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# Combining Quantitative Methods and Grounded Theory for Researching E-Reverse Auctions

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Even though many authors claim that e-reverse auctions (e-RAs) are detrimental to the effective building and management of buyer-supplier relationships (Emiliani and Stec 2004), not much is known about how *specific characteristics* of e-RAs may contribute to such negative effects on buyer-seller relations (Jap 2003). This study sets out not only to provide a first investigation of context, participants' information behaviour, and buyer-supplier relationships in e-RAs, but also to illustrate new methods for theory building in the e-RA and information systems domain. Following a grounded-theory approach, a comprehensive online questionnaire was developed (Lösch and Lambert 2006) based on the critical review of the literature and the results of a preceding exploratory

study (Lösch 2005). Usable responses were received from 89 buyers and 54 suppliers, including both users and non-users of e-RAs. The data were analyzed using a novel approach to quantitative analysis based on suggestions by Glaser (1994). The results indicate that e-RAs have fewer negative effects on buyer-supplier relationships than currently assumed. They also show how context and the participants' information behaviour correlate with buyer-supplier relationships, thus providing first suggestions for a better management of e-RAs. The paper also thus provides a first illustration of how quantitative methodology might be usefully applied to information systems research, an area which is dominated by the use of qualitative methodology.

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## Introduction

The investigation and evaluation of information systems (IS) has become an increasingly important topic for information scientists (see Avison *et al.* 2001; Reichmann 2004). This paper investigates electronic reverse auctions (e-RAs) – a new technology that is used by both private and public sector organizations to achieve direct cost reductions when purchasing goods and services from suppliers. In e-RAs, the buying organization invites a number of suppliers to take part in the e-RA who will then directly bid against each other for the supply of the specified product(s). Thus, the price of the products is not fixed but 'negotiated' through the auction (Germer *et al.* 2004). Usually,

the supplier with the lowest bid wins the e-RA and the contract.

Even though buying organizations are able to achieve significant savings through e-RAs (Barling 2001; Sashi and O'Leary 2002), recent research (Emiliani and Stec 2004; Jap 2003; Smeltzer and Karr 2003) indicates that this new technology can be detrimental to the relationships between buyers and suppliers which, in the long term, may result in higher purchasing costs for buyers. Thus, research is needed to identify how e-RAs differ from other purchasing and sales methods, and how they might be managed in a more relationship-friendly and efficient way. As Jap (2003) points out, the important question of how and why e-RAs have seemingly negative effects on buyer-

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supplier relationships yet remains unanswered. Moreover, the status quo of empirical research on e-RAs is significantly low with most empirically supported publications relying on qualitative case studies (Germer *et al.* 2004) – a trait which seems to be characteristic for the entire field of IS research (Avison *et al.* 2001).

This paper therefore aims to fill the existing thematic and methodological gap in e-RA research. The following objectives are addressed: (1) to examine how general context, information behaviour, and buyer-supplier relationships differ between e-RAs and other sourcing/sales scenarios; (2) to provide a first investigation of how particular aspects of e-RAs (i.e. general context, information behaviour) may impact on buyer-supplier relationships; and (3) to illustrate how the adaptation of quantitative methods can further the generation of grounded theory in a little or one-sided researched field like e-RAs, or information systems in general.

## Background

### *Characteristics of research on e-RAs*

Germer *et al.* (2004) stress that even though an impressive number of auction papers have been published in the economics literature, e-RAs are – unfortunately – very little researched from a managerial, real-life perspective. As this study investigates managerial issues of e-RAs in their real-life context (i.e. information behaviour and buyer-supplier relationships), the focus will be on the purchasing and supply chain management literature rather than on economic auction theory. Appendix A gives a brief overview of the existing e-RA literature that takes into account relational issues. The literature is classified in terms of its content, methodology and informants/sources. Regarding methodological aspects, papers only quoting other sources or giving non-specified case examples without rigorous analysis of data (e.g. Daly and Nath 2005b; Emiliani 2004) were not considered empirical.

As shown in Appendix A, six contributions (Daly and Nath 2005a, 2005b; Emiliani and Stec 2005; Jap 2003; Smart and Harrison 2003; Tassabehji *et al.* 2006) have their main focus on relational issues between buyers and suppliers. However,

several other papers too (Beall *et al.* 2003; Carter *et al.* 2004; Emiliani 2004, 2005; Griffiths 2003; Jap 2002; Sashi and O'Leary 2002; Smeltzer and Karr 2002, 2003; Stein and Hawking 2002; Stein *et al.* 2003; van Tulder and Mol 2002) at least mention that e-RA may be detrimental to buyer-supplier relationships. Generally, the topic of buyer-supplier relationships in e-RAs is highly controversial as indicated by the heated discussion between Emiliani and Stec (2005) and Daly and Nath (2005a) about the compatibility of e-RA usage and good buyer-supplier relationships. Despite the great interest in relational issues of e-RAs, Jap (2003) points out that there is little evidence about how *specific characteristics* of e-RAs (e.g. the participants' information behaviour) may contribute to the observed negative effects on buyer-seller relations. Indeed, all 16 articles below simply identify or illustrate that there may be negative effects of e-RA usage for buyer-supplier relationships without examining potential causes for this finding. Merely non-e-RA literature indicates that the information behaviour between buyers and their suppliers may contribute to these effects (Helper 1991; Mohr and Spekman 1994; Spekman 1988).

