

The appropriateness of electronic reverse auctions – an explanation from the incomplete contract theory and the resource dependence theory

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Abstract: Despite the growing importance of electronic reversed auctions (ERAs) few empirical studies have explored the appropriateness of ERA usage. Most commonly, transaction cost theory has been used for these ERA-studies, relying on arguments that consider asset specificity as the primary explanation for organizational boundaries. We seek a more thorough explanation for perceived Electronic Reverse auctions (ERA) appropriateness, using multiple theoretical perspectives. This study includes insights and variables from the incomplete contract theory and the resource dependence theory. A conceptual model for ERA appropriateness was developed from the buyer perspective. This model was empirically validated using a survey of 176 purchasing professionals. The findings suggest a positive impact of buyer power on ERA appropriateness, while total interdependence does not appear to affect ERA appropriateness. The results further indicate that asset specificity stimulates ERA usage. ERA-minded purchasers consider ERAs as a tool for exploiting buyer power and for imposing relationship investments on suppliers. At the same time, variables related to collaboration do not appear to be important for ERA appropriateness from the perspective of the buyer. Suppliers are required to make relation-specific investments, but are not valued for their relational efforts. The novelty of this article Scholars have taken several approaches to investigate and to explain company's sourcing decisions that include ERA use. We address an important gap in the literature by using the incomplete contract theory in combination with the resource dependence theory to provide a better understanding of buyers' perceived ERA appropriateness.

Keywords: Auctions, Procurement, Transactional relationships), Other – electronic reversed auctions

JEL: D44, H57, L14, M29

1. Introduction

Companies are faced with many new problems and opportunities with the emergence of the Internet and the advancements in information and communication technologies. Many applications of e-commerce have been developed since the mid-1990s (e.g. Tarazona-Bermudez et al. 2014). Johnson and Whang (2002) categorized forms of e-business technology into three types: e-commerce, e-collaboration, and e-procurement. Buyers increasingly use e-procurement for different purchasing activities, including request for proposals, tendering, authorization, ordering, delivery and payment. Studies have identified the potential benefit from e-procurement, especially reducing administrative and process costs, more effective purchasing processes, shortening the order fulfillment cycle time, lowering inventory levels and the price paid for goods, greater visibility on expenditure control, and benefits from managing suppliers (e.g. Croom 2000; Davila et al. 2003). Within the possibilities of e-procurement, there is an increasing interest in e-reverse auctions (Saprikis 2013). In an electronic reverse auction (ERA), a buyer invites suppliers with a request for quotation who will directly compete against each other online, in real-time by submitting e-bids for a specific good or service (Hackney et al. 2007). Many transactions that would be previously conducted as traditional face-to-face negotiations are now candidates for online, real-time auctions (Williams, Dobie 2011).

The increasing popularity of ERAs has resulted in a burgeoning of academic research (Yeniyurt et al. 2011). Nevertheless, the examination of ERAs is considered still in the early stages leaving research with much more to uncover (Saprikis 2013). ERA use has been criticized because it may negatively impact supplier relationships (e.g. Percy et al. 2007; Gattiker et al. 2007; Carter, Stevens 2007). Therefore, it is important to examine how purchasing professionals reach the conclusion that an ERA is appropriate for a particular procurement situation. Explanations of why purchasing professionals decide to utilize an ERA are incomplete. Despite the growing importance of ERAs few empirical studies have explored the appropriateness of ERA usage (e.g. Joo, Kim 2004; Kaufmann, Carter 2004; Mithas et al. 2008; Hawkins et al. 2009).

Scholars have taken several approaches to investigate and to explain company's sourcing decisions that include ERA use. Most commonly, transaction cost theory has been used for these ERA-studies, relying on arguments that consider asset specificity as the primary explanation for

organizational boundaries (Malone et al. 1987; Williamson 1975). However, there is a call for expanding traditional transaction cost-reasoning by embracing other theoretical perspectives (Mithas et al., 2008). The current study addresses an important gap in the literature by using the incomplete contract theory in combination with the resource dependence theory in a search for a better understanding of buyers' perceived ERA appropriateness.

A comprehensive view of buyer-supplier relationships should include an understanding of the interdependence structure that encompasses the importance of power and dependence (e.g. Pai, Yeh 2016; Caniëls, Gelderman 2007). Power and dependence are important concepts, explaining ERA use, for instance because ERAs can be imposed in buyer dominated situations (Tassabehji 2010). The concepts of power and dependence are firmly rooted in the resource dependence theory (Pfeffer, Salancik 1978). Building on the resource dependence theory, this study includes power and dependence as variables to explain the appropriateness of ERAs from the buyer perspective. Incomplete contract theory expands our understanding of ERA use by adding the notion of non-contractibility to asset specificity (Bakos, Brynjolfsson 1993a, 1993b). Non-contractibility refers to important, yet difficult to specify elements of exchange such as trust, flexibility, commitment to quality, and information sharing (Mithas et al. 2008). This study will investigate the impact of asset specificity and non-contractibility on the perceived ERA appropriateness. Hypotheses are formulated and empirically tested through an electronic survey among B2B procurement professionals in the Netherlands.

2. Theoretical background and hypotheses

2.1 Electronic reverse auctions

In a traditional auction, sellers offer one or more items for sale while potential buyers compete with each other for purchasing an item of common interest. In a reverse auction, multiple suppliers are vying for a single buyer, so that the supplier with the lowest offer wins the auction (Tarazona-Bermudez et al. 2014). The electronic variant of a reverse auction requires that pre-qualified suppliers directly compete against each other online in real-time (Beall et al. 2003). An ERA is a downward bidding event in which suppliers submit successively lower prices bids within a fixed timeframe (e.g. Schoenherr, Mabert 2011). Most commonly, buyers announce

requirements and select suppliers from the lowest bidders (Mithas et al. 2008). ERAs can substitute traditional, asynchronous, paper-based or email-based request for proposals and face-to-face negotiations (Hawkins et al. 2009).

