ELECTRONIC REVERSE AUCTIONS:
FACTORS OF SUCCESS

Research paper study

STUDENT NAME: Elhami Memeti
STUDENT NUMBER: 08502064
COURSE NAME: Electronic Business
DEPARTMENT: Department of Informatics
COURSE CODE: 53029

SUPERVISOR: Luis Terán
DATE OF SUBMISSION: 18 May 2011
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ABSTRACT

Background
The electronic reverse auctions (eRA) are an e-sourcing method of competitive bidding between multiple qualified suppliers competing against each other in order to win a contract by a buying organization. As opposed to the classical auction, where the product being sold, is sold to the company/person who pays the highest price, here we deal with the buyer that wants to buy the product or the service with the lowest price from different suppliers. During the recent years, buyers from public sector organizations and private sector businesses are increasingly adopting electronic reverse auction as procurement tool to achieve greater savings as compared to traditional sourcing methods. But, researches reveal that these saving benefits for buyers, come in expense of the suppliers, which may affect buyer-supplier relationship and which might yield in low or no participation from the good suppliers. Despite this, eRAs may affect the non-price performance of the suppliers like product or service quality, innovation, commitment etc. This paper seeks to find the eRA success factors yielding in savings for buying organizations and their correlation between them, but by having minimal negative impacts on buyer-supplier relationships.

Methods
The eRA success factors, their correlation among them are evaluated by reviewing literature and comparing the results of similar hypothesis of different papers.

Findings
It has been found that competition between suppliers, eRA preparation and buyer-supplier relationships are the factors that have the biggest influence on the success of the eRAs. It has also been found that the design of eRAs has an important on buyer-supplier relationship which suggests that making the appropriate eRA design is important success factor.

Keywords: electronic reverse auctions, buyer-supplier relationship, success factors
INTRODUCTION

Problem statement

During the last years, electronic reverse auctions eRAs are becoming an important electronic tool for purchasing in electronic procurement. They have been used to procure billions in parts and services in the government sector and virtually every major industry (Jap, 2007).

Many governments of different countries are conducting eRA-s because of the savings that they may achieve. For instance, The United Kingdom Office of Government Commerce OGC reported savings of 52 millions in IT hardware eRA-s over 4 years, and anticipated total savings of 270 million through all eRA purchases by the end of fiscal year 2011/2012 (Shalev & Stee, 2010).

Other researches have also reported that eRA-s significantly reduce the purchase price of materials and services, with reports on some cases of 20 and even 30 plus percent. (Carbone, 2003). All these price reductions are realized by the competition among suppliers, which results in lower profits for them. In order to have greater margins, suppliers might reduce their quality of product or service, and some may not wish to participate in an eRA event.

Even though eRAs have been proved to give many benefits to the buying organizations like price savings, shorter cycle time, increased buyers’ reach, etc. (Beall, et al., 2003; Shalev & Stee, 2010; Wagner & Schwab, 2004), they have been perceived by many supplier organizations as a controversial sourcing tool (Caniëls & van Raaij, 2008). Incumbent suppliers have been shown to percept the eRAs as coercive tool since the suppliers have no other option to win the business and they see them as detrimental in buyer-supplier relationship because of their greater focus on price (Emiliani & Giampietro, 2007). They either participate or they win nothing. But eRA providers have evolved and now they offer different designs of eRAs in order to be fairer like not awarding a supplier only by its price, but include some post eRA negotiations among the buyer and 2 or 3 most competitive suppliers. Beside of this, eRAs are not still fully accepted as a fair sourcing tool.

On the other hand, literature suggests that in order to achieve greater savings, there
should be greater competition among suppliers. Being perceived as controversial tool, eRAs may lead to a smaller number of suppliers wishing to participate in an eRA event and lower the performance of the suppliers. So it is important that suppliers have not a negative opinion about eRAs.