In terms of their methodology, Appendix A shows that the papers considering relational problems of e-RAs favour qualitative methods. Even though 9 out of these 16 contributions are empirically based (Beall *et al.* 2003; Carter *et al.* 2004; Jap 2002, 2003; Smart and Harrison 2003; Smeltzer and Karr 2002, 2003; Stein and Hawking 2002; Stein *et al.* 2003; Tassabehji *et al.* 2006; van Tulder and Mol 2002), the use of qualitative methods remains predominant – like in the whole area of e-RA and IS research. Jap (2002; 2003) is the only author relying on survey and quasi-experimental methodology. Thus, it is not surprising that many authors (e.g. Carter and Dresner 2001; Hartley *et al.* 2006) recommend the use of more quantitative approaches including survey or experimental designs to develop valid and reliable measures that can be used in future research. The question, however, is how to take this important step towards quantification considering that, so far, there is little evidence of potentially influencing characteristics of e-RAs (i.e. context and participants' information behaviour) on buyer-supplier relationships. The following section will briefly present the background of the two major approaches to research to underline the methodological choice made in this paper.

### *The quantitative-qualitative debate*

Most authors (e.g. Lee 1999; Silverman 2000; Strauss and Corbin 1998) differentiate the qualitative [1] and the quantitative [2] approach as the two basic approaches to research. Whereas quantitative research is associated with features like 'hard', 'fixed', 'objective', 'thin', qualitative research tends to be characterized as 'soft', 'flexible', 'subjective', 'rich' (Robson 2003; Silverman 2000). Qualitative approaches [3] tend to be more open and collect primarily non-standardized data. On the other hand, quantitative approaches [4] are less flexible and primarily collect highly standardized (hence quantitative) data. Silverman (2000) points out that for a long-time, quantitative research was considered to be the 'golden standard' for research – qualitative research at best was suitable for preliminary exploration. The fact that, in qualitative research, the reliability of the interpretation of the data has often been questioned because there is no standardized method for analysis (see Robson 2003) might have contributed to the apparent inferiority of qualitative research. Also, regarding the soundness of explanations offered, qualitative research often is accused of 'anecdotalism' without any attempt to analyse less clear or contradictory data (Silverman 2000). However, in the last decades, the quantitative research tradition, too, has become subject of criticism because the highly standardized tools, methods, and results seemed to do little for capturing the essence and complexity of real-life. Robson (2003, 32) explains: "There is no unquestionable foundation ..., no 'facts' that are beyond dispute. Knowledge is a social and historical product." For instance, the pursuit of 'measurable' phenomena can mean that unperceived values creep into the research by simply taking on board highly problematic and unreliable concepts; also, 'variables' used for hypotheses-testing may be arbitrarily defined in the context of naturally occurring interaction (Silverman 2000). Moreover, testing 'theoretically' – or, worse, in dubious ways – derived hypotheses clearly makes the generation of theory that is empirically grounded very difficult, if not impossible as Glaser and Strauss (1967) point out.

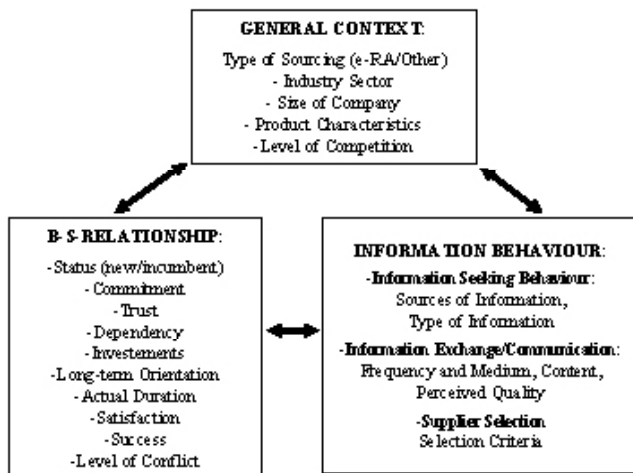
Regarding the issue of what kind of research approach to choose best, many authors (Lee 1999; Robson 2003; Silverman 2000; Strauss and Corbin 1998) have taken an intermediary position in the