An electronic reverse auction (ERA) requires clear, complete and comprehensive specifications of the product or service (Tarazona-Bermudez et al. 2014). Other requirements refer to the magnitude of the purchase, and appropriate market conditions and infrastructure (Pereira et al. 2011). Commodities such as bulk materials, stock commercial goods, or non-technical services are most suitable for an ERA (Saprikis 2013), because they can be easily specified and their switching costs are negligible (Smart, Harrison 2003).

ERAs are increasingly and widely used in order to reduce the cost of materials (e.g. Percy, Giunipero 2006). They reverse the roles of buyers and suppliers, with the main buyer's objective to drive purchase prices down (Kros et al. 2011). ERA sourcing has had continued use (Schoenherr, Mabert 2011), and the soaring number of business-to-business (B2B) ERA service providers proves continued ERA interest and growth expectations (Aloini et al. 2012; Hawkins et al. 2010; Kros et al. 2011). ERAs have brought significant savings in terms of prices and transaction costs (Aloini et al. 2012; Schoenherr, Mabert 2011). Research suggested other ERA benefits, i.e. cycle time reductions, quality improvement, a broader supply base (Yeniyurt et al. 2011), faster information transmission, and increased competition (Kros et al. 2011). Suppliers may benefit too from ERAs. The participation in ERAs could provide suppliers with specific benefits, such as new distribution channels, a wider customer data base, new means to increase sales, to reduce excess inventory, and reduce the cost of products for sale (Tarazona-Bermudez et al. 2014).

However, ERAs have negative aspects. Firstly, research suggests overstated savings due to price reduction focus and not total supply chain costs focus. Secondly, ERAs potentially damage buyer-supplier relationships (Caniëls, Van Raaij 2009; Schoenherr, Mabert 2011), and challenge suppliers' trust in buyers (Nadler, Kros 2010). Thirdly, ERAs constitute a potentially coercive use of buyer market power (Giampietro, Emiliani 2007). Buyer-supplier tensions exist, especially since suppliers think ERAs only benefit buyers (Emiliani 2004; Tassabehji et al. 2006). ERA competition may induce suppliers to substantially lower their bids, which ultimately results in a buying organization that benefits at the expense and profitability of the 'winning' supplier (Yeniyurt et al. 2011). However, sound empirical research explaining perceived ERA

appropriateness is lacking, and few studies empirically examined the determinant factors of ERA use (Mithas et al. 2008; Tassabehji 2010).

Perceived ERA appropriateness is defined as “the degree to which a sourcing professional views the use of an ERA as a fit between the attributes of the tool, the specific requirement being sourced, and the supply market” (Hawkins et al. 2009: 56). The perceived appropriateness is an attitude that is likely to have a strong link with behavior (cf. the theory of reasoned action, Fishbein, Ajzen 1975). Therefore, perceived ERA appropriateness will precede a decision to actually use an ERA, although other factors, such as organizational policy, guidelines and organizational incentives, are likely to impact the decision-making processes of purchasing professionals (Hawkins et al. 2009; Gumussoy, Calisir 2009). The greater the perception of appropriateness, the higher the possibility that a purchasing professional will decide to use ERAs (Hawkins et al. 2010). In this study we will explore how purchasing professionals may decide to use an ERA by examining and explaining the perceived ERA appropriateness from a buyer’s perspective.

2.2 Transaction cost theory: asset specificity

The transaction cost theory is most commonly used in studies on ERAs, focusing on asset specificity as the primary explanation for ERA usage (Mithas et al. 2008). Scholars have argued the need to expand traditional transaction cost-reasoning. Bakos and Brynjolfsson (1993a, 1993b) proposed to include non-contractible elements in studies, explaining procurement choices such as using reverse auctions.

Asset specificity refers to the degree to which investments in a particular asset has lower value in its next-best use (Williamson 1975). Relation-investments result in higher levels of asset specificity and higher levels of transaction and coordination costs. The electronic market hypothesis (EMH) predicted an IT-enabled reduction of coordination costs, inducing firms to prefer markets to hierarchies (Malone et al. 1987). EMH draws on the transaction cost theory, explaining strategic sourcing decisions (Williamson 1975). Although research indeed found reduced coordination costs, less support has been reported for the EMH (e.g. Choudhury et al. 1998; Hess, Kemerer 1994). An implication of the EMH would be that ERAs are appropriate in relationships that require no substantial relationship specific investments.

ERAs have long been considered as the ultimate means for cost reductions and putting extreme prices pressure on competing suppliers. The price is driven down by suppliers who all need to meet the buyer's full and fixed product specifications (e.g. Cullen, Webster 2007). However, in many instances buying companies are not in a position to define the specifications up-front (e.g. Ellram et al. 2007) or prefer a sourcing process in which stabilization and destabilization of specifications stimulate and facilitate improved supplier performance (e.g. Selviaridis et al. 2011). Changing (service) definitions can be seen as 'business as usual' with collaborative suppliers (Gelderman et al. 2015). In addition, it could well be that companies use ERAs as a 'supplier discovery' mechanism and then move on to establish a deeper collaborative supplier relationship (Mithas et al. 2008). ERA outcomes are not limited to price savings, operational and strategic outcomes are important as well (Standaert et al. 2011). Operational performance refers to cycle time reductions, buying process efficiency and the quality of the offering that suppliers provide, key strategic ERA outcomes are relationship quality, project learning and supply base rationalization. A recent study found that operational and strategic outcomes were positively related to ERA satisfaction, while cost reduction was not (Standaert et al. 2015). Suppliers are required to make specific investments, also in the case of ERAs (Jap, Haruvy 2008). A supplier that invests in an asset specificity element such as technical labour skills while possessing business acumen and understanding that match the ERA contemplating buyer's requirements, will likely be tempted to participate in the ERA. Buyers will appreciate the willingness to make relationship investments of suppliers participating in an ERA. We hypothesize:

H₁: Asset specificity is positively related to perceived ERA appropriateness.

