

Application and Implementation of E-Procurement Technologies in Malaysian Manufacturing Firm

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Abstract— In the present scenario of global business competition, web-based technology is of great importance. It has become an extremely important criterion where businesses are now adopting e-commerce such as electronic procurement for the operation management of their organization. Despite this, they are still experiencing slow adoption of e-procurement. The main objective of this study was to determine the extent of e-procurement implementation in Malaysia organization as well as identify the relationship between the e-procurement system and supply chain performance among organizations in Malaysia. The study anchored on relevant theories on e-procurement which was Technology Acceptance Model. This study used descriptive research design. The population of this study was the employees from the manufacturing firms in Malaysia. A questionnaire was used to collect data. Data collected was analyzed quantitatively through the Statistical Package for the Social Sciences (SPSS). The procurement processes include E-ordering, E-sourcing, E-tendering, E-reverse auctioning and E-informing. The findings indicated that the firms had implemented E-procurement to a moderate extent. The respondents indicated that E-tendering was highly implemented in the organization in order to improve the supply chain performance to a large percentage (M=3.92, SD=0.701). The results also identified that the e-procurement system was positively associated with the supply chain performance of the organization. This study provides insights into manufacturing firms regarding the importance of E-procurement technologies.

Keywords— Application and Implementation, E-Procurement technologies, manufacturing firm, supply chain performance, Technology Acceptance Model

1. Introduction

In the era of globalization, overall governments have exhibited the need to enhance service delivery and have the capacity to deal with issues quickly and systematically. The innovation of internet technology has made it feasible for governments to upgrade themselves by providing traditional services directly on the web [1] Subsequently, the Malaysian government has launched e-Government as one of the Multimedia Super Corridor (MSC) Flagship Applications with the mission to apply multimedia technologies in enhancing the government operation. One of the initiatives taken by the government to embark into a whole new level of supply chain operations was introducing the e-procurement system. Electronic procurement, regularly specified as e-procurement, can be characterized as the application of the electronic method in every stage of the purchasing process of goods and services for organizations [2]. There are five forms of e-procurement, i.e. i) e-ordering, ii) e-sourcing, iii) e-tendering, iv) e-auctioning and v) e-informing [3] Procurement system is one of the organizational systems which consist of particular responsibilities and authorities to people and organizations that contribute towards achieving a good quality of materials and end product [4]. Organizations as in manufacturing firm utilize e-procurement for acquiring contracts to attain several advantages, for example, productivity increment among their employees and to reduce expenditures

by receiving fast services and less expensive products. Furthermore, it likewise enhances transparency and prevents corruption in procurement processes among the employees in the organizations.

E-procurement system was implemented in Malaysia in the year of 2002. In spite of that, there were 30,000 government suppliers registered with the Ministry of Finance, which has yet to have an established infrastructure to carry out the e-procurement system [5]. Moreover, the lack of top management commitment has become one of the problems faced by organizations to implement e-procurement system. Among the challenges encountered by organizations to implement e-procurement is the trouble of compatibility of the existing software in the market. This is due to the fact that the majority of these software packages are not compatible with the organization's technology system. Another issue is that it would be tedious for an organization to outline its own e-procurement framework. The implementation of e-procurement systems has the potential to create its value for organizations which directly effects on supply chain performance [6]. In other words, e-procurement can provide a strategic function for supply chain management which can contribute to supply chain performance [7]. Nevertheless, the process through which e-procurement affects supply chain performance is still an unknown issue. In terms of academics, e-procurement is an emerging phenomenon and needs to be systematically analyzed. As for supply chain managers, e-procurement is an approach which creates a need to be aware of the information technology factors which contributes on the achievement of competency on a practical level [6]. Therefore, the main objective of this paper is to determine the extent of e-procurement system implementation as well as to identify the relationship between the e-procurement system and supply chain performance among organizations in Malaysia.

2. Literature Review

This research was guided by relevant theories of e-procurement which is the Technology Acceptance Model. Nowadays, there is an increment in procurement costs which leads an organization to adjust the budgets systematically. The manufacturing organization has accepted and adopted the information and communication technologies which have become enablers in

information access, knowledge sharing, as well as innovation [8]. Technology Acceptance Model (TAM) was introduced and justified by Davis [9] which has become the most widely applied model of usage and technology acceptance. There are two main enablers of technology acceptance which comprehends perceived ease of use as well as perceived usefulness as clarified by the criteria of the information system [9]. It is necessary for the organizations to carry out an assessment among the employees towards the implementation of e-procurement to ensure the level of supply chain performance.