quantitative vs. qualitative debate and advocate the possibility of blending qualitative and quantitative research where appropriate and necessary. Strauss and Corbin (1998, 27) point out: "Briefly, we maintain that the aim of theorizing is to develop useful theories. So, any methodology, whether qualitative or quantitative, is only a means for accomplishing that aim. We do not believe in the primacy of either mode of doing research." Similarly, Silverman (2000, 11) concludes: "The fact that simple quantitative measures are a feature of some good qualitative research shows that the whole 'qualitative/quantitative' dichotomy is open to question." Rather than blindly favouring one approach over the other, research should be evaluated in terms of its context and the accuracy with which the methods have been used, thus, critically assessing criteria such as reliability, construct validity, and internal and external validity (Yin 2003). This paper shares the assumption that, in fact, much may be gained from taking into account the merits and disadvantages of both quantitative and qualitative approaches in the particular context of this research. The study at hand is therefore based on what Robson (2003, 42) refers to as "pragmatic approach" to research, and will at each step of the process (e.g. data collection, analysis and interpretation) carefully consider the usefulness and appropriateness of various alternative procedures – may they be qualitative or quantitative (Strauss and Corbin 1998).

### *The research – general design and methodology*

Considering the limited amount of empirical and theoretical evidence on buyer-supplier relationships in e-RAs at the beginning of this PhD project in 2003, the research at hand follows the inductive Grounded Theory (GT) approach developed by Glaser and Strauss (1967, 1978). As Strauss and Corbin (1998, 8) point out, the value of the GT approach "lies in its ability not only to generate theory but to ground that theory in data". Thus, grounded theory appears to be a particularly suitable approach for theory-building when the topic is little researched and no theoretical basis has been developed yet. At the same time, given the one-sidedness of predominant qualitative approaches in e-RA investigations, it seemed necessary to also incorporate quantitative methods in order to reduce what Robson (2003) calls 'the

Figure 1: Conceptual Framework – Context, Information Behaviour, and Buyer-Supplier Relationship



risk of inappropriate certainty' in e-RA research. Robson (2003) stresses that the one-sided use of a certain methodology may delude investigators in believing that they have found the 'right' answer when this is not the case. Investigating a topic through multiple methods reduces the risk of inappropriate certainty and enhances the overall validity of the research (Robson 2003; Yin 2003). The question arises whether it is actually possible to use quantitative methodology as part of a – widely perceived to be purely qualitative – GT approach. Glaser and Strauss (1967, 1994) answer this question by pointing out that the use quantitative methods is not opposed to the generation of grounded theory. On the contrary: "The freedom and flexibility that we claim for generating theory from quantitative data will lead to new strategies and styles of quantitative analysis ... that will bring out the richness of quantitative data that is seen only implicitly while the focus remains on verification." (Glaser 1994, 198)

### The design of the study

The investigation of context, information behaviour and buyer-supplier relationships consisted of two phases: (1) An exploratory study based on interviews with automotive buyers and suppliers (Lösch 2005), and (2) a comparative cross-industry survey based on responses from 89 buyers and 54 suppliers including both users and non-users of e-RAs (Lösch and Lambert 2006). The purpose of the exploratory study was to get a basic insight into

the topic under study by exploring the phenomenon itself as well as the population of e-RA users. This exploration gave important hints regarding the design, sampling strategy, and focus of the main study, and lead to the development of an initial conceptual framework (see Figure 1).

The conceptual framework was then used to develop a comprehensive online questionnaire for the second, 'quantitative' phase of the research. The purpose of the survey was "to maximize opportunities to discover variations among concepts and to densify categories in terms of their properties and dimensions" (Glaser 1978, 124) by getting feedback from a greater number of buyers and suppliers in various industries on the items detailed in the conceptual framework above (see Figure 1). The aims and objectives were: (1) to investigate the differences between e-RAs and other sourcing/sales events in terms of their context, buyer-supplier relationships, and participants' information behaviour; and (2) to examine the impact of both context and information behaviour on buyer-supplier relationships in e-RAs.

### Sampling strategy and data collection

Based on the suggestions by Glaser and Strauss (1967, 1978), the survey followed the strategy of theoretical sampling. Whilst the exploratory study had solely focussed on the automotive industry, the survey aimed to include buyers and suppliers from all private and the public sectors as well. In addition to facilitating a higher number of responses, this new sampling strategy of maximum variation would also allow for detecting 'generalizable', common patterns, thus, supporting even better the development of theory (Miles and Huberman 1994; Wagner and Schwab 2004). Overall, the aim was to obtain responses from at least 50 buyers and 50 suppliers across various industries with ideally 50% being e-RAs users and 50% being non-users.