2.3 Incomplete contract theory: non-contractibility

In essence, asset specificity is a factor, related to cost and economic efficiency. A more complete explanation of ERA appropriateness can be pursued by including intangible aspects of specificity (Mithas et al. 2008). It is difficult and often impossible to specify all the contingencies and requirements in a request for proposal and later on in a contract (e.g. Chou et al. 2012). When it is difficult or undesirable to specify requirements in a way that it permits the measurement of

quality outcomes, a non-contractibility approach will be preferred. In such cases, the contracts are not fully specified, instead, some criteria are dealt with in trust-based ways (Hansson, Longva 2014). The incomplete contract theory highlights the importance of non-contractibility (Bakos, Brynjolfsson 1993a, 1993b). This theory complements asset specificity by identifying relational arguments and intangible investments (Mithas et al. 2008). Non-contractibility involves difficult-to-specify future investments, needed in a set of current or future exchanges with a business partner (Bakos, Brynjolfsson 1993a). Typical non-contractible elements of exchange are trust, responsiveness, flexibility, and information sharing (Mithas et al. 2008).

The incomplete contracts theory stipulates that buyers will prefer close relationships with a limited number of suppliers, if supplier investments in non-contractible parameters are critical to the relationship success (Bakos, Brynjolfsson 1993b). It can be cost-effective to rely on trust, ex-post bargaining, and long-term relationships to deal with non-contractible aspects, instead of depending on (incomplete) contracts (Bakos, Brynjolfsson 1993a). This logic suggests that buyers will avoid ERAs in exchange relationships with high degrees of non-contractibility (Mithas et al. 2008). We hypothesize:

H₂: Non-contractibility is negatively related to perceived ERA appropriateness.

2.4 Resource dependence theory: power and dependence

Resource dependence theory is concerned with how organizational behavior is affected by external resources. The main principle of this theory is that it considers the ability to acquire and maintain resources as the key to competitive advantage and even organizational survival (Pfeffer, Salancik 1978). In order to obtain favorable power and exchange conditions, companies are advised to minimize their own dependence and by maximizing the dependence of other organizations on themselves (Pfeffer 1981). Power and dependence are generally considered important concepts for understanding buyer-supplier relationships in general (e.g. Cox 2004), and also for understanding perceived ERA appropriateness in particular (Tassabehji 2010). However, most commonly power and dependence are not included in ERA studies (e.g. Aloini et al., 2012; Parente et al. 2004).

Power and dependence are closely related concepts. Dependence refers to the degree that a party needs to maintain its relationship in order to achieve desired goals (Frazier et al. 1989). Buyer power can be conceptualized as the difference in value between the supplier's dependence on the buyer and the buyer's dependence on the supplier (Buchanan 1992; Caniëls, Gelderman 2007).

A buyer has power over a supplier to the extent that he can get the supplier to do things that he might otherwise not do (Blau 1964). In an asymmetrical relationship, the most dependent party is likely to comply with the most powerful party (e.g. Gelderman et al. 2008). A situation of buyer dominance creates opportunities for exploiting transactional market relationships (Schoenherr, Mabert 2011). This means that power can be an important determinant factor for ERA use. The larger the buyer's market power, the more supplier pressure the buyer can exert. Differences in power influence motivation to compete in ERAs (Aloini et al. 2012). ERAs tend to be used by buyers with supplier leverage (Emiliani 2005). ERAs are likely to be used in situations of buyer dominance (Tassabehji et al 2006). Following this line of reasoning, we hypothesize that procurement professionals are more likely to use an ERA if dependence is shifting in their favor.

H₃: Buyer power is positively related to perceived ERA appropriateness.

Various scholars have argued that the interdependence structure of buyer-supplier relationship encompasses the power asymmetry and the total interdependence of both companies (e.g. Kumar et al. 1995; Geyskens et al. 1996). Interdependence refers to the intensity of a relationship (Caniëls, Gelderman 2007). A high level of interdependence is the result of a combination of high buyer dependence and high supplier dependence. In other words, interdependence exists when both the buyer and the supplier rely on one another within their relationship (Hoejmose et al. 2013). A widely-used method for operationalizing interdependence in empirical studies is to calculate the sum of each firm's dependence on its partner (e.g. Pai, Yeh 2016).

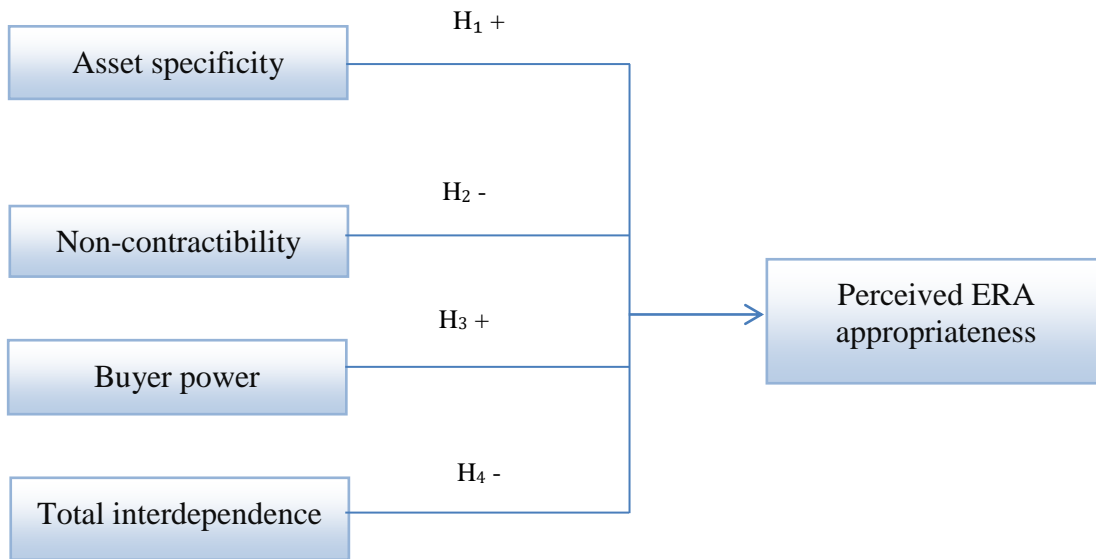
A high level of total interdependence makes it dangerous for either party to engage in opportunistic behavior and negative tactics or coercion (Kumar et al. 1995). When companies acknowledge that each is dependent on the other, their relationship is appropriate for achieving

mutually beneficial goals (Pai, Yeh 2016). A high level of interdependence is an indicator for a strong, long-term relationship in which both parties have invested (Caniëls, Gelderman 2007), most likely characterized by mutual trust and mutual commitment (Geyskens et al. 1996). Therefore, purchasing professional might be less likely to use ERAs in cases of high interdependence. We hypothesize:

H4: Total interdependence is negatively related to perceived ERA appropriateness.

