

THE ADOPTION OF E-PROCUREMENT ON PERFORMANCE
IMPACT: MALAYSIAN CONTRACTORS' PERSPECTIVES

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ABSTRACT

Procurement has become a significant research area since the e-Procurement became prominent just over two decades ago. Researchers have studied and proposed theories and models of e-procurement usage and value creations in order to predict and explain technology acceptance. Each theory or model proposed with different sets of determinants. Most of them developed in advanced countries. Therefore, questioned whether the theories and models related to e-Procurement technology investment that have been developed, modified, and extended in the advanced countries are relevant to developing countries. It also questioned whether there might be other determinants play important roles in this specific environment. Thus, this perception study examined the factors determining e-Procurement usage and its influence on contractors' performance in the Malaysian Construction Industry (MCI). In seeking empirical evidence of e-Procurement usage and its implications, the Multidimensional model was developed. The Multidimensional model assessed the drivers of e-Procurement usage by considering the congruence among performance expectancy, effort expectancy, social influence and facilitating condition, as suggested in the Unified Theory of Acceptance and Use of Technology (UTAUT) model and effect on performance, and attitude towards e-Procurement. The questionnaire survey method was utilized in collecting primary data. Samples selected using stratified random sampling yielded 250 usable questionnaires. The structural equation modeling method was employed to evaluate the model. In observing the relationship among variables in predicting contractors' performance, all the pairs were found to have significant relationships except for only usage that was found to have a not significant influence on the contractors' performance ($p\text{-value} > 0.05$). The relationship between UTAUT and usage, usage with satisfaction, usage with performance impact, satisfaction with performance impact and anxiety with resistance had positive relationship. Five pairs of variables (satisfaction with anxiety, usage with anxiety, satisfaction with resistance, resistance with performance impact and anxiety with performance impact) found to have significant ($p\text{-value} < 0.05$) negative relationship with each other. Unexpectedly, the direct effects of usage on performance impact is not significant ($p\text{-value} > 0.05$). Instead, the indirect effects of User Satisfaction are significant ($p\text{-value} < 0.05$). In other words, satisfaction is important for practitioners to achieve performance impact. Next is the incorporation of user anxiety into the multidimensional model. All of four relationships that related to anxiety were found to have significant influence. Usage and satisfaction found to have negative significant influence on anxiety. In addition, anxiety was a threat to performance, and it also has positive significant effect on resistance. It hoped that this study would narrow down the gaps in knowledge area and furnish useful guidelines that could trigger e-Procurement usage in the Malaysian Construction Industry. In order to reap the maximum benefit of e-Procurement, more attention should be focused on enhancing the effect of positive factor of satisfaction. Only through satisfaction, usage of e-procurement will give a performance impact. At the same time, preventive act needs to be taken to curb the problems in e-procurement usage as it appeared to be a threat to performance via satisfaction.

APPROVAL

I certify that I have supervised /read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in quality and scope, as a thesis for the fulfilment of the requirements for the degree of Doctor of Philosophy.

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DECLARATION

I hereby declare that the thesis is submitted in fulfilment of the PhD degree is my own work and that all contributions from any other persons or sources are properly and duly cited. I further declare that the material has not been submitted either in whole or in part, for a degree at this or any other university. In making this declaration, I understand and acknowledge any breaches in this declaration constitute academic misconduct, which may result in my expulsion from the programme and/or exclusion from the award of the degree.

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A handwritten signature in black ink, appearing to read 'Suhaidi', written over a horizontal line.

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With the name of Allah, who is the Most Gracious and Merciful.
First and foremost, thank you God the Most Merciful. With his bless and will, I have completed this thesis.

It is my name that appears on the front page of this dissertation, but behind every scene has been a group of people who have unfailingly contributed of their time and talents, support and friendship.