For data collection, an online approach was chosen as it would have several important advantages: The flexibility of the online format would make it possible to include and directly compare different groups (i.e. both buyers and suppliers with and without e-RA experience) in terms of contextual factors, information behaviour, and buyer-supplier relationships. This was particularly important considering that the exploratory

study had indicated that e-RAs may have several disadvantages over 'traditional' sourcing/sales methods. Also, the online format would allow for overcoming the lack of anonymity which had presented itself as a major problem during the interviews in the exploratory study. Finally, the flexibility of the online format enabled participants to add freely further information and/or answer possibilities to most questions, in addition to the specified standardized answers. Thus, despite its usually strong quantitative nature, the online survey could remain largely exploratory and open to theory-building in the sense of the overall GT approach.

The distribution of the online survey was supported by various organisations which would be able to provide access to buyers and suppliers across all industries, including e-bidding software provider CombineNet, e-sourcing consultancy e-Three, the Chartered Institute of Purchasing and Supply (CIPS) and their Policy Advisory Network (PAN), the NHS, the Southern (SUPC) and North Western Universities Purchasing Consortium (NWUPC). Participants were asked not only to complete the questionnaire, but also to forward it to their particular customer/supplier which would ensure that as many relationship dyads as possible were included (Ambrose 2005). Regarding the content of the survey, respondents were first requested to identify the most recent e-RA or sourcing/sales event they had recently undertaken. They were then asked to provide information (1) about the context and information behaviour in this particular e-RA or sourcing/sales event and (2) about the relationship to the buyer/ supplier in this event. The questionnaire is available online at [www.ico-trg.mmu.ac.uk/andrea/buyer/](http://www.ico-trg.mmu.ac.uk/andrea/buyer/) and [www.ico-trg.mmu.ac.uk/andrea/supplier/](http://www.ico-trg.mmu.ac.uk/andrea/supplier/). After a pilot test in April, data collection took place between May and July 2005. Usable responses were received from a total of 89 buyers and 54 suppliers across various sectors including construction, manufacturing, retail, wholesale, service and the public sector. The initial exploration of the data set showed that the sampling goal (approximately 50% e-RA users and 50% non-users) had been achieved in both the buyer and the supplier sample. Also, regarding the participants' affiliation to various industry sectors, no significant differences between e-RA users and non-users could be found in both samples.

### *Data analysis – the problem of using statistical tests*

The responses were analysed using SPSS. Given the sampling strategy (i.e. theoretical sampling) in this study and its implications for the validity of statistical tests, the question arises why statistical tests should be used for analysis at all and if so, what value they may have. One could argue that due to the sampling strategy, any statistically significant findings obtained from a test would neither be reliable nor generalizable, so that there would be little point in using statistical tests. However, even if the sampling strategy in this study had been different, the value of significance testing per se remains questionable because there are a number of pitfalls to it (Chatfield 1988; Cohen 1990, 1994; Field 2005; Glaser 1994):

First of all, it is arguable whether these tests are appropriate with any survey data, since "the statistical assumptions necessary to use them cannot be met with such data and also are ineptly applied" (Glaser 1994, 211). Moreover, the criterion for statistical significance remains highly controversial. Apart from the fact that there seems to be very little justification for this criterion being  $p < .05$  (why not  $p < .06$ ?) (Field 2005), a probability of  $p < .05$  does not even mean that there is no effect (e.g. 'no difference between two means' or 'no relationship between variables') (Chatfield 1988; Cohen 1990; Field 2005). It only says that the *probability* of observing this very effect in the population is less than 5%, and thus, that the effect is *likely* to have arisen by chance. As can be seen from this discussion, the fact that significance testing is based on probabilistic reasoning severely limits what we can conclude from such results (Cohen 1994; Field 2005). In fact, "even the smallest of differences would be deemed as statistically significant if a big enough sample were used" (Field 2005, 28). Thus, testing the statistical significance presents a strong barrier to the generation of theory as these tests direct attention away from theoretically interesting relationships that are not of sufficient magnitude to be statistically significant (Glaser 1994).

Taking into account the general limitations of significance testing, the severe limitations of the above survey sample for statistical tests, and the research strategy employed in this study, the questionnaire cannot and should not be analyzed fo-

Table 1: Use of Quantitative Methods in the Main Study vs. Traditional Significance Testing

METHOD	GENERAL PURPOSE	FOCUS OF ANALYSIS IN	
		(a) THIS STUDY	(b) CORRESPONDING STATISTICAL TEST
<i>Analysis of Cross-tabulations</i>	Identification of differences between two groups, i.e. e-RA users vs. non-users	Consistency of the differences in frequencies between e-RA users & non-users in terms of direction & size	Chi-square ( $\chi^2$ ) analysis: statistical significance of the difference in frequencies (%) between e-RA users & non-users
<i>Analysis of Means</i>	Identification of differences between two groups, i.e. e-RA users vs. non-users	Consistency of the differences in mean values between e-RA users & non-users in terms of direction & size	Mann-Whitney-test (or t-test): statistical significance of difference in ranks (or mean values) between e-RA users & non-users
<i>Analysis of Correlation Coefficients</i>	Identification of correlations between two constructs	Consistency & strength of the correlation coefficient Kendall's tau ( $\tau$ )	Statistical significance of the correlation coefficient Kendall's tau ( $\tau$ )