Figure 1 shows the conceptual model and the hypothesized relationships, explaining perceived ERA appropriateness from the buyer’s perspective.

Figure 1 Conceptual model



Source: authors’ own elaboration

3. Methodology

Data collection took place through an electronic survey amongst a sample of procurement professionals in the Netherlands. The sampling frame consisted of 742 private sector organizations in the Netherlands. Procurement professionals at organizations with more than 300

full-time employees were invited through LinkedIn. The final version of the questionnaire was first administered online in February 2014. After a week non-respondents received a kind reminder with the request to complete the questionnaire. In order to stimulate response, two iPads were raffled among participants. Respondents were asked to provide information about their experiences, perceptions and opinions concerning ERAs within their own organization, and were given confidentiality and anonymity guarantees. Respondents were asked to take a recent, specific sourcing project in mind, in which they were personally involved. The project should involve the procurement of a leverage product (high financial value, low supply risk). The focus was set on leverage product, since this product category can be sourced either through (electronic) tendering or through a process of negotiation (Kraljic 1983; Kumar, Maher 2008). In order to be able to measure ERA appropriateness, it was not necessary that an ERA was used in this specific sourcing project. The questions were answered with the selected supplier in mind. This approach is similar to the research design of Mithas et al. (2008) and Schoenherr and Mabert (2011) in which respondents were asked to keep a specific product in mind.

The variables in the hypotheses were measured as multiple-item constructs on 5-point Likert scales. All operationalizations were derived from measurement scales that were used and validated in other academic studies. Perceived ERA appropriateness is operationalised as a 4-item first order construct, based on Hawkins et al. (2009). The items for asset specificity and non-contractibility have been derived from Mithas et al. (2008). Buyer dependence and supplier dependence both consist of 4 items, based on Caniëls and Gelderman (2007). Buyer power is calculated as the difference between supplier dependence and buyer dependence. A positive sign for buyer power indicates that the supplier is more dependent on the buyer than the other way around, whereas a negative sign would point at supplier dominance. The scale runs from -4 (maximum supplier dominance) to +4 (maximum buyer dominance). Total interdependence is measured by the sum of buyer dependence and supplier dependence (on a scale that runs from +2 minimal interdependence to +10 for maximum interdependence). Buyer dependence and supplier dependence were measured first, with total interdependence defined as the sum of these, and buyer power as the difference between supplier and buyer dependence. This is a widely-used method in the literature for operationalizing (buyer) power and total interdependence (e.g. Kumar et al. 1995; Duffy, Fearne 2004; Caniëls, Gelderman 2007, 2010; Pai, Yeh 2016).

4. Results

A total number of 176 completed questionnaires were received, yielding an effective response rate of 23.7% (176/742). The median time taken for the survey was just under 7 minutes and the 95% majority of respondents needed 4 to 18 minutes to complete the questionnaire. We included some background variables in order to get an insight in sample characteristics. Company size was measured by questions about the number of employees. About 12.5% of the respondents were employed at companies with less than 500 employees, while 15.3% worked at larger companies (500-1.000 employees). Most respondents were positioned at large companies with more than 1.000 workers (72.2%). A slight majority of the respondents is employed at companies with no former experience with reversed electronic auctions (57.4%). The other respondents work at companies that have organized electronic reverse auctions in the past. The inclusion of non-experienced respondents is not problematic, since we intended to measure and explain the perceived ERA appropriateness, not the actual ERA usage. As expected, we found higher levels of perceived appropriateness at companies that have used an ERA compared to companies that have not yet made the decision to use ERAs in their sourcing strategy (cf. Hawkins et al. 2010; Tassabehji 2010).

Table 1 Means, standard deviations, and correlations

	Mean	SD	1	2	3	4
1. Perceived ERA appropriateness	2.27	0.83				
2. Asset specificity	3.22	0.79	0.13 *			
3 Non-contractibility	3.65	0.52	0.08	0.20*		
4. Buyer power	0.42	0.88	0.26*	- 0.08	0.06	
5. Total interdependence	6.12	1.07	- 0.01	0.43*	0.12	- 0.11

Notes: N=176

* $p < 0.05$

The appendix shows the items that have been used for the construction and measurement of the variables. Cronbach's alpha's showed satisfactory levels, with a lowest value of 0.68 for supplier dependence. The variable constructs were calculated as the mean of items scores.

Table 2 Results of the multiple regression analysis

Dependent variable	Perceived ERA appropriateness		
Variables	Unstandardized coefficients	Standardized Beta	T
(constant)	1.645		
Asset specificity	.170	.163	1.984 ^a
Non-contractibility	.069	.043	.580
Buyer power	.245	.259	3.520 ^a
Total interdependence	-.046	-.059	-.728

Note: ^a indicates significant at $p < 0.05$. Adjusted $R^2 = .070$, F-value: 4.282^a, $n = 175$.

