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## **Determining the factors that attracts vendors to participate in an e-procurement system**

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Shamshul Bahri\* and Nurmazilah Mahzan

Faculty of Business and Accountancy,  
University Malaya,  
Kuala Lumpur, 50603 Malaysia  
Fax: 0060379673980  
E-mail: esbi@um.edu.my  
E-mail: nurmazilah@um.edu.my  
\*Corresponding author

Lee Chee Kong

University Malaya Graduate Business School,  
Level 4, Block C, City Campus,  
Jalan Tun Ismail, 50480 Kuala Lumpur, Malaysia  
E-mail: ckleek@hotmail.com

**Abstract:** E-procurement has the potential to provide savings to organisations by properly developing, planning, allocating the company's resources and communicating effectively with vendors. Through the implementation of an enterprise resources planning (ERP) and the electronic data interchange (EDI). As a result, buyers and sellers can develop partnerships through the automation of delivery schedules by linking the company's material management system with the vendors system. The success of these initiatives however, depends on the vendors' willingness to participate in an e-procurement system. Therefore, this paper attempts to examine the factors that would attract the vendors to participate in an e-procurement system. A survey was carried out on two hundred and fifty five registered vendors of a public listed company in Malaysia. This study found that the component of spending analysis is the most important component that influences the successful participation of the system while the contract management feature is the least important component.

**Keywords:** e-procurement; participation factors; vendors; spending analysis; procurement management.

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**Biographical notes:** Shamsul Bahri received his PhD from Brunel University, his MBA from University of Malaya and his Bachelor in Business Administration from Universiti Kebangsaan Malaysia. He is currently a Lecturer in the Department of Operations and Management Information Systems, Faculty of Business and Accountancy, University of Malaya.

Nurmazilah Mahzan received her PhD from Birmingham University and his Bachelor in Accounting from the International Islamic University Malaysia. She is currently a Senior Lecturer in the Department of Financial Accounting and Reporting, Faculty of Business and Accountancy, University of Malaya.

Lee Chee Kong is currently working as a Purchasing Manager after completing his MBA at the University of Malaya Graduate School of Business.

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## **1 Introduction**

E-procurement is a system that enables the internal staff of a company to make purchases of goods or services online. The system also manages the interactions of business processes between several transacting parties. In order to achieve those functionalities, the system has to include features such as management of correspondence, request for information (RFI), request for proposal (RFP), e-tendering, vendor management inventory (VMI), and questions and answers. It must also be able to send events to all participants in all of the selected emails. Consequently, it helps to create a more efficient communication channel and ensure a transparent process on procurement decisions.

A good e-procurement system will help firms organise its interactions with its most crucial vendors and become the business partner in handling change in the business environment (Hannon, 2010; Carter and Yan, 2007). Lintukangas (2011) concluded that firms with organisational capability to manage supplier relationships will be able to achieve the following advantages;

- 1 have the ability to coordinate their supply chains effectively
- 2 are committed to develop their relationships in collaboration with suppliers
- 3 aim at trustful relations
- 4 communicate actively with their suppliers
- 5 follow valid supply processes.

For an e-procurement to effectively fulfil such capability, the system has to include components such as expense control and analysis, electronic communication platforms, and supplier performance management which are provided through an automated built in monitoring tools. The system also provides an organised way to keep an open line of communication with potential vendors during a business process and a channel for new vendors to participate at the tender stage or request for a proposal (Hong and Kwon, 2012). The system will become the channel for the managers to confirm pricing, and leverage previous agreements to assure each new price quote is more competitive than the last.