Taking into the consideration that participation, competitiveness and performance of the suppliers is very important, in this paper we seek to find the conditions that lead to benefits for buying organizations but minimizing the negative effect on supplier opinions about eRAs.

**Literature review**

Stephan Wagner and Andreas Schwab (2004) determine three categories of factors that may impact the success of the eRAs: a) purchasing management related conditions, b) Auction design and c) eRA process. They focused only on the first category and built a framework to evaluate if eRAs are to be profitable for a buying organization as a purchasing tool. They found out using their case studies of 23 eRAs, that the product to be bought should be precisely specified and the buying organizations should pay bigger attention to the time that is needed to understand if it is possible to increase the competition between the suppliers. A similar study was done by Moshe Shalev and Stee Abjonsen (2010). They have identified the factors that result on success of eRAs in public sector in the concept of price savings by reviewing the literature and tested these factors through a statistical analysis of a large sample of eRAs. They found that there is no correlation between eRA success and the number of bidders, but found out that the success is correlated with the competition among suppliers, purchase complexity and purchase specification.

According to the literature, buyer supplier relationships might have an important impact on the success of the eRAs. eRA design can influence these relationships. Jap (2007) researches the impact of eRAs on buyer-supplier relationships and shows us how the number of suppliers, the economic stakes and price visibility and the price dynamics of the course of the auction affect its relationship with the suppliers. In addition to its effect on buyer-supplier relationship, eRA design has another effect on propensity of buyers to make another bid during an eRA event. Rank-based visibility eRAs have been proven to make
suppliers bid more comparing to full-price visibility eRAs (Yeniyurt, Watson, Carter, & Kay Stevens, 2011).

Focusing on the low price and inviting a greater number of suppliers which will introduce greater competition (Beall, et al., 2003; Shalev & Stee, 2010; Wagner & Schwab, 2004), suppliers might think that the buyer is intentionally acting opportunistically to increase its savings. Carter and Kaufmann (2007) and Carter and Stevens (2006) examine how perceptions of opportunism among suppliers might affect trust relationships between buyers and suppliers, supplier commitment and non-price attributes of supplier performance. They found out that these perceptions have negative impact on non-price performance. They also suggest that the eRAs can be configured such that they result in lower perceptions of opportunism.

In a research done by CAPS Research (Beall, et al., 2003), along with the benefits of the eRA usage, describe the factors that are relevant to the success of an eRA: clear specification, sufficient training in the use of the eRA system (buyers and suppliers), only qualified bidders allowed to participate, appropriate market evaluation, not awarding business to a supplier at a price so low that it cannot deliver as specified, choosing the appropriate commodity that will make suppliers participate, switching costs are acceptable, not choosing items that are highly differentiated strategic items where buyer and supplier are tightly coupled through strategic alliances (Beall, et al., 2003).

In addition to price reductions, eRAs can also achieve shorter cycle time, increase transparency (especially important for public sector), and have other administrative benefits like avoiding to have time to time negotiations with the suppliers etc. (Amelinckx, Muylle, & Lievens, 2008; Shalev & Stee, 2010; Beall, et al., 2003). In order to achieve these additional savings, it is important that top management of the buying organizations, cross-functional teaming are committed to support eRAs and e-sourcing expertise and procedural fairness are in place (Amelinckx, Muylle, & Lievens, 2008).
RESEARCH QUESTION/HYPOTHESIS

By evaluating the literature on eRAs, we have identified these factors that may influence the success of the eRAs:

1. Specification simplicity
2. eRA volume and lotting
3. Number of qualified suppliers
4. Competition among suppliers
5. Buyer-supplier relationship
6. Switching cost of incumbent suppliers
7. eRA preparation

**Specification simplicity**

Literature suggests that product or service to be auctioned in an eRA event should be clearly specified (Beall, et al., 2003; Shalev & Stee, 2010; Carter, Kaufman, Beall, Carter, Hendrick, & Petersen, 2004). Although eRAs may be used to purchase anything, they are normally recommended only for simple purchases, such as commodities (Shalev & Stee, 2010). Making clear and unambiguous specifications will make qualified suppliers correctly understand what they are bidding for and avoid misinterpretations.

