA sourcing satisfaction as a determinant of the decision to source via ERAs.

While the exploratory work of Jap (2002), Hartley et al. (2005), and Hawkins et al. (2010) offer initial insights on buyer satisfaction with the ERA tool, purchasing process, supplier relationships, and purchase price, they do not consider a broader set of ERA project outcomes, and do not investigate how these outcomes are related to ERA project satisfaction.

The above definition of ERA project satisfaction is consistent with the expectation–confirmation theory, which considers satisfaction with an information system to be formed by a comparison between what is expected or desired before use and the actual outcomes after

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1 In open bid ERAs, all participating suppliers, as well as the buyer, see each bid at the same time. In sealed-bid auctions, only the bidding supplier and the buyer have access to the details of the supplier’s specific bid (Jap 2002).
using the system (Bhattacherjee 2001, McKinney et al. 2002). Hence, an ERA project team is considered to be satisfied when the outcomes of the ERA project meet or exceed prior project team expectations (Hawkins et al. 2010). The more the outcomes exceed prior expectations, the more satisfied the ERA project team will be (Oliver 1980). In this study, we expand the investigation of price savings and relationship quality outcomes, which have been considered in prior research, with the study of other important outcomes, as proposed by Amelinckx et al. (2008). In particular, Amelinckx et al. (2008) identified three types of ERA project outcomes: financial (price savings), operational (cost reduction, cycle time improvement, quality of the offering), and strategic (relationship quality, project learning, supply base rationalization) outcomes.

Price savings refer to the percentage change in contract price compared to the historical price (or, if not available, the estimated market price). Price savings are widely regarded as the key, financial, ERA project outcome for buying organizations (Smart and Harrison 2003). Based on supplier input on 25 ERAs, Jap (2007) reports average price savings of 25%, and a 0–57% price savings range. A buying organization typically sets up a repeat auction after a period of time for an identical or similar offering, especially for products with regularly changing markets (Beall et al. 2003, Jap and Haruvy 2008). For repeat auctions, buying organizations, however, do not expect to obtain the same level of price savings as in a first-time auction, and typically report low levels of price savings (Arnold et al. 2005, Hartley et al. 2005). In keeping with the expectation–confirmation theory, we hypothesize that the extent to which the price savings obtained in the ERA meet or exceed the expectations of the ERA project team, is positively related to ERA project satisfaction.

Operational outcomes for the buyer include reductions in cycle time and associated process costs, as well as maintaining or enhancing the quality of the offering (Carter et al. 2004, Hartley et al. 2005). Cycle time refers to the time the sourcing project takes from initiation to completion of the online processes involved; these processes consist of business intelligence, configuration, supplier search, supplier authentication, product authentication, and valuation (Hult 1997, Muylle and Basu 2008). The majority of buyers report that the use of ERAs results in a decrease of cycle time (Carter et al. 2004). Costs related to the buying process include specification, search, comparison, examination, negotiation, and communication costs (Liang and Huang 1998). ERAs are claimed to reduce the negotiation and communication costs (Amelinckx et al. 2008). Another key operational outcome is the impact of the use of ERAs on the quality of the offering that suppliers provide, which is defined as “a perceived fundamental characteristic of products and services which meet or exceed the buying organization’s expectations regarding features and performance as described in the demand specifications” (Calantone and Knight 2000, p. 495). This impact may be detrimental, because a supplier may feel that it has to shirk on quality or reduce value-added services to bear the drop in its margins (Beall et al. 2003, Jap 2002). Therefore, Caniels and van Raaij (2009) argue that suppliers that aim to compete on quality (instead of price) refrain from taking part in ERA projects. In keeping with the expectation–confirmation theory, we hypothesize that the extent to which the operational outcomes meet or exceed the expectations of the ERA project team, is positively related to ERA project satisfaction.

A key strategic outcome of ERA projects is relationship quality, which is defined as “the overall depth and climate of the interfirm relationship” (Bejou 1997, Dwyer et al. 1987, Johnson 1999, p. 6, Morgan and Hunt 1994). In addition to adversely affecting the quality of the offering, the one-sided focus on price competition in ERA projects is widely recognized as severely harming the buyer–supplier relationship (Carter and Stevens 2007, Carter et al. 2004, Jap and Haruvy 2008, Jap 2007, Ray et al. 2011). Two other important strategic outcomes are project learning and supply base rationalization (Amelinckx et al. 2008). Project learning involves a group, rather than individual, perspective of learning and is defined as the knowledge accumulated in a project to the benefit of future projects (Blazevic and Lievens 2004, Dai et al. 2005). Supply base rationalization is generally referred to as supply base reduction (Cousins 1999). The ability to rationalize the supply base as an outcome of conducting ERAs is consistent with the move to a reduced set of stable partnerships through the use of information technology (Clemons et al. 1993, Hitt 1999). We hypothesize, in keeping with the expectation–confirmation theory, that the extent to which the strategic outcomes meet or exceed the expectations of the ERA project team, is positively related to ERA project satisfaction. In summary, we hypothesize that financial, operational, and strategic ERA project outcomes are positively related to ERA project satisfaction.

**Hypothesis 1 (ERA Project Outcomes).** Financial, operational, and strategic ERA project outcomes are positively related to ERA project satisfaction

In what follows, we formulate hypotheses relating the financial, operational, and strategic ERA project outcomes to antecedent factors. Amelinckx et al. (2008) distinguished between organizational and project antecedents. While the first refer to the organizational context in which the ERA project is executed, the latter are specific to the ERA project.

2.2. ERA project outcomes and organizational antecedent factors

From their exploratory work, Amelinckx et al. (2008) identified two antecedent factors at the organizational level: top management support and organizational commitment.