cussing only on statistical significance and generalization. Instead, statistical tests and quantitative methods can and should be used as a means of revealing interesting differences and relations between the variables as Glaser (1994) illustrates. As a consequence, the use of quantitative data analysis in this study closely follows the suggestions by Glaser (1994) and Field (2005) by focussing on the consistency and size of the effects rather than on their statistical significance. Table 1 below illustrates how quantitative methods have been used in this study as opposed to the 'usual' corresponding statistical tests.

*Illustration – blending quantitative methods and grounded theory*

The analysis of differences between e-RAs and other sourcing/sales events is based on: (1) The analysis of cross-tabulations for all categorical variables and (2) the comparison of the mean values of all ordinal variables similar to Glaser (1994). Due to a lack of space, not all results can be displayed here in detail. Instead, parts of the data set will first illustrate the use of quantitative data analysis in this study, and then, the overall results of the survey will be presented and discussed.

*Example 1: Analysis of cross-tabulations*

The analysis of the cross-tabulations is illustrated by data on one contextual factor, i.e. the size of the company/organisation. Table 2 displays the percentage of large companies in each sample. As can be seen, the number of large companies tends

Table 2: Company Size – Percentage of Large Companies in e-RAs vs. Other Sourcing/Sales Events

Sourcing/Sales Situation	BUYER SAMPLE		SUPPLIER SAMPLE	
	Buyer	Supplier	Buyer	Supplier
E-RA	90.2%	62.5%	88.0%	64.2%
Other	89.6%	47.9%	72.4%	32.6%

to be consistently higher in the context of e-RAs (first row) than in other sourcing/sales scenarios (second row). Even though the additional chi-square analysis reveals that not all of these differences are statistically significant, the consistency of the differences for all buyers and suppliers in both samples makes it a fairly noticeable effect. Thus, considering the consistency of the differences, it might be concluded that in e-RAs, companies tend to be larger in terms of their size. This apparent difference between e-RA users and non-users is not too surprising considering that small companies may often lack the capacities for taking part in or conducting an e-RA.

*Example 2: Analysis of means*

For all ordinal variables, the analysis focused on the difference of the mean value achieved on the particular item in the group of e-RA users minus the mean value achieved on that particular item in the group of non-users, i.e.  $Mean_{eRA} - Mean_{Other}$ . A positive figure for an item thus indicates that the mean value is higher for e-RA users than for non-users. Table 3 summarizes the difference in mean values between e-RA users and non-users for vari-

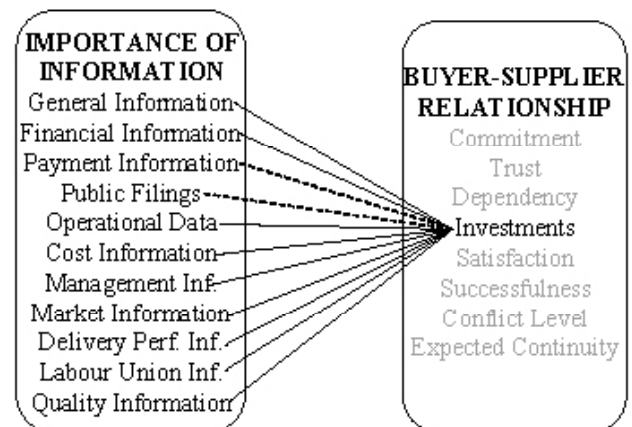
Table 3: The Buyer-Supplier Relationship in e-RAs and Other Sourcing/Sales Scenarios

Characteristic	BUYER SAMPLE	SUPPLIER SAMPLE	SUPPLIER CONTROLLED
	Difference Mean	Difference Mean	Difference Mean
Commitment	- 0.59	- 0.32	- 0.05
Trust	- 0.44	- 0.03	+ 0.05
Dependence	- 0.27	- 0.42	- 0.07
Investments	- 0.08	- 0.43	- 0.18
Long-term Orientation	- 0.26	- 0.03	+ 0.07
Satisfaction	- 0.11	+ 0.03	- 0.05
Successfulness	- 0.01	- 0.09	+ 0.07
Conflict Level	- 0.17	+ 0.1	+ 0.14

ous characteristics of the buyer-supplier relationship in both the buyer and the supplier sample. As the high percentage of potentially 'sore' losers in the supplier sample [5] might have considerable effects on their answers, the results for both the original supplier sample and the controlled supplier sample (i.e. excluding suppliers who were not awarded the contract) are presented.