**eRA volume and lotting**

eRA volume is said to have a positive effect on the success of the eRAs (Beall, et al., 2003; Wagner & Schwab, 2004). If the suppliers are awarded larger volumes, they are able to produce larger lot sizes which are associated with lower transaction costs and economies of scale (Wagner & Schwab, 2004). The impact of eRA volume on success of the eRA could be due to a greater emphasis preparation by the buying firm, or the increased interest by the competition among suppliers, due to the greater dollar volume (Beall, et al., 2003). eRA volume is said to have an impact on the buyer–supplier relationship also. As the size of the purchase contract increases, the inter-organizational relationship is enhanced through heightened overall satisfaction and continuity expectations (Jap, 2007).
The number of qualified suppliers

The number of qualified suppliers is said to have a strong effect on propensity of the suppliers to put subsequent bids (Yeniyurt, Watson, Carter, & Kay Stevens, 2011). Bigger number of qualified suppliers leads to greater competition among suppliers (Beall, et al., 2003; Wagner & Schwab, 2004; Shalev & Stee, 2010; Yeniyurt, Watson, Carter, & Kay Stevens, 2011), thus resulting lower prices for buying organizations. This can lead to the suspicion of opportunism by suppliers that the buyer has made a strategic choice to raise the level of price competition (and increase the likelihood of lower supply margins). There are also cases of eRAs resulting in savings with only two qualified suppliers.

Competition among suppliers

Competition is said to be the most important factor of success of the eRAs. When there is a high competition, suppliers participating on an eRA compete against each other by bidding lower prices. This leads to greater savings for buying organizations. The greater number of bidders results in greater competition, but it is not always the case. Beall et al. (2003) gives an example of an unsuccessful eRA including five suppliers, but only one of them was competitive supplier. So this tells us that competition among suppliers is more important than the number of bidders, since we may end up with suppliers not wishing to bid lower.

Buyer-Supplier relationship

This is another important point for eRA success. Auction design is suggested to have its impact on buyer-supplier relationship and is an important strategic variable in determining auction revenues and savings (Jap, 2007). If the buyer-supplier relationship gets damaged because of the eRAs, this might result in no or lower participation from good suppliers, which may decrease the savings from eRAs. Awarding rules on an eRA has its effect on the supplier opinion about eRAs. Lowest price award rule is perceived positively by the suppliers who compete only on price (Caniëls & van Raaij, 2008) and therefore we do not have negative impact on buyer-supplier relationships when this award rule is implemented. But this rule should be used when we deal with suppliers that compete only on price.

As you can see on the Figure 1, buyer-supplier relationship is suggested to be influenced by the auction design and format and event dynamics (Jap, 2007).
From Figure 1 we can also see that number of qualified suppliers, eRA volume, number of lots, price visibility and price drops are suggested to be correlated with the buyer-supplier relationship which is correlated with the success of the eRAs. Auction volume, auction mechanism and event dynamics are also suggested to be correlated with buyer-supplier relationship.

**Figure 1. The impact of eRA design on buyer-supplier relationship (Jap, 2007).**

On the other hand non-ethic behavior of the buyers, results also in detrimental buyer-supplier relationships. A common example of non-ethic behavior of buyer perceived by the suppliers was that of buying organizations were submitting “phantom” bids during an eRA in order to artificially increase competition (Beall, et al., 2003). There are also other ethical issues, but it is important that the suppliers are guaranteed and convinced that the conduction of an eRA for sourcing a good would be transparent and fair.