**Top management support** for e-sourcing refers to the degree to which top management understands the importance of, and provides the necessary resources for e-sourcing (Bajwa et al. 1998, Ragu-Nathan et al. 2004). Resources needed for the implementation of e-sourcing involve costs related to software licensing, annual maintenance and hosting, buyer training, auction support staff development, and consulting fees (Hur et al. 2007). Prior research has identified top management support as a critical factor in business-to-business e-commerce adoption and deployment (Gebauer et al. 1998, Phan 2001, Soliman and Janz 2004, Teo et al. 2006). Also, the creation of a vision and guidelines by top management are considered necessary for supply chain and information system success (Fawcett et al. 2006, Kearns 2006).

For example, top management support contributed to the successful implementation of e-procurement at Hewlett–Packard, Novo Nordisk, and Skanska AB (Aberdeen Group 2005) and ERAs at Shell Chemicals (Gattiker 2005). Also, Carter et al. (2004, p. 237) suggested a top-down approach to ERA implementation to be “more effective than a bottom-up approach in minimizing resistance from other functional areas in the organization”. Also, Arnold et al. (2005) referred to “the lack of internal acceptance and the lack of attention and support through the top management” as determinants of ERA failure (Arnold et al. 2005, p. 122). In addition, prior research found top management support to be positively related to performance outcomes (Bajwa et al. 2008, Blazevic and Lievens 2004, Ragu-Nathan et al. 2004, Yoon et al. 1995). In keeping with this positive relationship and with the exploratory research findings of Amelinckx et al. (2008), who posited top management support to be an important organizational antecedent in ERAs, we hypothesize that top management support is positively related to financial, operational, and strategic ERA project outcomes. Therefore, we formulate the following hypothesis:

**Hypothesis 2 (Top Management Support).** Top management support for e-sourcing is positively related to financial, operational, and strategic ERA project outcomes.
Organizational commitment to e-sourcing refers to internal stakeholders' attitude towards the changes brought about by the new way of sourcing as well as towards the use of e-sourcing tools for performing sourcing tasks (Tatis et al. 2006, Wang and Chen 2006). Organizational commitment is considered to be an important determinant of the successful implementation of information systems (Ein-Dor and Segev 1978, Ginzberg 1981, Newman and Sabherwal 1996, Yoon et al. 1995) and is positively related to productive behavior (Reichers 1985). In addition, Amelinckx et al. (2008) identified organizational commitment as a key organizational antecedent for ERA projects. In keeping with the literature and the case study research insights of Amelinckx et al. (2008), we hypothesize that organizational commitment is positively related to financial, operational, and strategic ERA project outcomes:

Hypothesis 3 (Organizational Commitment). Organizational commitment to e-sourcing is positively related to financial, operational, and strategic ERA project outcomes

2.3. ERA project outcomes and project antecedent factors

Amelinckx et al. (2008) identified cross-functional team composition, project team expertise, and procedural fairness as project-related success factors for ERAs. Purchasing-related tasks are frequently completed by a task force or group of people from a variety of functional areas (Burt 1989, Elram and Pearson 1993, Trent and Monczka 1998). If personnel from at least three functional areas are brought together to achieve a purchasing-related assignment, this is referred to as a cross-functional sourcing team (Trent and Monczka 1998). This is no different for purchasing via ERAs, which are commonly executed by a cross-functional team, involving multiple organizational functions such as supply management, quality control, operations, and engineering (Beall et al. 2003, Carter et al. 2004, Hur et al. 2006, Wang et al. 2013). Teams are typically formed for each new ERA project, bringing together people from different domains depending on the specialized skills: product knowledge to correctly specify the offering, market research skills to understand the supply base, and cost analysis capabilities to accurately understand profit margins (Beall et al. 2003, Smelter and Carr 2002). Not only general sourcing oversight, but also commodity and supply market knowledge, and appropriate technical support are needed (Hur et al. 2007).

Cross-functional purchasing teams are generally considered critical in realizing performance benefits in buyer-supplier relationships and in achieving desired outcomes (Chen and Paulraj 2004, Denison et al. 1996, Pinto et al. 1993). In terms of obtaining a broad set of ERA outcomes, Amelinckx et al. (2008) identified cross-functional team composition as a key project antecedent. In keeping with the purchasing literature and the conceptual model developed by Amelinckx et al. (2008), we hypothesize that:

Hypothesis 4 (Cross-functional Project Team Composition). Cross-functional project team composition is positively related to financial, operational, and strategic ERA project outcomes

Project teams with ERA expertise, which refers to the e-sourcing specific knowledge acquired through experience and training, can be expected to have a better understanding of the ERA processes, and can therefore obtain better results, than less experienced teams (Hur et al. 2007, Smeltzer and Carr 2003, Spence and Brucks 1997). Indeed, ERA use can be optimized through an iterative learning process involving benchmarking, experimenting, and analyzing (Hur et al. 2006, Mabert and Skeels 2002). According to Smeltzer and Carr (2002), not every company is ready to get involved with ERAs: “To wield this strategic sourcing tool, a company must have professionals who understand it and can implement the process correctly (Smeltzer and Carr 2002, p. 51).”

The case of Hewlett Packard, for example, described for their workforce expertise resulted in negotiated savings and spend reduction for indirect procurement (Aberdeen Group 2005). Furthermore, Carter et al. (2004) state that there is no initial positive relationship between buyer experience and price reductions in ERAs, due to the tendency of buying organizations to primarily select ‘low hanging fruit’ for ERA projects. However, the authors indicate that the implication of increased ERA learning not only involves the consideration of price savings, but also cycle time and process improvements. Indeed, Amelinckx et al. (2008) found project team expertise to be related to operational outcomes. Hence, we keep with the literature and the exploratory research findings of Amelinckx et al. (2008) and hypothesize that:

Hypothesis 5 (ERA Project Team Expertise). ERA project team expertise is positively related to financial, operational, and strategic ERA project outcomes

Procedural fairness constitutes another project antecedent factor and encompasses the fairness of the buying organization’s procedures and processes in relation to the suppliers participating in the ERA (Kumar et al. 1995). A buying organization can conduct an ERA in a fair manner by clearly explaining and communicating the auction rules and conditions to participant suppliers, and by adopting objective procedures that do not discriminate between the suppliers participating in the auction (Carter et al. 2004). The buying organization should avoid incomplete or incorrect specifications, unusual auction designs and rules, granting of permission to certain suppliers to rebid after the closing date, or squeezing of suppliers to a point of loss-making, all of which are generally perceived unfair (Arnold et al. 2005, Beall et al. 2003, Tassabehji et al. 2006).