The results in Table 3 indicate that taking part in e-RAs affects buyers' and suppliers' perception of their relationship in a different way: In the buyer sample, e-RAs appear to generally have a negative impact on the buyer-supplier relationship as the consistently lower mean values for e-RA users (indicated by the minus sign) illustrate. The use of e-RAs seems to reduce the buyers' commitment, trust, dependence, long-term orientation, and satisfaction. In the supplier sample, the picture is very different: General effects of e-RAs that have been found amongst both winners and losers of the contract only include reduced investments made by the supplier as well as an increase of conflicts. Only suppliers who were not awarded the contract as consequence of the e-RA showed further negative effects, such as lower levels of commitment, dependence, and investments. Overall, it seems that e-RAs primarily have negative effects on the buyers' perception of the buyer-supplier relationship. Suppliers on the other hand remain largely unaffected by the use of e-RAs, unless they lose the business. Like above (see Example 1), if focussing merely on the statistical significance of the corresponding Mann-Whitney-Test, only few of these interesting differences would be recognized.

Figure 2: Correlation-Coefficients between the Importance of Information and Characteristics of the Buyer-Supplier Relationship

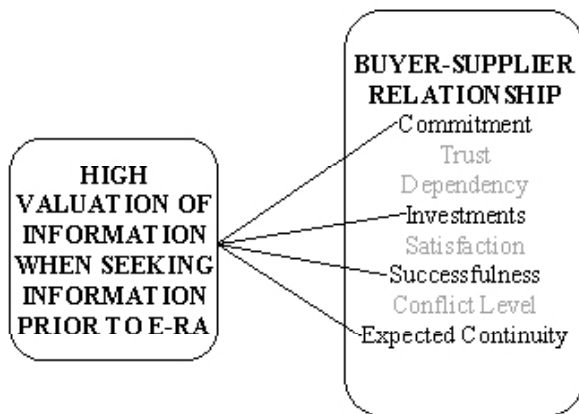


Example 3: Analysis of correlations

For the analysis of the relationships between different concepts (e.g. buyer-supplier relationship and information behaviour), Kendall's tau ( $\tau$ ) statistic was used as it tends to be more accurate in small samples (Field 2005). However, unlike the usual focussing on the statistical significance of the correlation coefficients, this study placed the emphasis on the strength of the correlations (i.e. effect size) and their consistency. As Field (2005) stresses, effect sizes are useful because they provide an objective measure of the *importance* of an effect in the sample instead of the *generalizability* of the effect, as statistical significance does. Effects can generally be classified as small ( $\tau=.10$ ), medium ( $\tau=.30$ ), and large ( $\tau=.50$ ) (Field 2005). Figure 2 displays the correlation coefficients found in the buyer sample between the importance of various types of information when seeking information prior to the e-RA and one characteristic of the buyer-supplier relationship (here: the level of investments buyers make into their relationship). The dashed lines in Figure 2 represent small effects, the normal lines medium and large effects. It is important to note that all correlation coefficients displayed below were positive, indicating that a higher appreciation of all types of information by the buyers is related to higher investments made by them.

Such consistent, predominantly strong positive correlations of the importance of all types of information could also be found for other charac-

Figure 3: Correlation-Coefficients for the Importance of Information and all Characteristics of the Buyer-Supplier Relationship



teristics of the buyer-supplier relationship, i.e. commitment, perceived successfulness of the relationship, and the buyers’ expected continuity of the relationship (see Figure 3). Interestingly, no consistent negative effects could be found. Thus, it may be concluded that a high appreciation of information when seeking information prior to the e-RA has generally positive effects on the buyers’ relationship to their suppliers by increasing the buyers’ commitment, their investments, the perceived successfulness and the expected continuity of their relationship. Again, when only focussing on the statistical significance of the correlation coefficients, most of this information would have been ignored and only single, statistical significant coefficients would have been detected. Thus, the in-depth analysis of the correlation-coefficients in the sense of the GT approach allows for obtaining a more detailed and more complete picture of what is actually happening.

*The Survey results at a glance*

Overall, the analysis of the survey delivered several surprising results. Table 4 summarizes the major findings with the first column listing the particular item or concept under investigation. The second column then illustrates how e-RAs and their users differ from non-users for this particular item or concept. The third column shows how the item or concept generally influences or relates to the buyer-supplier relationship.