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LIST OF ABBREVIATIONS

AEC	Architecture/Engineering/Construction
AMOS	Analysis of Moment Structure
AVE	Average Variance Extracted
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
DMISM	DeLeon and McLean Information Success Model
EFA	Exploratory Factor Analysis
ICT	Information and Communication Technology
IDT	Innovation Diffusion Theory
IT	Information Technology
KMO	Kaiser-Meyer-Olkin
MCI	Malaysian Construction Industry
RMSEA	Root Mean Squared Error of Approximation
S. E.	Standard Error
SEM	Structural Equation Modelling
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TPB	Theory of Planned Behaviour
TPC	Technology Performance Chain
TRA	Theory of Reason Action
TTF	Task-Technology Fit
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER 1: INTRODUCTION

This chapter presents background of the study, Malaysian Construction Industry (MCI), problem statement, objectives of the study, research question, significance of the study, operational definitions, delimitations of scope and outline of the thesis.

1.1 Background of the study

Procurement is a management process that begins in the first phase with the identification of needs, followed by planning, organizing and deciding on methods of obtaining and selling products and services. However, public procurement refers to all activities involving the purchase of goods and services (consultancy and professional services), construction, capital goods as well as real estate lease agreements for government use (ACCI, 2003).

The government buys goods and services to perform its functions and provide public goods. Consumption is intended for both day-to-day government activities and development purposes. In the role of regulator and service provider, the federal government, state governments and local governments buy consumer goods and services as operating costs. Development expenditure includes investments in infrastructure such as roads, bridges, airports, hospitals, etc. As the largest single enterprise and employer in the country, the volume of government investment and government expenditure (excluding military expenditure, which absorbs a large proportion of government expenditure in some countries) in many countries, 10-20% of GDP is different, and this figure may be higher in

other countries depending on the size of the government and its size in society (Nambiar, 2005).

Public procurement in Malaysia began after the ratification of the budget and its adoption by the parliament. Procedures and guidelines are discussed in the Financial Procedures Act of 1957, the Provisions Act of 1957, and the Government Contracts Act of 1949. Detailed information on how government agencies manage contracts and the supply of goods and services, and grant rights and concessions implied in these rights.

The Malaysian government procurement policy generally supports the full implementation of the goals and aspirations of the national development policy and 2020 vision, i.e. to the status of a developed country. Among the main principles are as follows:

- a) To stimulate the growth of local industries through the maximum utilization of local materials and resources;
- b) To encourage and support the evolvement of Bumiputera (indigenous) entrepreneurs in line with the nation's aspirations to create Bumiputera Commercial and Industrial Community;
- c) To increase and enhance the capabilities of local institutions and industries via the transfer of technology and expertise;
- d) To stimulate and promote service-oriented local industries such as freight and insurance;
- e) To accelerate economic growth whereby Government procurement is used as a tool to achieve socio-economic and development objectives

In general, Government procurement is essentially based on the five principles that firstly, procurement should obviously reflect public accountability entrusted with the

Government. Second, all procurement regulations, conditions, procedures, and processes need to be clear and transparent to facilitate better understanding among suppliers and contractors. Third, government procurement should yield the best returns for every Malaysian Ringgit spent in terms of quality, quantity, timeliness, price, and source. Fourth, the process involving Government procurement should offer fair and equitable opportunities to all those participating or competing in any procurement. Lastly, all acceptable bids will be processed fairly based on current rules, policies, and procedures.

Malaysian Government procurement is perceived as a major function of government and a substantial amount of money is allocated annually for the procurement of goods and services (Thai, 2001; Maniam, Halimah & Murali, 2009). The Malaysian government spends more than RM150 billion every year since 2007 in procuring goods, works and services and the amount ascending year by year significantly. Thus, this gives a sign of importance of public procurement to the country (Ministry of Finance, 2020).