Prior research studies have identified procedural fairness as an important issue in ERAs (Amelinckx et al. 2008, Daly and Nath 2005a, Tunca et al. 2013) and examining its role is promising, as it has been shown to be important in studies of other inter-firm relationship settings (Kumar et al. 1995, Luo 2008). Kumar et al. (1995) found that procedural fairness enhances relationship quality between relatively smaller, vulnerable resellers and larger, powerful suppliers. Furthermore, Luo (2008) found that procedural fairness improves both operational and financial cooperation outcomes in alliances. In addition, in the organizational justice literature, procedural fairness is viewed as a means to generate favorable outcomes (Colquitt et al. 2001, 2013, Konovsky 2000). More specifically, procedural fairness is concerned with the fair process effect (Folger and Cropanzano 1979), which is as follows: “the more someone considers a process to be fair, the more tolerant that person is about the consequences of the process, such as adversely unfair outcomes that a decision-making process creates when it governs the distribution of outcomes” (Folger and Cropanzano 1998, p. 32). In sum, we draw from the literature to hypothesize that establishing and implementing fair procedures can enact the fair process effect and relate positively to ERA outcomes:

Hypothesis 6 (Use of Procedural Fairness by ERA Project Team). The use of procedural fairness by the ERA project team is positively related to financial, operational, and strategic ERA project outcomes

3. Research method

We first describe the data collection and the sample characteristics. We then introduce the study measures, and describe the
control variables. We end this section with a confirmatory factor analysis to evaluate the psychometric properties of the constructs in the model.

3.1. Data collection

The unit of analysis in the study was a single, completed ERA project, managed by a project team that typically involves different organizational functions, as represented by the procurement department (Carter et al. 2004). The population of interest to this study therefore consisted of procurement professionals in multinational companies, who were co-responsible for ERA projects. Four electronic sourcing consultancy firms and service providers active in Europe and the U.S., and two procurement associations in Europe provided contact data of procurement professionals at customer firms who had engaged in at least one ERA. In total, 851 invitation e-mail messages with an active hyperlink to an online survey were distributed. Usable responses were provided by 180 procurement professionals. This sample size represents an effective response rate of 21.2%, which is generally considered satisfactory for an industrial survey (Erdog and Baker 2002, Frohlich 2002). Moreover, as data concerning ERAs are regarded as “unique and enormously difficult to obtain” (Jap 2007, p. 147), the sample size of this study can be considered exceptional in the field.

We adopted a key informant approach (Campbell 1955), in which only knowledgeable informants who were co-responsible for an ERA project were allowed to participate. Similar to the approach of Doney and Cannon (1997) and Brown et al. (2012), respondents were requested to refer to one specific project and to report on the views of the project team. In addition, the key informant provided factual information with respect to the price savings, as obtained from the auction record. To prevent recall decay bias, the respondent was instructed to complete the questionnaire with reference to a recently completed ERA project (Blazevic and Lievens 2004). We assessed non-response bias by comparing the responses of early respondents with those of late respondents (Armstrong and Overton 1977). No statistically significant differences were found for any of the constructs considered in this study and therefore non-response bias did not appear to be a problem.

3.2. Sample characteristics

The ERA projects in this study involved a wide range of industries, from automotive, chemicals and consumer goods, to services, telecommunications, and pharmaceuticals. The market offerings that were auctioned included IT hardware, palm oil, cokes, pallets, packaging material, office cleaning, temporary labor, transportation, car leasing, consultancy, facility management and logistical services. The companies in this study were distributed around the globe, with 77% of the companies being headquartered in Europe, 15% in the US, and the remaining 8% in other regions of the world.

3.3. Measures

The measures in this study were obtained from the literature and the wording of the items was modified for use in an ERA setting. An initial version of the questionnaire was pretested qualitatively with four academics and three domain experts from industry, as well as quantitatively with 24 respondents. Thereafter, minor modifications and refinements in the questions and items were made. The final survey questions are presented in Appendix 2. The multi-item scales all were measured on a seven-point Likert scale. Cost reduction was measured using two items, which were averaged. The scale items of the constructs, their factor loadings and the Cronbach alpha values are shown in Appendix 3, and the cross-factor loadings are presented in Appendix 4.

3.4. Control variables

To minimize confounding effects, we controlled for three supplier-related factors that were identified by Amelinckx et al. (2008): supply market competition, supplier e-readiness, and supplier e-sourcing expertise. Supply market competition is the degree to which the buying firm has alternative, qualified suppliers that are able to meet specifications and have a strong interest in winning the contract (Cannon and Perreault 1999, Perdue and Summers 1991). Supplier e-readiness refers to the degree to which suppliers participating in the e-sourcing project are willing and ready to conduct business activities electronically (Barua et al. 2004). Supplier e-sourcing expertise consists of the supplier’s e-sourcing specific knowledge acquired through experience and training (Kuusela and Spence 1998, Spence and Brucks 1997). The relationships between these control variables and ERA project outcomes are expected to be positive (Amelinckx et al. 2008).