Supply chain performance can be defined as an evaluation of supply chain management, which includes both tangible (cost) and intangible (capacity utilization) factors [10]. A procurement system is an important component of the supply chain system of an organization, which involved procuring certain necessary resources from external parties [11]. In the context of supply chain management, e-procurement is described as the adoption of technology systems in the procurement stages which involves ordering, sourcing, tendering, auctioning as well as negotiations. The e-procurement method is categorized into five main applications which consist of E-ordering, E-sourcing, E-tendering, E-reverse auctioning and E-informing [12]. First and foremost, E-ordering draws in electronically capturing data which includes orders, requests, and information received by the customer as well as the storage database of an organization. These data will be analyzed by the in-charge departments. Ordering process seems to be a straightforward and simple process but it is one of the major challenges for the suppliers and buyers [7].

Besides, E-sourcing is mainly described as the process of identifying and selecting suppliers based on their specific requirements of the procurement. This application does also acquire bids from various suppliers through a single line portal [13]. This strategy allows the firms to choose their favorite suppliers according to the competitive aspects listed online. Subsequently, E-tendering is an application where the invoices and purchases requests are being sent to suppliers. This is a secure platform which allows buyers and suppliers to perform online transactions. E-tendering systems cover the process of the tender requirement until the contract placements as the documents will be electronically exchanged [14]. Moreover, E-reverse auctioning refers to an online bidding process which is done in a real time where the suppliers compete to obtain business or contract given by buyers [15]. Other than that, E-informing is an approach to collecting information regarding purchases to buyers as well as

suppliers using web-based technology [12]. This method includes assembling information and distribution of particular information to external and internal parties using extranet. The independent variable in this study is e-procurement (E-ordering, E-sourcing, E-tendering, E-reverse auctioning and E-informing) while the dependent variable is the supply chain performance of the organizations. Figure 1 shows the conceptual framework which has been applied in this research.

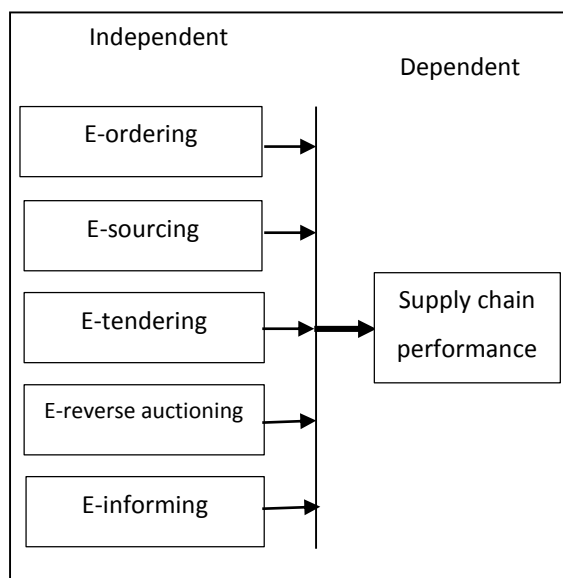


Figure 1. Conceptual Framework

3. Research Methodology

3.1 Research Design

This study applied quantitative research. The survey instruments were validated by a group comprised of two supply chain academic experts from Malaysian University and two supply chain analyst, from a public organization and a private organization in Malaysia. The questionnaire was adopted from De Boer et al. [16] and Quesada et al. [17] and modified according to the requirement of this research. The duration of answering the questionnaires was estimated as 20 minutes, and the survey was conducted in English. The targeted population sample of this study comprised of 325 procurement managers of the manufacturing firm in Malaysia. The questionnaires were then given out to the organizations which adopted an e-procurement system using random sampling method. A total of 142 respondents feedback were recorded. The data was analyzed quantitatively by Statistical Package for the Social Sciences (SPSS). Each construct's reliability of the questionnaire was evaluated using Cronbach's α . In order to determine the research

objective, descriptive statistics were applied where the dependencies between independent and dependent variable were analyzed using regression analysis. The relationship between e-procurement and supply chain performance was measured by the following multivariate regression analysis where:

$$Y = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + e$$

where;