Table 1.1: Malaysian Government Budget on Procurement

Year	Total Government Budget (RM billion)	Procurement of Service and Supplies (%)	Total Allocation (RM billion)
2020	297	13	38.6
2019	314.6	9.2	28.9
2018	280.3	12	33.6
2017	260.8	12.3	32
2016	267.2	13.6	36.3
2015	273.9	13.9	38.1
2014	264.2	13.8	36.6
2013	251.6	13.4	33.7
2012	232.8	13.1	30.5
2011	213.9	13.2	28.2

2010	191.5	10.9	20.9
2009	207.9	12.8	26.5
2008	176.9	14.4	25.5
2007	159.5	14.5	23.2

Source: www.treasury.gov.my

In line with the emerge of advance technology, procurement is also kept abreast with the new system by using e-procurement. Electronic procurement, commonly known as e-procurement, can be defined as automating purchasing processes in an organization using web applications. E-procurement refers to the purchase of goods and services for organizations (Turban, King, Lee & Viehland, 2006). The procurement is usually one of the largest exceptional items in the company's cost structure (Lennon, 2002). Public sector organizations use electronic public procurement to obtain contracts for benefits such as increasing productivity among their employees and saving costs by obtaining faster and cheaper services and goods. In addition, it also helps improve transparency and reduce corruption in procurement services among employees and managers in organizations.

E-procurement is also defined as the use of integrated information technology for part of or all the procurement functions, from the beginning to end, i.e. from searching, sourcing, negotiating, ordering, and receipt to post-purchase review (Croom and Jones., 2005, 2007; Trkman and McCormack., 2010). E-procurement has been recently receiving much attention from businesses, industries, and governments as it reportedly becomes a powerful tool to improve effectiveness and efficiencies as well as the service quality of its adopters.

E-procurement technologies can be categorized into several types based on many researchers such as De Boer, Harink & Heijboer (2002), Dooley and Purchase (2004), Kheng and Al-Hawamdeh (2002), Segev and Gebauer (2001) and Van Weele (2005). Table 1.2 below gives a brief description of e-procurement technologies.

Table 1.2: Types of e-procurement technologies

Types	Description
Electronic auction (e-auction)	E-auction is a bidding process of products over the Internet and the auction is most often traded in real time. E-auction enables companies to purchase goods or services from suppliers with the lowest price or a combination of the lowest price and other aspects.
Electronic tendering (e-tendering)	E-tendering encompasses the process of sending requests for invoices (RFI), request for purchases (RFP) etc. to suppliers and receiving the suppliers' responses via web-based technology. E-tendering allows buyers and suppliers to securely manage their online interactions during the tendering process.
Electronic Sourcing (e-sourcing)	E-sourcing refers to the process of finding or identifying new potential suppliers for a specific category of purchasing requirements using Internet technology. The Internet enables companies to connect with potential suppliers in a wide range and help them in choosing suppliers.
Electronic Informing (e-informing)	E-informing is a form of electronic procurement that is not directly related to the basic purchasing cycle stage, such as contracting or ordering. It is the process of gathering and disseminating related purchase information from buyers, suppliers and other parties using Internet technology.
Electronic Catalogue (e-catalogue)	E-catalogue is an innovative digital medium in which information about products and services may be placed within an executable (.exe) file that can be distributed or sent by email from a website. E-catalogue does not require any other software to run it and offers great benefits for companies that communicate with internal and external customers via the Internet or Intranet.

Electronic Maintenance repair and operation (e-MRO)	E-MRO focuses on the process of creating and approving purchasing requirements, placing orders and receiving ordered goods or services using system software based on Internet technology. The system involves the use of electronic infrastructure to send purchase orders, invoices, payments and other relevant information about indirect products and services.
Web-based Enterprise resource Planning (web-based ERP)	Web-based ERP system involves the purchase of direct goods/product related items (goods that are used directly to produce finished products) and all related transactions such as purchase order, invoices, payments and other necessary documents via online.
Web-based Electronic data Interchange (web-based EDI)	Web-based EDI systems are an economical way to automate the exchange of structured business arrangements documents between business partners, because all transactions are done electronically. The system enables companies to replace expensive EDI communication with cheaper web communication and provides them with real time information about market conditions.