3.5. Confirmatory factor analysis

We evaluated the psychometric properties of the multi-item constructs in our empirical study through a confirmatory factor analysis, using Amos 19.0 (Arbuckle 2010), specifying the relations of the observed measures to their posited underlying constructs (Anderson and Gerbing 1988). The overall fit measures of the measurement model compared favorably against common cut-off criteria (Hooper et al. 2008, Hu and Bentler 1999): χ²(685) = 918.03 (p < 0.01); CFI = 0.94; TLI = 0.93; NFI = 0.82; RMSEA = 0.04. Standardized item factor loadings all exceeded 0.53; well above the 0.4 minimum suggested by Hulland (1999), and r-values for all item factor loadings indicated significance at the 0.01-level (factor loadings are listed in Appendix 3). We retained the items with factor loadings below 0.7 (and above 0.4), in keeping with Baumgartner and Homburg (1996), who recommend to retain items that add substantial meaning to their respective construct in order to increase the probability of tapping all facets of the construct of interest. The Cronbach alpha values for all constructs were above the 0.7 threshold (Nunnally and Bernstein 1991). We assessed convergent validity using composite reliability (CR) (Werts et al. 1974) and average variance extracted (AVE) (Fornell and Larcker 1981). All CRs exceeded the 0.7 criterion, ranging from 0.76 to 0.91, and all AVEs were above the 0.50 recommended level, ranging from 0.51 to 0.73. Discriminant validity for all the constructs in the model was confirmed. The AVE values exceeded the shared variance (squared inter-construct correlations; see Table 1), indicating that all constructs shared more variance with their measures than with other constructs (Fornell and Larcker 1981). Table 1 also reports the means and standard deviations for the multi-item variables.

We assessed the likelihood of common method bias by using the procedure suggested by Podsakoff et al. (2003). A confirmatory factor analysis indicated that a single (method) factor did not fit the data, providing evidence that inter-item correlations were not purely driven by method bias (χ²(740) = 3471.14 (p < 0.001); CFI = 0.34; TLI = 0.27; NFI = 0.30; RMSEA = 0.14). Furthermore, a test of the measurement model, including common method bias as a construct, showed that common method bias explains 10% of the variance. Therefore, we consider common method not to have a substantive impact on our model.

4. Analysis and results

To test the hypotheses, we specified a model in which the antecedent factors were related to ERA project outcomes, and the outcomes were related to ERA project satisfaction. Furthermore, we
included the control variables in the analysis. The model showed good fit statistics: \( \chi^2(887) = 1459.95 \) (\( p < 0.01 \)); CFI = 0.87; TLI = 0.85; NFI = 0.73; RMSEA = 0.06.

Hypothesis 1, on the relationships between ERA project outcomes and ERA project satisfaction is partly supported by the data, as shown in Table 2. This table displays the estimated standardized regression weights and the \( p \)-values. In particular, cycle time improvement, quality of the offering, and project learning were positively related to ERA project satisfaction. The \( R^2 \)-value indicates the model explains a considerable portion (64\%) of the variance of ERA project satisfaction.

To test Hypotheses 2, 3, 4, 5, and 6 we examined the factor loadings of the antecedent factors for each of the outcome variables (see Table 3), showing partial support for each hypothesis.

In terms of the organizational antecedents, top management support (H2) was positively related to relationship quality and project learning, and negatively related to price savings. Organizational commitment (H3) exhibited a strong positive association with every ERA project outcome, except price savings.

In terms of the project antecedents, cross-functional team (H4) composition had a significant positive relationship with cost reduction. Project team expertise (H5) had a positive relationship with price savings, while it was negatively related to cost reductions, cycle time improvement, quality of the offering, and supply base rationalization. Finally, procedural fairness (H6) had a strong positive association with quality of the offering, relationship quality, and project learning. The explained variances of the outcome variables \( (R^2) \) vary between 17\% and 57%.

5. Discussion

In this study, we extended and empirically tested the conceptual model developed by Amelinckx et al. (2008). Based on a global field study with 180 procurement professionals, we found partial empirical support for the hypothesized relationships between ERA project outcomes and ERA project satisfaction, and between organizational and project antecedent factors and ERA project outcomes.

Our empirical results showed that the most important ERA project outcomes, in terms of their relationship with ERA project satisfaction (as observed from the standardized factor loadings in Table 2), are cycle time improvement (0.36), quality of the offering (0.33), and project learning (0.31). Put differently, meeting or exceeding the expectations for these outcomes in an ERA project, is associated with higher ERA project satisfaction in our study, while meeting or exceeding the expectations for the remaining outcomes was not significantly related to ERA project satisfaction. This finding highlights the importance of considering operational and strategic outcomes, in addition to financial outcomes.

The lack of a significant positive relationship between ERA project satisfaction and price savings, cost reduction, relationship quality, and supply base rationalization is surprising. A closer look at our data set revealed that the repeat nature of the auction seems to moderate the relationship between ERA project satisfaction and both price savings and supply base rationalization. In particular, for first-time auctions, the correlation between price savings and ERA project satisfaction was significant and positive \( (r = 0.21; p < 0.05) \), while for a repeat auction it was found not to be significant \( (r = -0.05) \). Likewise, the correlation between supply base rationalization and ERA project satisfaction was significant and positive \( (r = 0.29; p < 0.05) \) for a first-time auction, while for a repeat auction it was found not to be significant \( (r = 0.18) \). These insights suggest that while the expectations of ERA project teams in terms of price savings and supply base reduction are met or exceeded the first time an ERA is set up for a specific market offering, the expectations are not met in repeat auctions. A possible explanation is that price savings and supply base rationalization obtained in a first-time auction, may be difficult to reproduce in a repeat auction. As to the lack of a significant positive relationship between cost reduction and ERA project satisfaction, and between relationship quality and ERA project satisfaction, a possible explanation may be that the significant positive relationships between cycle time improvement and ERA project satisfaction, and between quality of the offering and ERA project satisfaction obscure these relationships.