Y = Supply chain performance

α = Autonomous factors

X1= E-ordering

X2= E-sourcing

X3= E-tendering

X4= E-reverse auction

X5= E-informing

Bs represents beta coefficients of the independent variables

e= Error term

3.2 Sample Design

During this stage, once the ethical approval is received from the experts who verified the instrument, the updated questionnaire was distributed through electronic mail to a random sample of 300 procurement managers employed in manufacturing organizations in the southern region of Malaysia. Follow-ups were being done with the procurement managers for their involvement in the questionnaire survey. Follow-ups were important through telephone calls and electronic mails to make sure i) the response rate is high, ii) the range of time is reminded to the respondents, and iii) the significance of this research and the respondents' responses was assured. A tracking and monitoring schedule was set-up in order to ensure systematic follow-ups. A total of 142 respondents feedback has been recorded which clearly shows their contribution of knowledge towards e-procurement system. Therefore, the sample of this study is 142 procurement managers across Johor manufacturing sectors with a response rate of 47.3%, which according to Hair et al. [18] is acceptable for a survey. This survey provides an insight into the relationship of e-procurement implementation between supply chain performances.

4. Results and Analysis

4.1 Descriptive Analysis

In order to measure the internal consistency of the research constructs applied in this research, reliability tests were being carried out. For the

validity determination of the constructs used, an exploratory factor analysis was carried out and the result produced five items which are confirmed to be the constructs of the e-procurement system (e-ordering, e-sourcing, e-tendering, e-reverse auctioning and e-informing). The analyzed data is shown in Table 1. Table 1 indicates that the validity and reliability of the variables are confirmed. Hair et al. [19] stated that the Cronbach's alpha coefficients have to be within the lowest acceptable limit of the coefficient which is 0.7. The result of the reliability analysis strongly supports that the instruments constructs are reliable.

Table 1. Reliability Analysis

Factor	Variable & Item	Cronbach's Alpha Value
1	E-ordering	0.702
2	E-sourcing	0.809
3	E-tendering	0.722
4	E-reverse auctioning	0.765
5	E-informing	0.728
6	Supply chain performance	0.775

Table 2. E-procurement Implementation in Manufacturing Firm

Variable	Mean	Standard deviation
E-ordering	3.37	1.214
E-sourcing	3.62	0.778
E-tendering	3.92	0.701
E-reverse auctioning	3.78	0.684
E-informing	3.57	0.618
Total	3.652	

The first objective was to determine the extent of e-procurement implementation in manufacturing firm under this research. The respondents were therefore given options with the statement to rate on a Likert scale (ranging from 5= highest extent to 1= lowest extent). The procurement processes include E-ordering, E-sourcing, E-tendering, E-reverse auctioning and E-informing. The respondent's feedback indicates that their organizations have implemented E-procurement: E-ordering (M=3.37, SD=1.214), E-sourcing (M=3.62, SD=0.778), E-tendering (M=3.92, SD=0.701), E-reverse auctioning (M=3.78, SD=0.684), E-informing (M=3.57, SD=0.618). According to Chua [20], the interpretation of mean score is moderate due to the total mean recorded which is 3.652. The summary of results is shown in Table 4.2. The aggregate E-

procurement implementation level for the manufacturing firm is moderate indicating that some of the firms are still using the traditional procurement methods. These results coincide with the findings of GovWin [12] who recorded various types of e-procurement applications. The applications incorporate; E-ordering, E-sourcing, E-tendering, E-reverse auctioning, and E-informing as general components of electronic acquirement. Furthermore, the previous study on the application of e-procurement technologies was also carried out where the findings indicated that security, commitment, cost, quality, efficiency, legal environment, and delivery acceleration affect the extent of e-procurement adoption and application among manufacturing firm [21].

4.2 Regression Analysis

The second objective of this research was to identify the relationship between e-procurement implementation and supply chain performance among organizations in Malaysia. In order to answer this question, the respondents were asked to rate using a scale of 1 to 5 where 1 is strongly disagree, 2 is disagree, 3 is moderate, 4 is agree and 5 is strongly agree. Multiple linear regression analysis was conducted to determine the joint relationship between the E-procurement implementation with supply chain performance. The following regression model was used:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$$

where;

Y= Supply chain performance, α = Autonomous factors, X1 =E- ordering, X2 =E-sourcing, X3=E-tendering, X4=reverse auctioning, X5=E-informing, Bs represents the beta coefficients of the independent variables and e= Error term.