Source: De Boer et al. (2002), Dooley and Purchase (2004), Kheng and al-Hawamdeh (2002), Segev and Gebauer (2001) and Van Weele (2005)

Malaysian government embarked on the e-procurement or known as “e-perolehan” project in 1999 to transform the public procurement landscape. Since the Malaysian government is a major purchaser of supplies and services from the private sector spending a total of RM35 billion annually, e-procurement or specifically e-perolehan project is seen to be an effective tool of ensuring value for money as well as transparency and accountability in the public procurement process (Maniam, Halimah & Murali, 2010).

E-procurement application has been introduced in Malaysia since 1999 by Commerce Dot Com (CDC) in line with the promotion of electronic government (E-Government). The exercise of e-procurement has been developed in stages to allow the suppliers particularly small-scale companies to adapt themselves with the new changes in

the procurement system. The initial stage of implementation of e-procurement starts with the launching of two Modules that is the 'Procurement via Central Contract' and the 'Suppliers Registration' on October 6, 2000. This was followed by the launching of the 'Direct Purchase module' on May 10, 2002. The module for tender and quotation was the last module developed under the e-procurement system.

The e-procurement system enables government agencies throughout the country to order goods and services electronically from their suppliers. E-procurement transforms the practice of manual purchasing into electronic online practice. In turn, suppliers benefit from the opportunity to offer their products on the World Wide Web; suppliers can receive, manage and process government purchase orders, as well as receive payments from online government agencies through the e-procurement system. By automating the entire e-procurement shopping cycle, suppliers greatly benefit from the opportunity to reach a wider customer base than ever before, along with lower operating costs, shorter lead times, additional revenue, and increased customer satisfaction.

Other advantages of using the e-procurement system are a faster public procurement process and greater transparency compared to traditional procurement and tender methods. The system helps government agencies make more informed and accurate decisions, providing easy access and relevant information about each offer and competitor. The procurement process would be very organized and meticulous, since decision committees would have better knowledge about offers and would get better prices, which would ultimately save a lot of unnecessary costs.

The e-procurement application enables the suppliers to display and introduce their products and services virtually over the internet 24 hours a day. In addition, the application

also accommodates the procurement transactions from the initial stage of the procuring process to the final stage which involves payments to the suppliers and contractors. Among of the e-procurement, applications are e-perolehan, MyProcurement, Direct Tender, and e-Construction.

As of May 2006, there were 115,000 suppliers registered under e-procurement system in Malaysia and the e-Procurement system had generated revenue of RM 1.08 billion from 107,000 transactions (Berita Harian, 10th May 2006). As for May 2020, there are 146,645 suppliers registered with e-procurement system in Malaysia and there are 536,677 transactions (Kementerian Kewangan Malaysia, 2020). Meanwhile for the year 2019, there was about 1.5 million transactions recorded by the system. The government issued a directive TCL 5/2003 instructing all the e-procurement enabled government agencies to execute procurement transactions through the central contract and direct purchases on-line. Contractors, on the other hand, need to officially register under the Construction Industry Development Board (CIDB) before they can proceed with government procurement.

Even though construction is mainly a service industry, most of its activities require material handling and assembly functions. E-procurement is critical to construction because it involves a number of partners on each project who all have the need for inventory management in order not to delay the project or to tie space and money on excess inventory while also complying with specifications and other variables (Pheng and Meng, 1997). Beyond the obvious transaction cost savings and access to suppliers, e-procurement can offer product standardization, quality assurance, inventory management and the

opportunity to manage material flows down the value chain (i.e. the contractor having input in subcontractors' choices, the owner having input in contractors' choices, etc.).