In addition, an e-procurement system enables purchases to be regulated and tracked more efficiently that can lead to the avoidance of unnecessary or extravagant purchases. Furthermore, an e-procurement system eases the purchasing process. Instead of going to the store and shop, the purchasing manager can place the order online. As a result, companies that have put e-procurement systems in place have seen a substantial decrease

in waste and savings of millions of dollars annually. For example general electric reported savings of USD10 billion annually when converting to an e-procurement system (Hawking et al, 2004). Rai et al. (2009) provide evidence of the positive impact of e-procurement on procurement productivity while Smith (2009, 2011) argued that e-procurement offers the benefits of greater transparency, better pricing, wider geographical reach and lesser time of transaction.

Although many companies have implemented an e-procurement system, many of them failed to realise the benefits of the system. Instead, they encountered some problems during the system's participation. One of the biggest problem is the companies' employees refuse to use the system. Two more common problems faced by the companies are the difficulty in integrating with the vendors' systems and their late adoption of the system (Hannon, 2001). One of the major reasons for the vendors' late adoption of the system is incompatibility of IT infrastructure (Hawking et al., 2004). As a result, many potential participants of the system including vendors may shy away from the system because they feel that the difficulties and problems of the system outweigh its benefits. Therefore, we argued that it is very important to identify factors that would attract the vendors to participate in an e-procurement system. Our argument is based on the findings by Abdul Maged (2009) that in the e-procurement adoption process, the role of supply chain partners is very important.

### *1.1 Objectives and significance of this study*

Our main research question is 'what are the factors that would attract vendors to participate an e-procurement system?'. Further, we detailed out the sub research questions as follows:

- What are the factors that influence the vendors' decision to participate e-procurement?
- Which of the components is the strongest determining factor?
- Which of the components is the weakest determining factor?

Since procurement represents one of the largest expense items in a company's cost structure (Lennon, 2002; Attaran and Attaran, 2002), this study will help companies identify and manage the factors that influence their vendors' willingness to participate in e-procurement systems hence ensuring its success. Although some studies (Vaidya et al., 2006) have investigated factors that influence e-procurement implementation success, their perspective is different to this study. In addition, this study can also provide more information concerning e-procurement systems to decision makers to increase the flexibility of the companies' to suit the uncertain business environment. Previous studies that highlight the relationship between business strategy, environmental uncertainty and manufacturing flexibility suggest that organisations must continually measure performance and monitor the required flexibility to match their strategies with the ever changing environmental uncertainty (Beach et al., 2000).

The remainder of this paper will be organised as follows; next we will discuss the relevant literature on e-procurement and describe the hypothesis development. Subsequently we present the research findings and finally put forward our discussions and conclusions.

## 2 Literature review

Procurement activity represents one of the largest expense items in an organisation's cost structure. E-procurement is defined as a major activity in the management of supply chain is highly supported by information technology. The system will help companies develop a product catalogue over the network to fulfil the needs of internal customers. In order to compete with other global players, firms need to craft a portfolio approach to manage their relationships with trading partners and work together to create a competitive advantage (Hope-Ross et al., 2000b). For instance, in a collaborative procurement initiative (Bakker et al, 2008), firms tend to share resources to manage cost and e-procurement would help effective cost management. Procurement can also be regarded as a dynamic process involving a constant flow of information, material, and funds across multiple functional areas within the organisation. Therefore, no single e-procurement solution can adequately address the needs for a firm to purchase different types of goods or services (Hope-Ross et al., 2000b; Rajkumar, 2001) and the firms will need to consider three major types of electronic environments for e-procurement:

- 1 buy side applications
- 2 sell-side applications
- 3 marketplace services (Davila et al., 2003; Kyte, 2000a, 2000b).

### 2.1 *System features*

The choice of an e-procurement system will usually depend on its ability to integrate with the existing information technology infrastructure within the company. For example, Xerox chose the SAP e-procurement solution because of its integration capability with their existing SAP R/3 system. In other example, Cisco opted for ARIBAs' e-procurement system as it provided the best link to the Oracle system at the time and led in terms of user friendliness. These companies chose integration despite the availability of adapters to allow seamless integration with back-end systems. Cisco's Ariba system, for example, can extract all user information such as user name, password and IP addresses from the PeopleSoft human resources system. Additional interfaces exist to link in the Oracle financials and material management system. As e-procurement is not targeted exclusively at the optimisation of internal processes, integration is also required with the vendors and electronic marketplaces. SAP, for example, uses Emaro to link with vendors' systems for order processing and accounting.