**Switching cost of incumbent suppliers**

This is another important point for the success of eRA. eRAs are not the only sourcing tool to purchase a product or a service. There are cases that eRA is not appropriate for purchasing. In some industries, such as pharmaceuticals and aerospace, switching costs are high, while in others, such as some high technology industries that use commodity, switching cost are minimal (Beall, et al., 2003). Thus, eRA will not result successful on products or services where switching cost are high and should not be used in these cases.

As regarding to the public organizations, the switching cost might not be very important since most of them are obliged to re-tender a project if a contract has expired.
(Shalev & Stee, 2010). So, the usage of eRAs might be more appropriate for public organizations, as the effect of buyer-supplier relationship with incumbent suppliers might have lower negative effect.

**eRA preparation**

 eRA preparation is another factor that is suggested to be one of most important that may influence the success of an eRA. Before conducting an eRA the buying organizations should plan and check the following:

- whether the product can be clearly specified,
- there are enough competitive suppliers,
- see if the cost for conducting the eRA is smaller enough than the savings that may be achieved,
- Identify the correct design of the eRA regarding the price visibility, whether they should use full price visibility or partial price visibility, but also regarding the closing rule, whether the bidding time will be extended if there are still bidders bidding in the last two minutes (Beall, et al., 2003; Wagner & Schwab, 2004)

In this paper we will be answering the question of how the abovementioned factors influence the success of the eRA directly, and how these factors impact the buyer-supplier relationship in particular.

**Objectives and aims**

**Overall Objective**

The overall objective of this paper is to find the factors of the eRAs that can lead to multiple benefits for buying organizations, in the mean time sustain the good opinion (as possible) about eRAs at the supplier organizations.

**Specific Aims**

The following factors of the eRA such as: specification complexity, eRA volume, number of qualified suppliers, competition among suppliers, auction experience of buyers and suppliers and lotting strategy have an influence in decision of the suppliers to participate on an eRA event. In this paper we seek to find this influence of all this factors on the supplier willingness to participate in the eRA events.
RESEARCH DESIGN AND METHODS

Overview

We have reviewed the literature to determine the most important factors that have the greatest important impact on success of the eRAs. According to the literature, buyer-supplier relationship is a success factor in longer terms. We extend our study to this factor and we find the correlations between other success factors and this factor. For each success factor, we compare the results of different papers and derived a conclusion about it.

Population and Study Sample

For each of the hypothesis, samples from different papers are presented. These samples include both the successful and unsuccessful conduction of eRA.

Specification simplicity

The product specification is a key factor for a successful eRA. The product that cannot be specified clearly should not be conducted in eRA. Wagner & Schwab (2004), in their analysis of 23 eRAs, using a linear regression, found a strong and positive relationship between the success of an eRA and the specification simplicity (see Figure 2). Shalev & Stee (2010) with their analysis of 139 eRAs conducted by four organizations operating in the US and EMEA, found that there is correlation between specification simplicity and success of the eRA. These results could be that if the specifications were not clear, the buying organizations might receive something that it is not intended for and result even in loss of money. Clear specifications are advantageous for the suppliers also, because they might bid other prices and not win the business. Because of its importance (assuming that there will not be face to face negotiations), buying organizations spend more time to define specifications, therefore this results in better perception of eRAs also from the suppliers.
Figure 2. Auction success depending on simplicity of specification (Wagner & Schwab, 2004)

**eRA volume and lotting**

In their results obtained from 139 eRAs and with a volume from $1528 to $16.5 million, Shalev & Stee (2010) did not find a correlation between eRA volume and success. No correlation between eRA volume and success found Wagner & Schwab (2004). On the other hand, Beall, et al. (2003) in their study where the auction volume ranged from $1 million to over 45 million, found that the larger eRA volume, greater the success of an eRA. They suggest that this could be due to better preparation by the buying firm. The reason that Shalev & Stee (2010) and Wagner & Schwab (2004) didn’t find the same correlation, could be that the volume used on the sample of Beall et al. (2003) was higher than the Shalev and Wagner, which would have resulted in greater interest of suppliers to win the business. Therefore we assume that eRA volume is not strongly correlated with the success of eRAs. As regard to lotting, it is strongly related with the success of the eRAs (Beall, et al., 2003). It was suggested by Beall et al. (2003) that this could be due to the inefficiencies in the bidding process.