The best practices of the procurement processes in the construction industry are based on searching for vendor databases and comparing the products based on relevant technical and cost factors as well as detailed, uniformed, standard documentation (Opentext News, 2001). Sanders et al. (2001, cited in Issa, Flood & Caglasin, 2003) determined that e-procurement saves up to fifteen percent (15%) of the total purchase cost. It lowers the internal requisitioning cost by automating the internal requisitioning process. Companies reduce personnel costs and time inefficiencies with requisition approval and order processing. E-procurement automates the workflow of procurement/resource management processes, which reduces the cycle time of purchases, decreases stocking requirements, and lowers inventory management costs. Finally, e-procurement applications enable enterprises to manage long-term relationships with suppliers. These relationships can be leveraged to create an enterprise-wide buying environment with the most favorable conditions.

1.2 Malaysian Construction Industry (MCI)

The Construction industry is an industry that assembles parts of building infrastructure. It includes not only the building of houses, but also streets and highways as well as walls and other heavy objects, and often involves many people to get the job done. Workers may include general labors, carpenters, operating engineers, plumbers and pipefitters, supervisors and managers and office clerks. The process in construction is complex and unique where every project is different, and no project is the same as another (Enshassi et

al., 2006; Lin and Lin, 2006; Hanid et al., 2008; Memon and Mohammad Zin, 2010). Construction is also often characterized by a high degree of uncertainty in terms of physical features of the facility to be constructed, working environment, resource allocation, and activity constraints (Song, Al-Battaineh & AbouRizk, 2005).

According to Ibrahim, Roy, Ahmed & Imtiaz (2010), the Malaysian construction industry is generally divided into two broad categories namely general construction and special trade works. General construction consists of residential construction, non-residential construction, and civil engineering construction. Special trade works comprise activities of metal works, electrical works, plumbing, sewerage, and sanitary works, refrigeration and air-conditioning works, painting works, carpentry, tiling, and flooring works and glassworks.

The construction industry is an important sector of many countries and Malaysia is not an exception. This sector is crucial to the Malaysian economy for it is linked with many other parts of the economy, with related industries such as those for basic metal products and electrical machinery (CIDB, 2018a). Therefore, construction can be described as an economic engine for Malaysia. Due to its significant contribution to the country's economic growth, special attention has been given by the Malaysian government to assist in its growth and development. For instance, in the 10th Malaysian Plan, there is an allocation of RM230 billion (Euro 52.26 billion) development fund and RM20 billion (Euro 4.54 billion) facilitation fund where out of the RM230 billion (Euro 52.26 billion), 60% or RM138 billion (Euro 31.35 billion) will be spent on physical development to be undertaken directly by the construction sector. On the other hand, the RM20 billion (Euro 4.54 billion) facilitation fund will open doors to the private sector and investments worth

RM200 billion (Euro 45.44 billion) is estimated to roll in which also will involve the construction sector.

Under 10th Malaysian Plan also, it is reported that construction sector contributed RM194 billion to GDP at 11.1% growth per annum and this is a sign of good achievement as compared to other industries in Malaysia (Economic Planning Unit of PM's Department, 2015). The growth is supported by expansion in the civil engineering subsector, growing at 9.3% per annum, followed by residential subsector at 16.5% per annum and non-residential at 9.1% per annum. The sector provided 1.2 million jobs, constituting 8.9% of total employment. From 2011 to 2014, a total of 29,435 construction projects were awarded, valued at RM470 billion. These were largely private sector projects totalling RM387 billion or 82% of total value, with the remaining RM83 billion from public sector projects.

The construction sector is becoming more important due to higher demand for modern and efficient infrastructure in line with the aim of becoming an advanced nation. The construction sector is expected to grow at 10.3% per annum with a contribution of RM327 billion or 5.5% to GDP by 2020 (Economic Planning Unit of PM's Department, 2015). As part of the 11MP, the Government has introduced the Construction Industry Transformation Programme (CITP), 2016-2020, to propel the industry forward and meet market demand. The construction industry is one of the key sectors under the 11th Malaysia Plan (2016 to 2020), which is the final leg of the Vision 2020 journey. Under the 10th Malaysia Plan (2011 to 2015), the sector has seen astounding growth, surpassing that of other economic sectors.