Multiple regression analysis was used to estimate the impact of the explanatory variables on the perceived ERA appropriateness. The results of the regression analysis are presented in table 2. The results show that asset specificity has a significant impact on perceived era appropriateness. Buyer power has also a significant impact on the dependent variable. The findings support hypothesis 1 and hypothesis 3. Hypothesis 2 predicted that non-contractibility and perceived ERA appropriateness are negatively related. However, we found a positive, non-significant relationship. No support was found for hypothesis 4 that posited a significant negative impact of total interdependence on perceived ERA appropriateness. The variables that are related to ‘competition’ (i.e. asset specificity and buyer power) are more related to the intended use of auctions compare to the variables that are connected to ‘collaboration’ (i.e. non-contractibility and total interdependence).

5. Discussion

Most studies on ERA use and ERA appropriateness are based on traditional transaction cost economics. Our study complements this perspective by including insights and variables from the incomplete contract theory and the resource dependence theory. The study is a response to a call for embracing other theoretical perspectives than transaction cost theory.

We find that buyer power has a positive impact on the perceived ERA appropriateness. Buyer power is associated with ERA use, confirming that the least dependent party (i.e. the dominant buyer) is in the position to impose an electronic reversed auction to the suppliers. The impact of buyer power on perceived ERA appropriateness is in line with previous research (e.g. Emiliani 2005; Tassabehji et al. 2006). We did not find a significant impact of total interdependence, contradicting the expectation that purchasers are less likely to use ERAs when buyers and suppliers are equally dependent on one another. Total interdependence has been introduced as an indicator for strong, long-term relationship with mutual commitments (e.g. Caniëls, Gelderman, 2007; Geyskens et al. 1996). It should be noted that power and dependence are understudied explanatory variables of research on ERA appropriateness. Buyer power and total interdependence are core concepts in the resource dependence theory (Pfeffer, Salancik 1978).

We expected a positive association between asset specificity and ERA appropriateness. The empirical findings of our study confirmed this positive relationship. Asset specificity refers to cost and efficiency. In this study we aimed at a more complete explanation of ERA appropriateness by including intangible aspects of specificity. From the incomplete contract theory we derived the variable ‘non-contractibility’, covering non-contractible elements of exchange, such as trust, flexibility, and information sharing. However, we did not find support for the hypothesis that expected a negative impact of non-contractibility on ERA appropriateness. This finding contrasts the results of Mithas et al. (2008) who reported a strong, significant explanatory power of non-contractibility on perceived ERA appropriateness. The difference might be due to their sample of large component manufacturers in the US automotive industry who are engaged in supplier interactions characterized by “a complex and changing set of activities over time” (Mithas et al. 2008: 718). The complexity of the procurement might be an important variable, explaining the usefulness and appropriateness of ERAs (cf. Gattiker et al. 2007).

The overall findings of our study seem to support the conviction of purchasing professionals that ERAs are especially appropriate in case of buyer dominance. Suppliers are required to make relationship investments, enforced by perceived buyer power. Apparently, the respondents consider ERAs (still) as a tool predominantly for imposing demands on dependent suppliers. The findings seem to underline that ERAs tend to be used by buyers with supplier

leverage (Emiliani 2005; Tassabehji et al. 2006), to exploit their power position (Caniëls, Van Raaij 2009). The variables related to collaboration (i.e. total interdependence and non-contractibility) did not appear to impact the perceived ERA appropriateness from the buyer perspective.

6. Conclusions and recommendations

Our aim was to contribute to a better theoretical understanding of ERAs by analyzing the survey data of 176 purchasing managers. The findings support a positive impact of buyer power and asset specificity on ERA appropriateness. No support was found for non-contractibility and interdependence. Even though power is at the heart of all B2B relationships (e.g. Cox 2004), the assumption that ERAs tend to be used by buyers with supplier leverage has not been included in empirical ERA studies (Emiliani 2005; Tassabehji et al. 2006). Apparently, in cases of buyer dominance, purchasing professionals are motivated to use ERAs in their sourcing strategy. Suppliers should realize that an invitation to participate in an ERA can be considered a form of power play from the buyer perspective. In addition, suppliers should be aware of buyers' expectation about the ability and willingness to invest in relationship-specific assets. A high level of asset specificity will in its turn contribute to the dominant position of buyers. The results of the study support the notion that purchasing professionals value ERAs for the economic gains and benefits at the expense of suppliers. Buyers do not associate the more collaborative aspects (interdependence and non-contractibility) with ERA appropriateness.

As expected, ERA users report higher scores on ERA appropriateness compared to non-users. It is not surprising that ERA usage in the past contributes to the intentions to use the tool in the future too. Non-users could benefit from this finding, in the sense that ERA adoption apparently leads to positive results.

To get more insights in the appropriateness of ERAs, future research could use a dyadic approach and include the experience and views of both buyers and suppliers. Another limiting aspect is the cross sectional nature of this study. The cross-sectional design limits the ability to determine causality between the explanatory variables and perceived ERA appropriateness. Also, respondents were asked to choose a recently completed tendering project in which they

participated and to base their answers on their experience with that particular purchasing process. People are inclined to remember more critical or important events and incidents. An interesting avenue for future research would be including multiple members and different functional specialists in the research design. Future studies may attempt to link the perceived appropriateness to the actual usage of and satisfaction with electronic reversed auctions.

Decisions in the area of global sourcing are likely to be challenged or hampered by organizational resistance. In the organizational behavior literature, risk aversion (or a lack of risk willingness) is considered an important part of organizational resistance to change (Bovey, Hede 2001, 2013). Future studies on ERAs could draw on *organizational behavior* research, focusing on issues like change management, (organizational) resistance, and risk aversion/willingness. Another promising theoretical perspective is the *contingency theory* (Hofer 1975). Research could identify elements in the environment to which purchasing professionals adjust their sourcing strategies (cf. Bakker, Kamann 2007). The institution's environment can strongly influence the development of structures and strategies within organizations (Sherer et al. 2016). The *institutional theory* posits that the stability of an industrial sector can be enhanced by elements from the institutional environment, such as the cultural belief systems, normative frameworks, and regulatory systems (Jensen et al. 2009). An interpretative perspective could be used investigating ERA adoption by professional purchasers.