In terms of the relationships between the antecedent factors and the ERA project outcomes, we found partial support for the hypotheses. As to the organizational antecedents, we found that top management support and organizational commitment were positively related to multiple operational and strategic outcomes. Top management support positively related to two strategic outcomes: project learning and relationship quality. This finding suggests that top management considers ERAs to be a strategic tool. Conversely, top management support was not positively related to any of the operational outcomes. This finding is consistent with
prior literature, which found top management support to play a critical role in using information systems as a strategic resource (Kearns 2006), “enabling the organization to respond dynamically to environmental changes” (Ragu-Nathan et al. 2004, p. 468). In addition, “enabling the organization to respond dynamically to environmental changes” (Ragu-Nathan et al. 2004, p. 468). In addition, Teo et al. (2006) concluded that, in the context of B2B e-commerce, top management’s main interest is how e-commerce “can help enhance the company’s competitive position and improve the bottom-line at the strategic level” (p. 407). Finally, managers at the top of the corporation are said to emphasize strategic requirements, while purchasing managers focus on more operational measures (Gebauer et al. 1998).

Organizational commitment was significantly positively related to all operational and strategic outcomes. Hence, our results suggest that it may be important to strengthen and support organizational commitment to ERAs, as well as their motivation to support ERAs (Tatsis et al. 2006). However, the negative relationship between top management support and price savings and the non-significant relationship between organizational commitment and price savings, suggest that, at the organizational level, financial outcomes were not considered a priority when using ERAs.

Furthermore, we found several positive relationships between ERA project antecedents and outcomes. In particular, our results show that having a cross-functional project team composition is positively related to cost reduction and that project team expertise is positively related to price savings. The latter is consistent with the findings of Carter et al. (2004), who stated that for initial ERA projects the ‘low hanging fruit’ is opted for and hence no initial relationship between price savings and expertise is present. In this study, we found empirical evidence that beyond this initial stage, there is a significant positive relationship between project team expertise and price savings. While teams with more expertise were able to obtain enhanced price savings, no such relationships were found for the operational and strategic outcomes. As a matter of fact, project team expertise was negatively related to cost reduction, cycle time improvement, quality of the offering, and supply base rationalization. Interestingly, these outcomes were not related to top management support and positively related to organizational commitment, potentially divulging a field of tension between organizational and project team factors.

The use of procedural fairness was positively related to the quality of the offering, relationship quality, and project learning. This finding suggests that a buying organization can evoke the fair process effect in an ERA, potentially making the supplier more tolerant about the consequences of the auction and quality of the offering, preserving the buyer–supplier relationship, and allowing the buying organization to learn.

Finally, Amelinckx et al. (2008) asserted that the trade-off between price savings and quality outcomes does not hold, under certain conditions. This study found that quality of the offering and relationship quality were positively related to organizational commitment and procedural fairness. Furthermore, relationship quality was positively related to top management support.

5.1. Theoretical implications

This article extends electronic sourcing literature on ERAs by examining buyer satisfaction with the ERA project. While prior research has explored buyer satisfaction with the ERA tool, purchasing process, supplier relationship, and purchase price (Hartley et al. 2005, Jap 2002), we hypothesize the relationship of a broader set of ERA project outcomes with ERA project satisfaction. Our results, based on a large field study, indicate that operational and strategic outcomes are positively related to ERA project satisfaction. In particular, cycle time improvement, quality of the offering, and project learning are positively related to ERA project satisfaction. In addition, both price savings and supply base rationalization are positively related to ERA project satisfaction for first-time auctions. However, cost reduction and relationship quality are not positively related to ERA project satisfaction.

In addition, our study is an extension of the exploratory work of Amelinckx et al. (2008) and contributes to electronic sourcing theory by hypothesizing and empirically testing positive relationships between organizational and project antecedents and financial, operational, and strategic ERA project outcomes. Our results show that financial outcomes are positively related to project team expertise; operational outcomes are positively related to organizational commitment, cross-functional project team composition, and procedural fairness; and strategic outcomes are positively related to top management support, organizational commitment, and procedural fairness.

Finally, while the electronic sourcing literature widely supports the proposition that ERAs are detrimental to both quality of the offering and relationship quality (Jap 2002, 2003), the findings from this study suggest that a buying organization can potentially obtain price savings while maintaining quality of the offering and relationship quality, by organizing the ERA in a procedurally fair...
manner. The latter finding also answers a recent call for research to examine the conditions that preserve both price savings and relationship capital in ERAs (Ganesan et al. 2009).

5.2. Managerial implications

Managers of buying organizations can deploy ERAs to obtain financial, operational, and strategic outcomes. Our empirical results reveal that the relationship of buyer satisfaction with cycle time improvements, quality of the offering, and project learning is key. This suggests that procurement professionals can use ERAs to obtain a balanced set of outcomes (Carter et al. 2004). In addition, our results suggest that buying firms can improve ERA outcomes by managing organizational and project antecedents.

The results in terms of the control variables and their relationships with the ERA project outcomes under study are also of importance to practitioners. As can be seen in Table 3, supply market competition and supplier e-readiness, were positively related to ERA project outcomes, while supplier e-sourcing expertise did not show any positive relationships. These findings suggest that ERAs can be more successful when there are higher levels of supply market competition, and when suppliers feel more comfortable participating in e-sourcing, and also seem to suggest that it is less important to invite suppliers that are experienced and trained (Aloini et al. 2012, Amelinckx et al. 2008, Beall et al. 2003, Carter et al. 2004, Jap 2007).

5.3. Limitations and directions for future research

Our study has certain limitations. The cross-sectional research design limited our ability to determine causality between ERA project outcomes and ERA project satisfaction, and between ERA project outcomes and the antecedent factors. Reciprocal relationships are possible, for example between procedural fairness and relationship quality. A longitudinal design to explore the relationships posited in our model and the possible reciprocal relationships would be of value. More specifically, a repeated measures longitudinal design could shed additional light on the posited relationships over the course of sequential transactions. However, given that field data for a single ERA is enormously difficult to obtain (Jap 2007), collecting longitudinal data would be an exceptionally daunting task.