**Competition among suppliers**

Competition was found to be one of the most important factors that impact the success of an eRA, but it was also found that is strongly correlated with number of bidders if the bidders are independent of each other (Shalev & Stee, 2010; Beall, et al., 2003; Wagner & Schwab, 2004).
As we can see from the figure 3, probability of success increases with the competition among suppliers. It is not always the case that number of bidders will increase the competition. There are cases when 5 suppliers participated on an eRA event, and only one of them was competitive, which resulted in an unsuccessful eRA (Beall, et al., 2003). From this we can conclude that it is important to have independent suppliers participating in an eRA event. Beall et al. (2003) suggest measures to avoid having suppliers that only survey the prices and do not bid.

\[ p = \frac{1}{1 + e^{-z}} \]

where:
- \( p \) is the Probability of success
- \( z = -2.672 + 0.878 \times x \)
- \( x \) is the Competition among suppliers participating

**Figure 3. Competition influencing the success of an eRA (Wagner & Schwab, 2004)**

**The number of qualified suppliers**

The studies of Shalev & Stee (2010) and Wagner & Schwab (2004) did not find a direct impact of number of bidders on the success of the eRA. But they found strong correlation between number of bidders and competition among suppliers. These results could be due to fact that some of the suppliers were not competitive and did not put bids as we mentioned above. The correlation with competition among supplier is due to the fact that as much we have suppliers, we will have more bids. We will cover the correlation with buyer-supplier relationship of the number of qualified suppliers in the next subsection.

**Buyer-supplier relationship**

Jap (2007) suggested that the number of bidders have negative impact on buyer-supplier relationship. But after his quasi-experiment with 25 eRAs of 25 product categories, he finds out that number of bidders has positive impact. This could be because buyers didn’t include unqualified suppliers which other suppliers might percept it as an intention to
decrease the bid prices. Therefore it is important that the buyers behave ethically by not allowing “phantom” bidders or unqualified bidders in order to achieve greater savings in longer terms.

As regard to the eRA volume and lotting influencing the buyer-supplier relationship, Jap (2007) came up to the result indicating that eRA volume has a positive impact on buyer-supplier relationship. This could be due to the greater profit that suppliers might have from bigger contracting values, which might result in greater participation and competitiveness between suppliers. Jap (2007) found negative impact of lotting in an eRA if the number of lots exceeds 7 lots. The greater number of lots might make it harder for the suppliers to effectively put their bids.

Price visibility (whether the suppliers see all the bid prices that other suppliers have put or they only the lowest bid price or only their current ranking in the process of an eRA) was found to positively impact buyer-supplier relationship if it is partial (Jap, 2007). Ranking visibility has been found to increase competition among suppliers and is better in long run since the winning supplier might increase its price (since he knows the other supplier prices and competitiveness) when the same eRA is repeated for the second time (Beall, et al., 2003). So, we see that partial price visibility has double positive influence in an eRA: it raises the competition and it doesn’t harm buyer-supplier relationship comparing with full-price visibility. It is important to note here that some suppliers want to have more privacy regarding the bid prices since it may affect their business.