References

- Aloini D., Dulmin R., Mininno V. (2012), E-reverse auction design: critical variables in a B2B context, "Business Process Management Journal", vol. 18 no. 2, pp. 219-249.
- Bakos J. Y., Brynjolfsson E. (1993a), From vendors to partners: information technology and incomplete contracts in buyer-supplier relationships, "Journal of Organizational Computing", vol. 3 no. 3, pp. 301-328.
- Bakos J.Y., Brynjolfsson E. (1993b), Information technology, incentives, and the optimal number of suppliers, "Journal of Management Information Systems", vol. 10 no. 2, pp. 37-53.
- Bakker E.F., Kamann D.F. (2007), Perception and social factors as influencing supply management: a research agenda, "Journal of Purchasing and Supply Management", vol. 13 no. 2, pp. 304-316.
- Beall S., Carter C., Carter P., Hendrick T., Jap S., Kaufmann L., Maciejewski D., Monczka R., Petersen K. (2003), The role of reverse auctions in strategic sourcing. Research Paper, "Center for Advanced Purchasing Studies", pp. 1-86.
- Bovey W.H., Hede A. (2001), Resistance to organizational change: the role of cognitive and affective processes, "Leadership & Organization Development Journal", vol. 22 no. 8, pp. 372-382.
- Caniëls M.C.J., Gelderman C.J. (2007), Power and interdependence in buyer supplier relationships: a purchasing portfolio approach, "Industrial Marketing Management", vol. 36 no. 2, pp. 219-229.
- Caniëls M.C.J., Van Raaij E.M. (2009), Do all suppliers dislike electronic reverse auctions? "Journal of Purchasing & Supply Management", vol. 15 no. 1, pp. 12-23.
- Carter C.R., Stevens C.K. (2007), Electronic reverse auction configuration and its impact on buyer price and supplier perceptions of opportunism: a laboratory experiment, "Journal of Operations Management", vol. 25 no. 5, pp. 1035-1054.
- Chou S.W., Hung J.H., Hsieh P.H. (2012), Understanding satisfaction with service providers from the resource-based view of a firm, "PACIS 2012 Proceedings Paper 87", pp. 1-15.
- Choudhury V., Hartzel K.S., Konsynski B.R. (1998), Uses and consequences of electronic markets: an empirical investigation in the aircraft parts industry, "MIS Quarterly", vol. 22 no. 4, pp. 471-507.
- Cox A. (2004), The art of the possible: relationship management in power regimes and supply chains, "Supply Chain Management: An International Journal", vol. 9 no. 5, pp. 346-356.
- Croom S.R. (2000), The impact of Web-based procurement on the management of operating resources supply, "Journal of Supply Chain Management", vol. 36 no. 1, pp. 4-13.
- Cullen A.J., Webster M. (2007), A model of B2B e-commerce, based on connectivity and purpose, "International Journal of Operations and Production Management", vol. 27 no. 2, pp. 205-225.
- Davila A., Gupta M., Palmer R. (2003), Moving procurement systems to the Internet: the adoption and use of e-procurement technology models, "European Management Journal", vol. 21 no. 1, pp. 11-23.
- Duffy R., Fearne A. (2004), The impact of supply chain partnerships on supplier performance, "International Journal of Logistics Management", vol. 15 no. 1, pp. 57-71.
- Ellram L.M., Tate W., Billington C. (2007), Service supply management: the next frontier for improved organizational performance, "California Management Review", vol. 49 no. 4, pp. 44-66.

- Emiliani M.L. (2004), Sourcing in the global aerospace supply chain using online reverse auctions, "Industrial Marketing Management", vol. 33 no. 1, pp. 65-72.
- Emiliani M.L. (2005), Regulating B2B online reverse auctions through voluntary codes of conduct, "Industrial Marketing Management", vol. 34 no. 5, pp. 526-534.
- Fishbein M., Ajzen, I. (1975), Belief, attitude, intention, and behavior: an introduction to theory and research, Addison-Wesley, Reading.
- Frazier G.L., Gill J.D., Kale S.H. (1989), Dealer dependence and reciprocal actions in a channel of distribution in a developing country, "Journal of Marketing", vol. 53 no. 1, pp. 50-69.
- Gattiker T.F., Huang X., Schwarz J.L. (2007), Negotiation, email and Internet reverse auctions: how sourcing mechanisms deployed by buyers affect suppliers' trust, "Journal of Operations Management", vol. 25 no. 1, pp. 184-202.
- Gelderman C.J., Semeijn J., De Zoete R. (2008), The use of coercive influence strategies by dominant suppliers, "Journal of Purchasing and Supply Management", vol. 14 no. 4, pp. 220-229.
- Gelderman C.J., Semeijn J., De Bruijn A. (2015), Dynamics of service definitions - an explorative case study of the purchasing process of professional ICT-services, "Journal of Purchasing and Supply Management", vol. 21 no. 3, pp. 220-227.
- Geyskens I., Steenkamp J.E.M., Scheer L.K., Kumar N. (1996), The effects of trust and interdependence on relationship commitment: a trans-Atlantic study, "International Journal of Research in Marketing", vol. 13 no. 4, pp. 303-317.
- Giampietro C., Emiliani M.L. (2007), Coercion and reverse auctions, "Supply Chain Management: An International Journal", vol. 12 no. 2, pp. 75-84.
- Gumussoy C.A., Calisir F. (2009), Understanding factors affecting e-reverse auction use: an integrative approach, "Computers in Human Behavior", vol. 25 no. 4, pp. 975-988.
- Hackney R., Loesch A., Irani Z., Ghoneim A., Ozkan, S. (2007), Evaluating eReverse auctions (EeRa): a case research note, "Transforming Government: People, Process and Policy", vol. 1 no. 1, pp. 59-66.
- Hansson, L., Longva F. (2014), Contracting accountability in network governance structures, "Qualitative Research in Accounting & Management", vol. 11 no. 2, pp. 92-110.
- Hawkins T.G., Randall W.S., Wittmann C.M. (2009), An empirical examination of reverse auction appropriateness in B2B source selection, "Journal of Supply Chain Management", vol. 45 no. 4, pp. 55-71.
- Hawkins T.G., Gravier M J., Wittmann C.M. (2010), Enhancing reverse auction use theory: an exploratory study, "Supply Chain Management: An International Journal", vol. 15 no. 1, pp. 21-42.
- Hess C.M., Kemerer C.F. (1994), Computerized loan origination systems: an industry case study of the electronic market hypothesis, "MIS Quarterly", vol. 18 no. 3, pp. 251-275.
- Hoejmose S.U., Grosvold J., Millington A. (2013), Socially responsible supply chains: power asymmetries and joint dependence, "Supply Chain Management: An International Journal", vol. 18 no. 3, pp. 277-291.
- Hofer C. (1975), Toward a contingency theory of business strategy, "Academy of Management Journal", vol. 18 no. 4, pp. 784-810.