### 2.2 *Spending analysis*

One of the important functions of the e-procurement system is the spending analysis, which is the process of aggregating, cleansing, and analysing corporate spending data for the purposes of reducing costs and improving operational performance (Mitchell, 2004). Unfortunately, functional silos, ad hoc management practices, weak technology support, and poor source data qualities have worked against firms' ability to conduct spending analysis (Mitchell, 2004). Without spending analysis, a firm cannot maximise its buying leverage, arrive at intelligent sourcing decisions, ensure compliance with supplier contracts, raise supplier performance, optimise budgeting and planning, and anticipate the

impact of changes in cost, inflation and other factors (Mitchell, 2004). Some organisations face difficulty in proceeding with the data collection for analysing spending pattern because of ‘Maverick purchases’ within the company (Ronchi et al., 2010). ‘Maverick purchases’ refers to the purchase of goods or services without using the firm’s formally defined processes and authorised vendors (Kyte, 2001c). Such practice has several consequences such as depriving the firm of the ability to collect data on its employees’ spending patterns and, therefore, loses visibility and control over its expenditure. In addition it also raises procurement costs for the firm by as much as 20% compared to purchases negotiated by the firm’s purchasing professionals (Orr, 2002). Maverick buying can be eliminated by presenting end users with a highly efficient and easy-to-use e-procurement system that will lure them away from old purchasing habits (Kyte, 2001c; Ronchi et al., 2010).

Providing visibility into individual and unit spending within the firm is an important precursor to conducting spending analysis (Hope-Ross and Reilly, 2000b; Hope-Ross et al., 2000b). ‘Visibility’ means making transparent who is doing the spending, how much they are spending, on what they are spending, and with whom they are spending (Bushell, 2004). ‘Visibility’ also means assigning ownership of spending to the individual or unit that knows most about the purchase and sharing the responsibility over purchases with all other corporate units using those same goods. Managers should also track saving targets for each spend category, link these targets to departmental budgets, track actual savings achieved and, finally, tie the bottom line to individual or unit performance evaluations linked to the savings targets (Kanakamedala et al., 2003).

### *2.3 Vendor management*

The best procurement practice requires identifying which products or services should be sourced from specific vendors. This practice consequently will enable organisations to properly manage their vendors and consolidating their contracts (Hope-Ross, 2001c, Lintukangas, 2011; Oumlil, 2012). Lion Nathan, an Australian-based beverage firm, consolidated its sea freight spending and contracts with a single provider and achieved significant savings. Its operations in New Zealand, China, and Australia all used international sea freight services (Bushell, 2004). Lintukangas (2011) in his study of 100 Finnish firms indicate that the firms with organisational capability to relationships with vendor will have the ability to coordinate their supply chains effectively and also able to communicate effectively with them. A buyer’s strategic vendors usually constitute 20–40% of their supply base. These vendors offer the buyer firms, the greatest chances of e-procurement success. Buyer firms should further narrow down the list of potential vendors for e-procurement initiatives by considering only those with previous e-procurement engagements with other customers, those interested in emerging innovations, and those that have the local decision-making authority to approve the investments and business process changes the buyer might require (Kyte, 2001a, 2001b, 2001c).