Also, respondents were asked to choose a recently completed ERA project in which they participated and to base their answers on their experience with and perceptions of this e-sourcing project. Since it is human nature to recall memorable events, it may be that the chosen ERA projects might be those that run particularly positively or particularly negatively (cf. Arnold et al. 2005), excluding random selection of ERA projects. Furthermore, a single respondent evaluated all the constructs, as a representative of the ERA project team. This raises the issue of common method bias, for which we estimated the influence of method bias, for which we estimated the influence to be unlikely. However, having multiple members of a team respond would not only alleviate the common method possibility, it may also offer additional important insights into ERA project team dynamics. This is also an interesting avenue for future research.

Using only the buying organization’s perceptions of ERA antecedent factors and outcomes has its limitations. For example, it is possible that buyers evaluated their procedures fair, while suppliers felt they were treated unfair (Jap 2003). In the context of an ERA, however, it is very difficult to obtain both perspectives for a large number of participant firms. In our study, the identity of the suppliers was confidential and not to be disclosed, making the study of the dyadic relationships between the buyer organization and the suppliers impossible. Future studies may attempt to cross-validate the buying organization’s perceptions by collecting data from buyer-supplier dyads to increase our understanding of ERA project satisfaction.

Finally, a promising direction for future research is the examination of the relationships of satisfaction with continued ERA use intention and actual ERA use from both the buyer and supplier perspective (Bhattacherjee 2001, Emiliani 2005, Hawkins et al. 2010, 2014), which would further increase our understanding of ERA project satisfaction.

Appendix 1. Studies on ERA outcomes and antecedent factors

<table>
<thead>
<tr>
<th>Authors</th>
<th>Relationships between ERA Outcomes and Antecedent Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jap (2002)</td>
<td>Studied the impact of auction format (price visibility, setting the reserve price, closing the event, awarding the event), size of the auction, supplier selection, and communication, training and support on buyer satisfaction with the auction tool, improvements in the exchange process, evaluations of the auction tool, expectations of continued use of the electronic auction tool, satisfaction with the winning/non-winning suppliers, expectations of continued use of the winning/non-winning suppliers, and changes in behavior of winning/non-winning suppliers. The study of these relationships was based on an exploratory survey, completed by 38 sourcing managers of four Fortune 100 buying organizations.</td>
</tr>
<tr>
<td>Beall et al. (2003)</td>
<td>Identified the following key factors for successful ERAs (success defined as yielding sufficient price savings): level of competition, size of the ERA event, supplier visibility, lotting strategy, item specificity and complexity, switching costs, supplier success, and change costs. These factors were identified through exploratory qualitative interviews with buyers, suppliers and third-party providers of ERA services.</td>
</tr>
<tr>
<td>Jap (2003)</td>
<td>Studied the impact of the auction format (open versus sealed-bid auctions) on buyer cost savings (the percentage reduction in price from historical cost), and on the buyer–supplier relationship (the suppliers’ suspicions of opportunism and their willingness to make idiosyncratic investments). Based on a quasi-experiment involving six ERAs conducted in the supply base of one industrial buyer (survey with 68 respondents), the auction format did not have an impact on cost savings, open bid auctions increased suppliers’ suspicions of opportunism, and sealed bid auctions increased the willingness to make idiosyncratic investments.</td>
</tr>
<tr>
<td>Smeltzer and Carr (2003)</td>
<td>Identified the following conditions for success – reducing operating and material costs – in ERA projects, based on field interviews with 41 purchasing professionals: clear and comprehensive product or service specifications, large enough purchase lots, appropriate supply market conditions (sufficient number of competitive suppliers, excess supply capacity, elastic market prices), and an appropriate infrastructure within the buying organization (strategic sourcing approach, accurate demand forecast).</td>
</tr>
<tr>
<td>Smart and Harrison (2003)</td>
<td>Suggest that an ERA in and of itself is not necessarily a mechanism for reducing the price, rather the competition it introduces is key. Based on six case studies through participant interviews,</td>
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</table>
### Appendix 1 (continued)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Relationships between ERA Outcomes and Antecedent Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Millet et al. (2004)</td>
<td>Studied the impact of number of invited, accepting, attending and bidding suppliers in an ERA as well as rank auction type, number of bids and allowing for overtime bidding, on price reduction. From an analysis of data on 14,188 online procurement auctions conducted by a large multinational firm, they found that the highest price reduction results were obtained by inviting at least five or six, up to a maximum of 13, high-quality suppliers to the ERA and making invited suppliers actually participate in the ERA by using the right auction format (price visibility, number of lots), and by encouraging active bidding.</td>
</tr>
<tr>
<td>Carter et al. (2004)</td>
<td>Observed a positive impact of the number of participating suppliers in the ERA, the degree of competition, price visibility, the monetary volume, and the number of lots on price reductions, and consider the consequences of ERAs on productivity and cycle time reduction, buyer–supplier relationship, and ethical improprieties, based on case study visits at 15 providers, 16 buying organizations and 15 suppliers.</td>
</tr>
<tr>
<td>Wagner and Schwab (2004)</td>
<td>Identified eight conditions that have to be favorable in order to achieve lower purchasing prices in ERAs: ease of specifying demand, auction volume, expense of switching suppliers, number of suppliers participating, competition among suppliers participating, power of the buyer, complexity of the negotiation package, and time to auction, based on interviews with practitioners and academics.</td>
</tr>
<tr>
<td>Daly and Nath (2005b)</td>
<td>Developed guidelines and principles for relationship marketers to help render ERAs more relationship-friendly, including subsidies for investment, price negotiation after the auction, and payments to losing bidders. Emilian and Stec (2005), however, refute these guidelines and consider them to be misaligned with industry practice.</td>
</tr>
<tr>
<td>Hartley et al. (2005)</td>
<td>Studied the buyer’s satisfaction with ERAs and find that ERA adopting buying organizations were more satisfied with the purchase price, than with the supplier relationship and the ERA process itself, based on a survey with 47 supply chain managers.</td>
</tr>
<tr>
<td>Peary et al. (2007)</td>
<td>Studied the impact of relational (versus discrete) governance structure of ERAs on purchase price, supplier cooperation and time savings across different purchase categories (standardized direct materials and maintenance, repair and operating (MRO) supplies) and find that a relational governance structure has a positive impact on supplier cooperation, but negatively influences purchase price reduction and time savings, based on a cross-industry mail survey of 142 purchasing professionals.</td>
</tr>
<tr>
<td>Carter and Stevens (2007)</td>
<td>Studied the impact of price visibility, number of suppliers, and supplier need to win the contract on price savings and the buyer–supplier relationship (suppliers’ perceptions of buyer opportunism). Based on a laboratory experiment with 97 MBA and business PhD students, the authors found that rank (versus price) visibility, high supplier need to win a contract, and more suppliers were effective in obtaining price savings, and that the buyer–supplier relationship deteriorated as the price dropped.</td>
</tr>
<tr>
<td>Jap (2007)</td>
<td>Studied the impact of several ERA attributes (number of bidders, economic stakes, and price visibility) as well as the price dynamics on the inter-organizational relationship (consisting of the suppliers’ suspicions of opportunism, their overall satisfaction with the relationship, and their expectations of relationship continuity). Based on quasi-experiments involving 25 ERAs conducted by four buying organizations in a variety of industries, the author found that a large number of bidders (with a maximum of twelve), a large number of lots, a substantial size of the purchase contract, partial price visibility, and moderate price drops benefited the buyer–supplier relationship.</td>
</tr>
<tr>
<td>Jap and Haruvy (2008)</td>
<td>Studied the impact of the buyer–supplier relationship (in terms of willingness to make specific investments and relationship propensity) before the auction on the bidding behavior during the event, as well as the effect of bidding behavior along with specific auction attributes (number of bidders, number of bids, duration of the auction) on the buyer–supplier relationship after the event. Based on longitudinal survey data from 60 participants in 12 ERAs conducted by 2 Fortune 50 companies, the authors found that incumbency, many bidders, and a willingness to make specific investments lead to less aggressive bidding, whereas the total number of bids from competing suppliers increases aggressiveness. Bidding aggressiveness has a negative impact on the buyer–supplier relationship and a longer auction duration is gentler on the relationship.</td>
</tr>
<tr>
<td>Amelinckx et al. (2008)</td>
<td>Posited organizational and project antecedents that impact financial, operational and strategic ERA project outcomes, and introduced supplier-related factors that moderate the antecedents–outcomes relationships, based on exploratory multiple-case study research in Europe.</td>
</tr>
<tr>
<td>Hawkins et al. (2010)</td>
<td>Explored ERA appropriateness and the decision to source via ERA, based on eight case studies, and identified external, strategy factors (attractiveness, specifiability, category of spend, competition, and expected savings) and internal, human factors (social influence, buyer confidence, and prior ERA sourcing satisfaction) as antecedent factors.</td>
</tr>
</tbody>
</table>
| Yeniyurt and Watson (2011) | Studied the impact of supplier characteristics, bidding history and experience, auction configuration, and timing on the suppliers’ propensity to submit bids in ERAs. Based on the laboratory experiment of Carter and Stevens (2007), the authors found the supplier’s need for (continued on next page)
Appendix 1 (continued)