- Jap S.D., Haruvy E. (2008), Interorganizational relationships and bidding behavior in industrial online reverse auctions, "Journal of Marketing Research", vol. 45 no. 5, pp. 550-561.
- Jensen T.B., Kjaergaard A., Svejvig P. (2009), Using institutional theory with sensemaking theory: a case study of information systems implementation in healthcare, "Journal of Information Technology", vol. 24 no. 4, pp. 343-353.
- Johnson M., Whang S. (2002), E-business and supply chain management: an overview and framework, "Production and Operations Management", vol. 11 no. 4, pp. 413-423.
- Joo Y., Kim Y. (2004), Determinants of corporate adoption of e-marketplace. an innovation theory perspective, "Journal of Purchasing and Supply Management", vol. 10 no. 2, pp. 89-101.
- Kaufmann L., Carter. C.R. (2004), Deciding on the mode of negotiation: to auction or not to auction electronically, "Journal of Supply Chain Management", vol. 40 no. 1, pp. 15-26.
- Kros J.F., Nadler S.S., Chen, H. (2011), The adoption and utilization of online auctions by supply chain managers, "Transportation Research Part E", vol. 47 no. 2, pp. 105-114.
- Kumar N., Scheer L.K., Steenkamp J.E.M. (1995), The effects of perceived interdependence on dealer attitudes, "Journal of Marketing Research", vol. 32 no. 3, pp. 348-356.
- Kumar S., Maher M. (2008), Are the temptations of online reverse auctions appropriate for your business?, "Supply Chain Management: An International Journal", vol. 13 no. 4, pp. 304-316.
- Mabert V.A., Skeels J.A. (2002), Internet reverse auctions: valuable tool in experienced hands, "Business Horizon", vol. 45 no. 4, pp. 70-76.
- Malone T.W., Yates J., Benjamin R.I. (1987), Electronic markets And electronic hierarchies, "Communications of the ACM", vol. 30 no. 6, pp. 484-497.
- Mithas S., Jones J.L., Mitchell W. (2008), Buyer intention to use internet-enabled reverse auctions: the role of asset specificity, product specialization, and non-contractibility, "MIS Quarterly", vol. 32 no. 4, pp. 705-724.
- Nadler S.S., Kros J.F. (2010), An assessment of supply chain managers' trust in online auctions, "Industrial Management & Data Systems", vol. 110 no. 6, pp. 805-822.
- Pai F.Y., Yeh T.M. (2016), The effects of interdependence and cooperative behaviors on buyer's satisfaction in the semiconductor component supply chain, "Sustainability", vol. 8 no. 2, pp. 1-14.
- Parente D.H., Venkataraman R., Fazel J., Millet I. (2004), A conceptual research framework for analyzing online auctions in a B2B environment, "Supply Chain Management: An International Journal", vol. 9 no. 4, pp. 287-294.
- Pearcy D.H., Giunipero L.C. (2006), The impact of electronic reverse auctions on purchase price reduction and governance structure: an empirical investigation, "International Journal of Services Technology and Management", vol. 7 no. 3, pp. 215-236.
- Pearcy D.H., Giunipero L.C., Wilson A. (2007), A model of relational governance in reverse auctions, "The Journal of Supply Chain Management", vol. 43 no. 1, pp. 4-15.
- Pereira G.M., Sellitto M.A., Borchardt M., Geiger A. (2011), Procurement cost reduction for customized non-critical items in an automotive supply chain: an action research project, "Industrial Marketing Management", vol. 40 no. 1, pp. 28-35.
- Pfeffer J., Salancik G.R. (1978), The external control of organizations - a resource dependence perspective, Harper & Row Publishers, New York.

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Pfeffer J. (1981), *Power in organizations*, Pitman Publishing, Massachusetts.

Saprikis V. (2013), Suppliers' behavior on the post-adoption stage of business-to-business e-reverse auctions: an empirical study, "Telematics and Informatics", vol. 30 no. 2, pp. 132-143.

Schoenherr T., Mabert V.A. (2011), A comparison of online and offline procurement in B2B markets: results from a large-scale survey, "International Journal of Production Research", vol. 49 no. 3, pp. 827-846.

Selviaridis K., Agndal H., Axelsson B. (2011), Business services 'in the making': (de)stabilisation of service definitions during the sourcing process, "Journal of Purchasing and Supply Management", vol. 17 no. 2, pp. 73-86.

Sherer A.S., Meyerhoefer C.D., Peng L. (2016), Applying institutional theory to the adoption of electronic health records in the U.S., "Information & Management", vol. 53 no. 5, pp. 570-580.

Smart A., Harrison A. (2003), Online reverse auctions and their role in buyer-supplier relationships, "Journal of Purchasing and Supply Management", vol. 9 no. 5-6, pp. 257-268.

Standaert W., Muylle S., Amelinckx O. (2015), An empirical study of electronic reverse auction project outcomes, "Electronic Commerce Research and Applications", vol. 14 no. 2, pp. 81-94.