Buyers will increasingly rely on their vendors’ willingness and ability to connect with them electronically and support the catalogue creation and maintenance issues involved in e-procurement. Their willingness may be impacted by the perceived usefulness of the systems to their supply process (Abdul Maged, 2009). Thus, buyers need to carefully

select vendors who are in the best position to respond to their e-procurement deployment plans (Hope-Ross, 2001b; Rajkumar, 2001). Vendors may prefer one e-procurement system over another on account of transaction fees being charged by e-marketplaces or catalogue managers (Hope-Ross, 2001a). Thus, buyers need to know if transaction fees are an issue for vendors because, if this is so, these additional costs will most likely be passed on to the buyers. Certain vendors will not be able to keep up with buyers' technology requirements (Hope-Ross et al., 2000b). Buyer channel masters need to be prepared to underwrite the costs of getting valued but underequipped vendors on board for any major e-procurement initiatives. PricewaterhouseCoopers calculated that a firm could gain savings of 30–40% of non-direct spending if they buy only from preferred vendors (Hope-Ross and Reilly, 2000a). Certain procurement software products are designed to automate a firm's purchasing processes and policies and, thus, direct order requests for specific goods to preferred vendors (Kanakamedala et al., 2003).

#### *2.4 Contract management*

Significant benefits from e-procurement come from reengineering procurement business processes and subsequent modifications in employee behaviour and relationships with vendors (Vaidya et al, 2006; Attaran and Attaran, 2002; Rajkumar, 2001; Hope-Ross and Reilly, 2000a). However, use of an e-procurement application to meeting change management requirements in affected procurement business processes is perhaps a secondary reason. Firms usually begin their e-procurement efforts by sourcing indirect goods and/or services first (Davila et al., 2003; Orr, 2002; Kyte, 2000a, 2000b). The Aberdeen Group (2001) found that about 30–60% of a firm's total expenditure is due to purchases of indirect goods/services. It is recommended that the firm centralise the control of its contracts, product data, catalogues, and price updates for indirect procurement (Bartels, 2004; Hope-Ross and Reilly, 2000b; Hope-Ross et al., 2000a). Web-enabled procurement enables the firm to embark on the consolidation of vendors and contracts by implementing centralisation of the purchasing processes (Angeles and Nath, 2005). Such strategy can bring benefits to firms such as cost saving from the economy of scale (Subramaniam and Shaw, 2002) and allowing firms to gain greater control over sources of supply, purchase price, and inventory policies (Croom, 2000).

Workflow rules embedded in the software govern the e-procurement tasks

- 1 access and privilege rules: the information presented to authorised users needs to be determined by information access and privilege rules covering such things as customer-specific information that may include pricing and detailed product item specifications
- 2 non-repudiation rules: allows vendors to ensure that the electronic message has been received by buyers and also authenticate the origin of the message
- 3 pricing rules: alerts buyers that certain vendors have increased the prices of certain goods beyond preset thresholds (Rajkumar, 2001; Hope-Ross and Reilly, 2000b; Hope-Ross et al., 2000).

### **3 The research method**

#### *3.1 The research hypotheses*

System's features have been extensively found in IS literature to influence the attractiveness of a system. A good procurement system has features that enable its users to easily navigate the system's functionality because the icons, forms, and buttons are arranged to be logical and intuitive. A good procurement system also has features that are pleasing to the users' eyes such as attractive layouts and good colour combination. Users generally would like to use such procurement system, thus attracting the firm to implement such system. Therefore, the following hypothesis is offered:

H1 System's features variable influences the attractiveness of a procurement system.

Spending analysis is one of the main tools of a procurement system. However, this tool varies between different procurement systems. A good system enables the users to analyse the spending at the macro to the micro levels of the firm. A good system also enables the users to aggregate the whole spending or to segregate it to different vendors, time and locations. As a result, the firm is able to scrutinise its procurement, thus making it an important attractor to implement the system. Therefore, the following hypothesis is offered:

H2 Spending analysis variable influences the attractiveness of the procurement system.