<table>
<thead>
<tr>
<th>Authors</th>
<th>Relationships between ERA Outcomes and Antecedent Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ray et al. (2011)</td>
<td>Proposed a relationship-preserving mechanism in ERA use for a limited supplier base, consisting of intermittently awarding business as well as a penalty scheme for untruthful behavior and tested this mechanism through a simulation study</td>
</tr>
<tr>
<td>Aloini et al. (2012)</td>
<td>Studied the impact of 6 antecedents on e-auction price and process performance: market context, supplier characteristics, buyer characteristics, buyer–supplier relationship, product characteristic, and auction process. Based on an online survey to a panel of academic experts and practitioners (N = 78), the authors find that these antecedents impact e-auction price and process performance</td>
</tr>
</tbody>
</table>

Appendix 2. Survey questions

Satisfaction (adapted from Cannon and Perreault 1999, Homburg and Stock 2004)

Please indicate how strongly you agree with the following statements (1 = “strongly disagree” and 7 = “strongly agree”):

- if the project team had to do it all over again, they would still choose to use electronic sourcing (SAT1),
- for the project team, electronic sourcing is first choice for the purchase of this product/service (SAT2),
- on an overall basis, the experience with this project has been positive (SAT3).

Price savings (adapted from Beall et al. 2003, Jap 2007, Smart and Harrison 2003)

What was the percentage change in contract price compared to the historical price or, if no historical price was available, to the estimated market price that resulted from the electronic sourcing project?

Cost reduction (adapted from Liang and Huang 1998)

Please indicate how strongly you agree with the following statements, relative to the presently discussed project (1 = “strongly disagree” and 7 = “strongly agree”):

- Our use of electronic sourcing significantly reduced the . . .
  - negotiation cost (COST1),
  - communication cost (COST2).

Cycle time improvement (adapted from Hult 1997, 2002)

Please indicate how strongly you agree with the following statements, relative to the presently discussed project (1 = “strongly disagree” and 7 = “strongly agree”):

- we have seen an improvement in the cycle time of the procurement process (CYC1),
- we were satisfied with the speediness of the procurement process (CYC2),
- compared with the traditional sourcing process, the electronic sourcing process was shorter (CYC3),
- based on our knowledge of the electronic sourcing process, we think it was short (CYC4).

Quality of the offering (adapted from Stanley and Wisner 2001)

How do you rate (1 = “very low” and 7 = “very high”):

- the overall product/service quality? (QUAL1),
- the quality of delivered product/service? (QUAL2),
- the quality of the product/service compared to your specifications? (QUAL3),
- the quality of the product/service compared to your expectations? (QUAL4).