Table 4: Summary of the Survey Findings

CONTEXT		
ITEM	IN E-RAs	EFFECTS ON THE BUYER-SUPPLIER RELATIONSHIP
Company Size	Larger	Positive effects of a large company size on successfulness.
Complexity of Product	Lower	Positive effects of higher complexity on relationship.
Strategic Importance of Product	Slightly lower	Positive effects of higher strategic importance on relationship.
Spend Volume	Slightly Higher/Same	Positive effects of higher spend volume on relationship.
Quantity/Order Size	Higher	No effects on relationship.
Level of Competition	Higher	Negative effects of increased competition on relationship.
INFO-SEEKING		
ITEM	IN E-RAs	EFFECTS ON THE BUYER-SUPPLIER RELATIONSHIP
Importance of Information Types	Higher	Positive effects of high importance of various types of information on relationship.
Importance of Information Sources	Higher	Positive effects of high importance of various sources of information on relationship.
INFO-EXCHANGE		
ITEM	IN E-RAs	EFFECTS ON THE BUYER-SUPPLIER RELATIONSHIP
Frequency of Information Exchange & Communication	Higher for buyers, but lower for suppliers	<i>Buyers:</i> Generally positive effects of more frequent communication on relationship. <i>Suppliers:</i> No effects of more frequent communication on relationship.
Perceived Quality of Information Exchange & Communication	Lower	Largely positive effects of all quality items (particularly openness and overall goodness) on relationship.
SUPPLIER SELECTION		
ITEM	IN E-RAs	EFFECTS ON THE BUYER-SUPPLIER RELATIONSHIP
Importance of Selection Criteria	Price & Past Experience higher, other criteria lower	<i>Buyers:</i> Generally positive effects of high valuation of all criteria. <i>Suppliers:</i> Positive effects of a higher valuation of past experience and quality by buyers on suppliers’ perception of relationship. <i>Overall:</i> Previously known or incumbent suppliers are more likely to be awarded the contract.

### Summary and Conclusions

Overall, the purpose of this paper was (1) to examine how general context, information behaviour, and buyer-supplier relationships differ in e-RAs and other sourcing/sales scenarios; (2) to provide a first investigation of how particular aspects of e-RAs (i.e. general context, information behaviour) may impact on buyer-supplier relationships; and (3) to illustrate how the adaptation of quantitative methods can further the generation of grounded theory in a little or one-sidedly researched field like e-RAs in particular, and information systems in general. Regarding the differences between e-RAs and other sourcing/sales scenarios, the research could confirm earlier findings on the general context of e-RAs (Beall *et al.* 2003; Jap 2002; Mabert and Skeels 2002; Smeltzer and Karr 2003), but also give new insights into information behaviour and buyer-supplier relationships in e-RAs. Particularly, it was found that both buyers and suppliers value information more in e-RAs – a finding which is in contrast to the prevailing opinion of many suppliers (Beall *et al.* 2003) and researchers (Emiliani 2006), but which might be explained by the tight time and procedural constraints of e-RAs: Whereas in other sourcing/sales scenarios information may be collected gradually and still be added later in the process, the timely preparation of the e-RA and having all required information ready and standardized for the auction day is a major pre-requisite for the success of e-RAs – both for buyers and suppliers. Sadly, the tight time-frame and highly standardized process of e-RAs seem to take their toll on the overall quality of the information and communication behaviour which is perceived to be lower in e-RAs by both buyers and suppliers thus confirming the results of earlier studies (see Lösch 2005). The buyers' decision-making process provides another surprise: Even though in e-RAs, buyers indeed value the price more as a final decision criterion, they too value the past experience with the supplier more which is in contrast to much of the current literature (e.g. Beall *et al.* 2003; Lösch 2005). Also, in contrast to earlier research (Jap 2003), the suppliers' perception of their relationship remains largely unaffected in e-RAs as shown above when excluding potentially 'sore losers' (i.e. suppliers who have not been awarded the contract). Moreover, the valuation of the relationship and the past

experience unexpectedly proved to be very influential decision making criteria. Thus, it is possible that much of the apparently negative impact of e-RAs in earlier studies (Beall *et al.* 2003; Jap 2002, 2003; Lösch 2005) was in fact the result of losing the contract rather than the result of taking part in an e-RA.

Regarding the impact of information behaviour and context, the analysis of the survey illustrates – for the first time – several important correlations between information behaviour/context and buyer-supplier relationships which may be used to manage e-RAs in a more 'relationship-friendly' way. Considering the above findings (see Table 4, Effects on the Buyer-Supplier Relationship), the following suggestions might be given to managers involved in e-RAs:

- Both buyers and suppliers should keep up the careful preparation of e-RAs as the high valuation of information had positive effects on the perception of the relationship.
- Both buyers and suppliers should try to increase the quality of their information exchange and communication behaviour as this, too, was found to have positive effects on the perception of the relationship.
- Because of the positive effects, buyers should make it more obvious to their suppliers that they *do* consider quality, past experience, and other criteria when they select their suppliers.
- Suppliers should increase the frequency of both communication and information exchange with their buyers as this was found to have positive effects on the buyers' perception of their relationship.