One of the most important purposes of a procurement system is to manage the relationship between a firm and its vendors. The system enables the firm to store a list of vendors that have supplied it with products and services. Later on, the firm would be able to analyse the transaction history between the firm and the vendors, enabling the firm to identify the vendors it has most transactions with and the vendors they have least. The vendor management tool also enables a firm to track the performance of each vendor. These capabilities should attract firms to implement an e-procurement system. Therefore, the following hypothesis is offered:

H3 Vendor management variable influences the attractiveness of an e-procurement system.

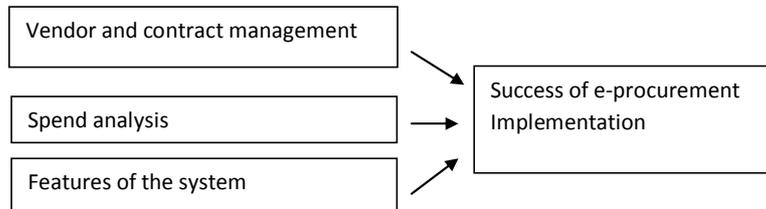
A relationship between a firm and a vendor is often based on a contract. In the past, contract management has to be handled manually. Although it is still possible to manage the contract manually, it has become a tedious affair. This is especially so when the firm has formed contractual relationships with many vendors. When the volume and frequency of transactions are large, they are almost impossible to manage manually. This problem can be overcome with the use of an e-procurement system, making it an attractive factor in the implementation of the system. Thus, the following hypothesis is offered:

H4 Contract management variable influences the attractiveness of the system.

Based on the discussion in the literature review, a research model is offered (see Figure 1). The model shows the relationship between the four independent variables

(system's features, spending analysis, vendor management and contract management) and the independent variable (attractiveness of e-procurement system).

**Figure 1** Framework to investigate factors influencing success of e-procurement implementation



### 3.2 The research process

The quantitative research method was employed for this study. The method was selected because it enabled the study to test the model and generalise the findings from a sample of data. The data for the study was collected through a seven page self-administered questionnaire that was distributed to 300 respondents. The questionnaire comprised of four sections: demographic information, partners' relationship, factors influencing the participation of e-procurement, and the system's attractiveness. Respondents were selected randomly from registered vendors of a large conglomerate in Malaysia which uses the Ariba procurement system. Using sample of respondents from this system enabled the study to control for differences in usage. In other words, the study can gauge more accurately the perception of the users because the context of the system was standardised.

## 4 Findings

### 4.1 Profile of respondents

In the data collection process, 300 questionnaires were distributed to companies that had registered with Ariba e-procurement system which is owned by a large procurement entity. However, only 277 questionnaires were returned. This yielded a return rate of 92.3%. Out of which, 22 sets of questionnaires were rejected due to incomplete answers. As a result, the final questionnaires analysed consisted of 255 respondents, which yielded a response rate of 85%. Based on the data collected, a demographic profile of the respondents was constructed. A completed profile of the respondents who participated in the survey is presented in Table 1. Descriptive analysis was carried out in order to understand the respondents' characteristics in number and percentage form.

From the analysis, a high proportion of the respondents companies have been operating for 5 to 10 years (29.8%) followed by those who have been operating for 1 to 5 years (28.6%) and 20 to 30 years (25.1%). In terms of company size, the largest group belongs to the 21 to 50 persons group (41.2%), followed by groups of 51 persons and above (23.5%) and 11 to 20 persons (17.6%). In terms of annual turnover, the largest group fall into the MYR 500,000 to MYR1 million (34.9%), followed by the group with more than MYR 1 million (26.3%).