Relationship quality (adapted from Sriram and Stump 2004, Stump and Sriram 1997)

The relationship with the current, active supplier(s) that won the business through this electronic sourcing project was characterized by (1 = “to a very little extent” and 7 = “to a very large extent”):

- mutual trust (REL1),
- information sharing (REL2),
- overall co-ordination (REL3),
- relationship commitment (REL4).

Project learning (adapted from Blazevic and Lievens 2004)

Please indicate how strongly you agree with the following statements, relative to the presently discussed project (1 = “strongly disagree” and 7 = “strongly agree”):

- our experience and learning in this project proved to be essential for the successful creation and completion of subsequent projects (LEAR1),
- the knowledge acquired during this project served as an essential input for other new projects (LEAR2),
- the development of this project created a general development expertise that eased the introduction and development of subsequent projects (LEAR3),
- the expertise of developing this new project led to an enhanced know-how for future projects (LEAR4).

Supply base rationalization (adapted from Chen and Paulraj 2004, Stump and Sriram 1997)

Please indicate how strongly you agree with the following statements, relative to the presently discussed project (1 = “strongly disagree” and 7 = “strongly agree”):

- thanks to this project, we maintain a close relationship with a limited pool of suppliers (RAT1),
- thanks to this project, we rely on a small number of high quality suppliers (RAT2),
- the use of electronic sourcing reduced the number of active suppliers for this product/service (RAT3).


Please indicate how strongly you agree with the following statements (1 = “strongly disagree” and 7 = “strongly agree”):

Top management...
– supports electronic sourcing (TMS1),
– keeps the pressure on purchasing units to work with electronic sourcing (TMS2),
– is likely to invest funds in electronic sourcing (TMS3),
– strongly encourages the use of electronic sourcing (TMS4),
– controls electronic sourcing closely enough to resolve conflict among different organizational subunits (TMS5).

Organizational commitment (adapted from Foote et al. 2005, Ginzberg 1981)

Please indicate how strongly you agree with the following statements (1 = “strongly disagree” and 7 = “strongly agree”):

– electronic sourcing does not fit well with our organization’s way of doing things (OC1),
– In the long run, there is not much to be gained by using electronic sourcing (OC2),
– the company’s decision to use electronic sourcing was a definite mistake (OC3).

Cross-functional team (adapted from Blazevic and Lievens 2004)

Please indicate how strongly you agree with the following statements, relative to the presently discussed project (1 = “strongly disagree” and 7 = “strongly agree”):

– this project involved cooperation from different functional specialists (CFT1),
– the development of this project was characterized by the involvement of a wide range of specialist skills including purchasing, operations, and (quality control) engineers (CFT2),
– this project required skills and professional inputs from a diversity of functional departments (CFT3).

Project team expertise (adapted from Ohanian 1990)

Please indicate how strongly you agree with the following statements, relative to the presently discussed project (1 = “strongly disagree” and 7 = “strongly agree”):

– our project team possessed the necessary expertise in electronic sourcing (PTE1),
– we believe our project team was knowledgeable about electronic sourcing (PTE2),
– we consider our project team to be experienced in electronic sourcing (PTE3),
– our project team was skilled in electronic sourcing (PTE4).

Procedural fairness (adapted from Kumar et al. 1995, Tyler and Lind 1992)

During the electronic sourcing project, our company (1 = “strongly disagree” and 7 = “strongly agree”):

– did not discriminate but rather treated all suppliers similarly (FAIR1),
– applied consistent policies and decision making procedures across all suppliers (FAIR2),
– treated the suppliers with respect (FAIR3).

Control variables

Please indicate how strongly you agree with the following statement (1 = “strongly disagree” and 7 = “strongly agree”):

– the supply market was very competitive (adapted from Cannon and Perreault 1999),
– suppliers felt comfortable (regarding security, privacy, etc.) engaging in electronic business (adapted from Barua et al. 2004),
– the supply base possessed the necessary expertise in electronic sourcing (adapted from Ohanian 1990).

Reverse coded items.

Appendix 3. Scale items

<table>
<thead>
<tr>
<th>Constructs and items</th>
<th>Loadings</th>
<th>α</th>
</tr>
</thead>
<tbody>
<tr>
<td>Top management support</td>
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<td></td>
</tr>
<tr>
<td>TMS1</td>
<td>0.74</td>
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</tr>
<tr>
<td>TMS2</td>
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</tr>
<tr>
<td>TMS3</td>
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<td></td>
</tr>
<tr>
<td>TMS4</td>
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<tr>
<td>TMS5</td>
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<tr>
<td>Organizational commitment</td>
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<tr>
<td>OC1</td>
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<tr>
<td>OC2</td>
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<tr>
<td>OC3</td>
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<tr>
<td>Cross-functional team</td>
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<td>CFT1</td>
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<tr>
<td>CFT2</td>
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<tr>
<td>CFT3</td>
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<tr>
<td>Project team expertise</td>
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<tr>
<td>PTE1</td>
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<td>PTE4</td>
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<td>Procedural fairness</td>
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<td>FAIR2</td>
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<td>FAIR3</td>
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<tr>
<td>Cycle time improvement</td>
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<td>CYC4</td>
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<td>Quality of the Offering</td>
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<td>QUAL4</td>
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<td>Relationship quality</td>
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<td>LEAR4</td>
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</table>

(continued on next page)
### Appendix 4. Factor loadings and cross-loadings

<table>
<thead>
<tr>
<th>Constructs and items</th>
<th>TMS</th>
<th>OC</th>
<th>CFT</th>
<th>PTE</th>
<th>FAIR</th>
<th>CYC</th>
<th>QUAL</th>
<th>REL</th>
<th>LEAR</th>
<th>RAT</th>
<th>SAT</th>
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<tr>
<td><strong>Supply base rationalization</strong></td>
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<tr>
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<td>0.28</td>
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<td>SAT2</td>
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References

Aberdeen Group, 2005. Best practices in e-procurement: Reducing costs and increasing value through online buying. Boston, MA.