As illustrated above, the novel use of quantitative methods was the key to obtaining these important and unprecedented findings. It allowed for further development of the initial conceptual framework by providing interesting details about the properties and inter-relations of the different categories and concepts. As indicated by the examples, the 'traditional' use of quantitative methods would have missed out on most of these interesting details and connexions. At the same time, the quantitative nature of this research does not only increase the validity and generalizability of this PhD project, but also furthers the validity and generalizability of the existing e-RA research in the sense of Yin's (2003) multi-method approach. Therefore, the paper at hand provides a first illustration of how quantitative methodology

might be usefully applied to information systems research, an area which too is dominated by the use of qualitative methodology. However, given the limited scope and relatively small size of the study, further research is required (1) to enhance the validity of the research findings, e.g. by an independent confirmation of the findings through multiple comparative case studies; and (2) to further develop the use of quantitative methods in IS research through additional quantitative studies of information systems.

### Notes

1. Also referred to as interpretative in Williams, M. 2002. Generalization in Interpretative Research. In May, T. *Qualitative Research in Action*. London: Sage Publications: 125–143, constructivist in Robson, C. 2003. *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*. Oxford: Blackwell Publishers Ltd., or inductive in Mutchnick, R. J., and B. L. Berg. 1996. *Research Methods for the Social Sciences: Practice and Applications*. London: Allyn and Bacon..
2. Also referred to as scientific in Williams, M. 2002. Generalization in Interpretative Research. In May, T. *Qualitative Research in Action*. London: Sage Publications: 125–143, positivistic in Robson, C. 2003. *Real World Research: A Resource for Social Scientists and Practitioner-Researchers*. Oxford: Blackwell Publishers Ltd., or deductive in Mutchnick, R. J., and B. L. Berg. 1996. *Research Methods for the Social Sciences: Practice and Applications*. London: Allyn and Bacon.
3. e.g. case studies, observations, or ethnographic studies
4. e.g. surveys or experiments
5. The vast majority of respondents (94.2%) in the buyer sample answered their questions referring to the supplier they had actually awarded the contract to. In the supplier sample, 26.4% of all valid responses, suppliers were not awarded the contract which might impact on their view of the relationship.

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Appendix A: Overview of the Literature on e-RAs

E-RA LITERATURE INCLUDING ISSUES OF BUYER-SUPPLIER RELATIONSHIPS			
Author(s)	Methodology	Informants	Focus
Sashi & O'Leary (2002)	No empirical basis.	N/A	(Dis-)Advantages of e-RAs; asymmetric information in e-RAs; effects of e-RAs on buyer-supplier relations.
Jap (2002)	Survey	Buyers	When, how, and why to use e-RAs.
Van Tulder & Mol (2002)	Case study (Basis: multiple interviews, roundtable discussion, and secondary materials).	Unknown.	E-RAs as part of a wider sourcing strategy.
Stein et al. (2002; 2003)	Case study (Basis: interviews, observations, existing documentation and emails)	Suppliers	E-RA process; business impacts of e-RAs; future of e-RAs.
Smeltzer & Karr (2002; 2003)	Field interviews.	Buyers	Reasons for using e-RAs; potential disadvantages for buyers and sellers; appropriate conditions for e-RA usage.
Griffiths (2003)	No empirical basis.	N/A	Creating trust in e-RAs; potential dangers of e-RAs; suggestions for using e-RAs.
Smart & Harrison (2003)	Case studies (Basis: interviews).	Buyers; suppliers	Impact of e-RAs on buyer-supplier relationships.
Jap (2003)	Quasi-experiment (Basis: interviews, e-RA pre- and post-test survey).	Buyers; suppliers	Effects of e-RAs on buyer-supplier relationships.
Beall et al. (2003)	Case studies (Basis: site-visits, face-to-face interviews).	Buyers; suppliers; service providers	Strategic context of e-RAs; managing and planning e-RAs; emerging issues of e-RAs; e-RA process.
Emiliani (2004)	No empirical basis.	N/A	Use of e-RAs in sourcing; collaborative problem solving and knowledge-sharing in networks.
Carter et al. (2004)	Case studies (Basis: semi-structured interviews)	Buyers; suppliers; service providers	Barriers and consequences of e-RA usage; management of e-RA process; ethical issues.
Emiliani (2005)	No empirical basis.	N/A	Efficiency of industry-specific codes of conduct for regulating e-RAs.
Daly & Nath (2005b)	No empirical basis.	N/A	Managing pricing advantage of e-RAs and long-term benefits of relationship marketing.
Emiliani & Stec (2005)	No empirical basis.	N/A	Commentary on Daly & Nath's (2005a) contribution.
Daly & Nath (2005a)	No empirical basis.	N/A	E-RAs and buyer-supplier relationships –response to Emiliani & Stec's (2005) commentary.
Tassabehji et al. (2006)	Case study (Basis: direct observation, interviews).	Suppliers	Impact of e-RAs on buyer-supplier relationships; e-RA adoption amongst suppliers in UK packaging sector.