**Table 1** Company profile of the respondents

<i>Years of operation</i>	<i>Frequency</i>	<i>Percent</i>
Less than one year	10	3.9
1–5 years	73	28.6
5–10 years	76	29.8
10–20 years	25	9.8
20–30 years	64	25.1
More than 30 years	7	2.7
Total	255	100.0
<i>Employees in the company</i>		
2–10 persons	45	17.6
11–20 persons	45	17.6
21–50 persons	105	41.2
51 and above	60	23.5
Total	255	100.0
<i>Annual turnover</i>		
Less than RM 50K	5	2.0
RM 50K–RM 150K	27	10.6
RM 150K–RM 500K	67	26.3
RM 500K–RM 1 million	89	34.9
More than RM 1 million	67	26.3
Total	255	100.0

#### 4.2 Reliability test

A reliability test was conducted to ensure that the instrument measures are consistent and stable over time (Cavana et al., 2001). In this study, the reliability of the standardised scales was confirmed using Cronbach's coefficient alpha whereby all the items showed alpha coefficients values higher than 0.8 (Table 2)

**Table 2** Summary of reliability statistics

<i>Variable</i>	<i>Cronbach's alpha</i>	<i>No of items</i>
Vendor management	0.922	6
Contract management	0.726	4
Spend analysis	0.866	5
Features and infrastructure	0.713	4
Attractiveness of system	0.802	5

#### 4.3 Test of hypotheses

Correlation analysis is used to examine the relationship between two variables in a linear fashion (Pallet, 2001). This study used the Pearson product-moment correlation

coefficients to measure the relationship of the success factors (vendor management, contract management, spend analysis and features, and infrastructure) and intention to participate an e-procurement system. In terms of the strength of the relationships between the two variables, Cohen (1988) has suggested some guidelines to determine whether the relationship of the variables is small, medium or large.

The summary of the correlations and their significance are indicated in Table 3. The strength of the relationship among success factors and the coefficient indicates the direction of the relationship (positive or negative). The absolute value of the correlation coefficient indicates the strength, with larger absolute values indicating stronger relationships. The correlation coefficients on the main diagonal are always 1, because each variable has a perfect positive linear relationship with itself. On the other hand, the significance level (or p-value) is the probability of obtaining results as extreme as the one observed. It is shown that all the factors have significant and positive relationship with the attractiveness of an e-procurement system. Among the four attractiveness factor, spending analysis was found to have the strongest relationship with the dependent variable ( $r = 0.584$ ), followed by vendor management ( $r = 0.568$ ). Meanwhile, features and infrastructure variable was found to have the weakest relationship with the dependant variable ( $r = 0.502$ ), followed by contract management ( $r = 0.524$ ).

**Table 3** Summary of correlation analysis

<i>Attractiveness factors and willingness to participate in an e-procurement system</i>			
Vendor management and participation in an e-procurement system	0.568**	0.000	Strong
Contract management and participation in an e-procurement system	0.524**	0.000	Strong
Spend analysis and participation in an e-procurement system	0.584**	0.000	Strong
Features and infrastructures and participation in an e-procurement system	0.502**	0.000	Strong

#### 4.4 Multiple regression analysis

Whilst useful, the correlation analysis above can only show the strength of the relationship between one independent and one dependent variable. It does not show the strength of the relationship between one dependent and multiple dependent variables. More importantly, correlation analysis could not determine the strength of a model and how its independent factors influence the dependent variable. Therefore, the multiple regressions technique was used to examine the relative importance of the attractiveness factors (vendor management, contract management, spend analysis and features) in predicting the participation of an e-procurement system.

The results of the analysis showed that the model is relatively strong. The adjusted  $R^2$  shows the value of 0.38. The result means that the model can explain 38% of the variance in the participation of e-procurement system while 62% of the variance cannot be explained through the model. In addition, the result from the Analysis of Variance (ANOVA) test shows that the regression model has a relatively high F value at 33.431 and was confirmed to be significant. Therefore, the findings from the resulting regression analysis can be accepted to be true.