Table 3. Regression Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.75489	0.58974	0.53851	0.7431

Predictors: (Constant), E-ordering, E-sourcing, E-tendering, E-reverse auctioning and E-informing

The goodness of fit shown by the regression summary model in table 4.7 had a value of 0.58974 shown by R2 which is a coefficient of determination. It can, therefore, be deduced that e-procurement implementation (E-ordering, E-sourcing, E-tendering, E-reverse auctioning and E-informing) explain 58.97% of the variations of supply chain performance. The equation obtained after running regression analysis in SPSS was

$$Y=1.103 + 0.565X1+ 0.683X2+ 0.773X3+ 0.187X4 +0.203X5 + e$$

Table 4. Multiple linear regression results of e-procurement system and supply chain performance

Model	Unstandardized		Standardize	t	Sig.
	Coefficients		Coefficients		
	B	Std. Error	Beta		
(Constant)	1.103	0.821		0.754	0.000
E-ordering	0.565	0.530	1.144	2.125	0.000
E-sourcing	0.683	0.478	0.100	1.878	0.047
E-tenderin	0.773	0.352	0.312	1.757	0.025
E-reverse auctioning	0.187	0.135	0.262	3.748	0.000
E-informin	0.203	0.378	0.219	1.874	0.045

The regression equation shows that taking all factors into account (E-ordering, E-sourcing, E-tendering, E-reverse auctioning and E-informing) supply chain performance will be 1.103 at 95% confidence. Holding all other predictor variables constant at zero, it was established that an increase in E-ordering by one unit will increase supply chain performance by 0.565. A unit increase in E-sourcing will increase supply chain performance by 0.683. An increase in E-tendering by one unit will increase supply chain performance by 0.773. A unit increase in E-reverse auctioning and E-informing will increase supply chain performance by 0.187 and 0.203 respectively. The Beta coefficients show the extent to which each variable contributes to the model. The larger the value means the larger the effect of the predictor variable on the dependent variable. The T and p values indicate the effect of the predictor variable on the criterion variable. P-values, as shown in Table 4, were lower than 0.05 affirming the statistical significance of the model. In terms of E-ordering, the respondents agreed that the employees of the procurement department make requisitions, post item specifications, as well as authorization, is done through online services. It shows that e-ordering is an efficient way of making

payment of goods due to the internet. It was established that E-ordering diminishes order transmission errors as well as decrease inventory to a high percentage. Thus, the results indicate that the e-procurement is positively associated with the supply chain performance on an organization. For the process of E-sourcing, the respondents indicated that their firms develop contract terms online, identifies new suppliers online, assess potential suppliers online and suppliers submit bids online. The respondents indicated that the submission of proposals and evaluation is done online. The respondents also agreed that the firm receives responses from suppliers online and that short listing of pre-qualified suppliers is done through the company website. The respondents further indicated that their firms had a pool of suppliers to choose from. It was also observed that the respondents agreed that E-procurement allows better comparison of quotes and that firm's do sourcing from a number of suppliers online. The response stipulates that E-sourcing has minimized the procurement lead times and increase the transparency in procurement processes. The results also indicated that E-tendering has led to reduced paper consumption and costs to a large percentage and enables suppliers and buyers to manage their transactions securely during online tendering. It was also established that E-reverse auction has led to real-time trading online and increased competitiveness and improving the price at which goods and services can be sold to a large percentage. E-informing has led to increased quality and availability of information and had led to increased purchasing intelligence. These findings are supported by the outcome of previous studies which reported that the most critical practices that contribute greatly to supply chain performance in an organization are e-sourcing, e-tendering, and e-requisitioning [22]. It was also indicated that through e-tendering, compliance to policy at firm level had improved as the firm can quickly procure products and services from preferred suppliers and are unable to create maverick purchase [23].

5. Conclusion

To conclude, this study focuses on the extent of e-procurement implementation in Malaysian manufacturing firm. Findings through descriptive analysis indicated that the implementation level of the e-procurement system is moderate in Malaysia. This paper also highlights on identifying the relationship of e-procurement systems and the supply chain performance of the organization. The results of the regression analysis show that the e-procurement system is positively associated with the supply chain performance of an organization. The

outcome of this research suggests that the government should take a more proactive role in promoting e-procurement in Malaysia. This research shows how e-procurement facilitates the supply chain performance in the organization. It is important to make sure that the government's policy on procurement does not contradict the implementation plan of e-procurement. Moreover, issues, for example, managing the expense for training and purchase of the significant products must likewise be in the control of the legislature to guarantee the small or local suppliers can become active members of the e-procurement system. The success of e-Government initiative in general and e-procurement in specific depends not only on the government as a policy maker and policy implementer but also requires commitment and cooperation from all participating agents such as responsibility centers, service provider and suppliers in adopting and using IT application systems in doing their business with the government agencies and departments. In this regard, it is expected that e-procurement will be highly implemented in Malaysian organization to achieve the objective of Vision 2020.

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