Tarazona-Bermudez G.M., Garcia-Bustelo B.C.P., Martinez O.S., Alvarez B.T., Rojal L.A.R. (2014), Reverse electronic web tool for B2B, "Computers in Industry", vol. 65 no. 5, pp. 841-849.

Tassabehji R. (2010), Understanding e-auction use by procurement professionals: motivation, attitudes and perceptions, "Supply Chain Management: An International Journal", vol. 15 no. 6, pp. 425-437.

Tassabehji R., Taylor W.A., Beach R., Wood A. (2006), Reverse e-auctions and supplier-buyer relationships: an exploratory study, "International Journal of Operations & Production Management", vol. 26 no. 2, pp. 166-184.

Williams J.A., Dobie K. (2011), Electronic reverse auctions: integrating an e-sourcing tool into a sales and purchasing cross-course negotiation project, "Marketing Education Review", vol. 21 no. 1, pp.35-42.

Williamson O.E. (1975), *Markets and hierarchies: analysis and antitrust implications*, Free Press, New York.

Yeniyurt S., Watson S., Carter C.R., Stevens C.K. (2011), To bid or not to bid: drivers of bidding behavior in electronic reverse auctions, "Journal of Supply Chain Management", vol. 47 no. 1, pp. 60-72.

Appendix 1 Item scales

Measure (on a 5-point Likert-scale)				
	Factor loadings	Cronbach's alpha	Mean	Standard deviation
<i>Perceived ERA appropriateness</i> ^a		0.84	2.27	0.83
- Based on our sourcing strategy, an electronic reverse auction would have been the best means to source	0.86			
- An electronic reverse auction would have been the best means to achieve our sourcing goals.	0.88			
- It was difficult to achieve our goals without the use of an electronic reverse auction.	0.74			
- We contemplated an electronic reverse auction because the projected savings exceeded the auction costs.	0.78			
<i>Asset specificity</i> ^b		0.71	3.22	0.80
- The supplier invests in equipment specifically for your requirements.	0.71			
- The supplier has technical labour skills that are unique to your requirement.	0.76			
- The supplier understands your business processes in order to satisfy all your needs.	0.70			
<i>Non-contractibility</i> ^b		0.83	3.65	0.52
- The supplier shares detailed information on their cost structure.	0.56			
- The supplier proactively anticipates to your emerging needs.	0.74			
- The supplier is responsive to your requests.	0.67			
- The supplier keeps you updated on your requests.	0.61			
- The supplier is absolutely trustworthy.	0.79			
- The supplier honours their promises.	0.74			
- The supplier establishes a very high level of mutual confidence with your firm.	0.76			
- The supplier is flexible in response to requests that may be beyond the terms of your contract.	0.56			
<i>Buyer dependence</i> ^c		0.78	2.85	0.73
- Our supplier would be costly to lose.	0.71			
- Our supplier would be difficult to replace.	0.81			
- We need the supplier's expertise.	0.71			
- We are dependent on our supplier.	0.81			
<i>Supplier dependence</i> ^c		0.68	3.27	0.65
- Our supplier would find it costly to lose us.	0.83			
- Our supplier would find it difficult to replace us.	0.85			
- Our supplier is dependent on us.	0.48			
<i>Buyer power</i> ^d			0.42	0.88
<i>Total interdependence</i> ^d			6.12	1.07

Notes: ^a Hawkins et al. (2009), ^b Mithas et al. (2008), ^c Caniëls & Gelderman (2010).), ^d derived from buyer dependence and supplier dependence.

***Odpowiedniość elektronicznych aukcji zwrotnych – wyjaśnienie oparte na teorii
niekompletnych kontraktów oraz teorii zależności od zasobów***

Streszczenie:

Poza wzrostem znaczenia elektronicznych aukcji zwrotnych (ang.: electronic reversed auctions – ERAs), kilka badań empirycznych dotyczyło stosowności ich wykorzystywania. W badaniach tych opierano się najczęściej na teorii kosztów transakcyjnych, wysuwając argument, zgodnie z którym jako podstawowe wytłumaczenie ograniczeń organizacyjnych rozważano specyfikę aktywów. Autorzy niniejszego artykułu poszukują bardziej wnikliwego i dogłębnego wyjaśnienia postrzeganej odpowiedniości elektronicznych aukcji zwrotnych (ERA) w oparciu o wielość podejść teoretycznych. Opracowanie zawiera rozważania i zmienne wywodzące się z teorii niekompletnych kontraktów oraz z teorii zależności od zasobów. Zbudowano koncepcyjny model stosowności ERA bazujący na perspektywie nabywcy. Model ten zweryfikowano empirycznie poprzez badania ankietowe pośród 176 profesjonalnych nabywców. Wyniki wskazują na pozytywny wpływ siły nabywców na stosowność ERA, a całkowita wzajemna zależność zdaje się nie oddziaływać na nią negatywnie. Dalsze wyniki wykazują, że specyfika aktywów pobudza wykorzystywanie ERA. Nabywcy ukierunkowani na ERA uważają je za narzędzie pozwalające wykorzystać siłę nabywców oraz wymusić na dostawcach inwestycje oparte na relacjach. Jednocześnie, z perspektywy nabywcy, zmienne dotyczące współpracy nie wydają się ważne dla odpowiedniości ERA. Od dostawców wymaga się dokonywania inwestycji specyficznych dla danej relacji, ale nie ceni się ich za ich wysiłki związane z relacją. Nowe podejście w tym artykule wynika z faktu, że autorzy wielotorowo podeszli do zbadania i wyjaśnienia decyzji zaopatrzeniowych przedsiębiorstw włączających użycie ERA. W ten sposób autorzy odnieśli się do istotnej luki w literaturze poprzez wykorzystanie teorii niekompletności kontraktów w połączeniu z teorią zależności od zasobów, aby zapewnić lepsze rozumienie postrzeganej przez nabywców odpowiedniości ERA.

Słowa kluczowe: aukcje, zaopatrzenie, relacje transakcyjne, inne – elektroniczne aukcje zwrotne
JEL: D44, H57, L14, M29