**Table 4** Model summary

<i>Model</i>	<i>R</i>	<i>R-square</i>	<i>Adjusted R-square</i>	<i>Std. error of the estimate</i>
1	.590(a)	.348	.38	2.560

**Table 5** Result for analysis of variance (ANOVA) test

<i>Model</i>	<i>Sum of squares</i>	<i>df</i>	<i>Mean square</i>	<i>F</i>	<i>Sig.</i>
1 Regression	876.597	4	219.149	33.431	.000(a)
Residual	1,638.799	250	6.555		
Total	2,515.396	254			

Meanwhile, variable-by-variable analysis of the regression seems to confirm the results of the correlation analysis. Out of the four variables, spending analysis was found to be the most influential and significant factor in attracting vendors to participate in an e-procurement system (standardised  $\beta = 0.381$ ). Although the three other variables are significantly correlated with the participation in the system, they do not seem to significantly influence the decision to participate in an e-procurement system (Table 6). This finding suggests that senior management requires spending analysis reports to identify addressable expenditure within the organisation and forming an effective strategy to procure the items that fall in this group.

**Table 6** Coefficients of Factors that influence vendor's adoption

<i>Model</i>	<i>Standardised coefficients</i>		<i>Sig.</i>
	<i>Beta</i>	<i>VIF</i>	
1 (Constant)			.000
Vendor management	.107		.551
Contract management	.013		.909
Spending analysis	.381		.035
Features	.116		.176

## 5 Discussion

This study found that spending analysis is an important factor in attracting vendors to participate in an e-procurement system. This factor, however, has been neglected by companies that had invited their vendors into an e-procurement arrangement. Too much emphasis has been given to the ability of the companies' and the vendors' systems to integrate. In other words, many companies presume that vendors are willing to participate just because they can. Very little effort has been put into enticing these vendors to participate by demonstrating the benefits of joining the system. One of those benefits is the ability analyse the amount of transaction between the vendor and the company.

How exactly the spending analysis tool should be designed depends on the requirements of the firm. Some firms would like to analyse expenditure up to the very detail information such as date of transaction, the persons handling it, and the breakdown of the expenditure. Some firms may prefer the use of advanced graphics to analyse the firm's spending. Thus, the system developer must have the ability to adapt the

e-procurement system to the needs of the firm. Only when the needs of the firm and the spending analysis features are matched will the system be successfully utilised by the users.

Although this study did not find a significant relationship between three other factors – namely system's features, vendor management and contract management – with the attractiveness to implement an e-procurement system, these factors are still important factors to consider in the use of the system. There were strong evidence from previous studies that either one of those factors have influenced the decision to implement an information system. Therefore, in future studies of other types of information systems, those factors should still be included because they may influence the attractiveness of those systems.

## **6 Conclusions**

This study indicates that vendor management, contract management, spend analysis, features and infrastructure are the attributes that affect intention towards the participation of an e-procurement system. In addition, this study also provides a useful comparison of the relative importance of success factors. It was found that spend analysis and features and infrastructure are the two most important factors in determining the intention of the participation of an e-procurement system. The outcome of this study will benefit vendor companies if the senior management understand the important factors to consider in participating an e-procurement system. The results of this study have several important implications. First, the study found that critical success factors will influence the intention towards the participation of an e-procurement system. The four elements (vendor management, contract management, spend analysis and features and infrastructure) were found to have a positive impact on the success of e-procurement participation. The senior management of companies will have a clear picture of the benefits of participation and be able to provide good justification to the shareholders to approve the use of resources on the participation of an e-procurement system. Further, the top management will have better control over the procurement process within the organisation and be able to synergise the resources to add value on the overall supply chain in order to survive in this competitive business environment.

However, this study is also not without any limitations. This study was limited to respondents who had self registered with the Ariba procurement system and they are vendors or a large procurement entity in Malaysia. Therefore it does not cover vendors which are not dealing with this procurement entity. The study also only focused on four variables (vendor management, contract management, spend analysis, features and infrastructure, system integration, resistance user and cost participation), to examine the impact on the participation of an e-procurement system. There are still many other factors that can be taken into consideration towards the participation of an e-procurement system. Despite the above shortcomings, the findings of the research could provide insights into the impact of variables on the e-procurement participation intention.

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