Jap (2007) did not found significant impact of award rules on buyer-supplier relationship. But when they are combined with the number of lots, auction-determined award rules (where the winner is determined by the eRA, not by the buyer which is the case of buyer-determined award rule) have positive impact on buyer supplier relationship (Jap, 2007). Jap (2007) has also found that auction determined eRAs have negative impact on buyer-supplier relationship when used with full-price visibility auctions. From this we can see that price visibility has bigger importance than award rules on eRAs.
Switching cost of incumbent suppliers

It has been found that lower or neglected switching cost are important factor of successful eRAs and it is favorable not to use eRAs when there is a stronger collaboration between buyers and suppliers (Beall, et al., 2003). But as regard to the public sector, switching cost can be neglected as they are mostly obliged to change the supplier when the contract expires (Shalev & Stee, 2010). Therefore eRAs are encouraged by the European Union in its Directive on public procurement.

eRA preparation

Beall, et al. (2003) and Wagner & Schwab (2004) found that eRA preparation is strongly correlated with the success of the eRAs. As more the organizations are prepared, the greater the success, especially when the preparation of the specification results to be clear. It is suggested that buyers and suppliers test the software before they run an eRA in order to make sure that buyers and suppliers know how the eRA works (Beall, et al., 2003). From these results we can conclude that procurement professionals at the buying organizations have to be very careful when they make decisions about running eRAs. They have to do a deep analysis of whether they can make clear specification and study the market if there are competitive suppliers which offer the desired quality of products or services.

In order to have a better picture of all the success factors and their correlation with success and buyer-supplier relationship, and their correlation among themselves, we have designed a figure which shows all these correlations (See Figure 4).
Figure 4. Correlation between success factors.
STRENGTHS AND WEAKNESSES OF THE STUDY

This study covers the most important factors that yield to successful conduction of eRAs and build a framework which can be used as a guide to check whether a buying organization should use eRAs as one of its e-sourcing tools.

The limitation is that this study has been only a literature review trying to determine the most important factors influencing the success of an eRA. So, this work is missing the experiment of the determined factors to test whether those factors still hold their position. A future work might be one that will test these factors and build a proven framework of each of the factors by allocating different points to them based on their importance of success.

This work does not cover the impact of procurement professionals of buying organizations on the success of the eRAs.
CONCLUSION

In our study of success factors of eRAs, we aimed to identify the most important factors that have greater impact on price savings but which minimally negatively impact buyer-supplier relationships. We have observed that specification simplicity, competition among suppliers and preparation of eRAs have a strong impact on success of the eRAs. So it is important that buying organizations planning to start using eRAs, should analyze the market if there are enough independent suppliers that can provide the desired product and service. The specification of the product to be bought must be very clear in order to have successful eRA. The time needed for the preparation is also important, since it takes time to study the market, make the good specifications, train users (both from buying and supplier firms) on the eRA software.

We have also observed that buyer-supplier relationships are an important factor that has an influence on the success of eRAs in longer terms. If the suppliers show no satisfaction with the usage of eRA then they might not want to participate on them in future. They might even organize and build their own auctions selling their products to the buyers which pay more (Beall et al., 2003). Therefore we have observed some of the eRA design factors that might have an impact on supplier’s perception on eRAs. We have found that price visibility affects buyer supplier relationships. If the price is fully visible, it has negative impact on buyer supplier relationship comparing to partial price visibility. Changing the incumbent suppliers has the greatest impact on the buyer supplier relationships. The cost of changing these suppliers might be high and it doesn’t worth conducting eRAs on these cases.

But buyer-supplier relationships are less affected when we deal with public sector organizations. Most of them are obliged to retender the projects when the contract has expired (Moshe and Shalev, 2010). This makes the government incumbent suppliers have lower negative perception on eRAs. Therefore, public sector organizations should be encouraged to use eRAs as an e-sourcing tool to achieve greater savings, but also the greater transparency.

This work has also its limitations. The greatest limitation is that this work didn’t include a direct research from different companies running eRAs or from an eRA provider.
like or Ariba or Buying Solutions. But testing our observations remains a future work. Another limitation is that we didn’t include the role of procurement professionals and executive officials in decision about whether the buying organization should run eRAs or not. We didn’t either cover the characteristics of the suppliers which may have an effect on the participation on eRAs.
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