



## **Implementation of Electronic Tendering in Malaysian Construction Industry: A Case Study In The Preparation and Application of E-Tendering**

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### **Abstract**

In Malaysia, construction sector plays a significant and important role in the country's economy. One of the most important and critical phase of a construction project is tendering and procurement phase. A paper-based traditional method of undertaking procurement phase is complicated, costly and time consuming. E-Tendering is a fully digitalized process which increases the efficiency and productivity during the tendering phase. This study evaluated the challenges and benefits of implementing E-Tendering or E-Procurement in Malaysian Construction Industry.

### *Keywords*

*E-Tendering, E-Procurement, Digital Document*



## 1 Introduction

Malaysia vision 2020 was introduced by Dr. Tun Mahathir Mohammad in 1990 which is pushing Malaysia to become a developed nation in terms of economy, quality of life, social and political aspect and spiritual values [1].

In Malaysia construction sector plays a significant and important role in the country's economy in terms of revenue generation and there is a strong relation between the economic growth of the country and construction sector [2].

Information Technology (IT) has brought many benefits from the advantages of innovation and digitization to construction sector [3]. Even though project's drawings and documentation such as contract document and payment certificates can be sent instantly via email but technological innovation and its advantages are much more than emails and phones [4].

Therefore, with the aid of IT and its innovation, construction sector is passing the traditional way of undertaking a project to a modern and efficient way of operating.

One of the most important and critical phase of a construction project is tendering and procurement phase. However, the traditional way of tendering process is a paper based, time consuming and ecologically inefficient method due to consuming significant amount of papers.

Recently in Malaysia, transforming traditional method to a digitalized process has been discussed by a few authors such as Ren and Kamarudin [5], Lias et al. [6] and Mehdipoor and Ali [7].

### 1.1 Electronic Tendering (E-Tendering)

According to Ren and Kamarudin [5], the electronic tendering (E-tendering) is conducting a tender process electronically. Both project owner and tenderer benefits from e-tendering by reducing tender period, cost, resources and increasing security and confidentiality [8].

However, there are some challenges in implementation of E-Tendering in Malaysia such as: user acceptance, accessibility, lack of computer skills, legal barriers, Management and staff resistance to change [9], [5].

## 2 Methodology

Case study methodology was used in this research. The case study was an infrastructure project in Johor, Malaysia. The project owner used e-tendering process during the tender phase. Therefore, no paper-based tender documentation was provided, and all evaluation process were conducted digitally.

E-tendering process map for this project was consisting of the following steps:

Step 1: Preparation of tender documentation including front-end document, form of contract, condition of



contract, preambles, bill of quantities and appendixes in digital form. In this step,

quantity surveyor used Microsoft Word, Excel and Acrobat Reader to create the package of digital tender document.

Step 2: Develop Smart Portable Document Format (PDF) version of digital document. In this step, a Smart PDF version of digital document were developed. The document is Java Scripted and capable of automatically calculating the bill of quantities, transform total amount of tender sum in the form of tender and digitally lock the amount for the submission.

Step 3: Call for Tender through the client's web platform. During tender period, all qualified tenderers were required to register, purchase, and download the tender document from client's web platform.

Step 4: Submission of Tender Bid. Each tenderer submitted a locked digital tender document through the client's web platform.

Step 5: Tender evaluation. In this step quantity surveyor accessed the database to download submitted bid for tender evaluation process.

Once the above-mentioned steps completed, the project owner awarded the project to the most appropriate tenderer.

To evaluate the impact of the implementation of electronic procurement in this project, a group of participants that were directly involved in this project, were interviewed for data collection.

Scoring approach technique was used for data analysis to assess the impact of the innovation to this project. The scores were defined as: 1 (Not effective), 2 (low effective), 3 (Medium effective), 4 (Medium-high effective) to 5 (Highly effective).

Qualitative analyses were used to discuss the impact of the innovation in details.

### **3 Findings**

#### **3.1.1 Experience of E-Tendering**

Participants with different role in the project were selected to be involved for data collection i.e. Quantity surveyor, Civil Engineer, Mechanical and Electrical Engineer, Client, Contractor and Clerk of Work. Total number of 24 responds were collected for quantitative and qualitative data analysis.

The majority of the respondents (83%) did not have any experience with the electronic procurement process while 17% were used to apply the innovation. Table 1 shows the experience of E-tendering.

Role	Number of participants	Yes/No
Quantity Surveyor	4	Yes
Civil Engineer	4	No
Mechanical and Electrical Engineer	3	No
Client	7	No
Contractor	7	No
Clerk Of Work	1	No
Total	24	17%/83%

Table 1 - Experience of E-tendering

### 3.1.2 Challenges of Implementing E-Tendering

The challenges faced while implementing the E-tendering were lack of IT knowledge, resistance to change by the management and staff, client's uncertainty to implement the innovation, high initial cost, legal issues, privacy and transparency issues, lack of awareness by the tenderer.

Challenges	Rank
Lack of IT knowledge	1
Client's uncertainty	2
Lack of awareness by the tenderer	3
Resistance to change	4
Legal issues	5
High initial cost	6
Privacy and Transparency issues	7

Table 2 - Challenges of E-tendering

Table 2 shows challenges of application of E-tendering and their rank based on each factor's impact. "Lack of IT knowledge" was ranked as the highest challenge with 83% respond in highly effective. The second highest among challenges was "Client's uncertainty to implement the innovation" with 79% respond in highly effective. The third, fourth and fifth challenge was "Lack of awareness by the tenderer", "Resistance to change by the management and staff" and "legal issues" with respond in 75% in highly effective, 75% in medium-high effective and 63% in medium effective respectively. "High initial cost" and "Privacy and Transparency issues" were less important and ranked as sixth and seventh. In conclusion, since top decision makers are usually the older generation that have not kept up with new IT skills, "Lack of IT knowledge" becomes the most important issues which slow the implementation of e-tendering in the

Malaysian construction industry.

### 3.1.3 Advantages of E-Tendering

It is evident from the responses collected from participants involved in the evaluation process through experts interview that the E-Tendering brings significant advantages to the project. The key impacts are as follows:

"Fully digitalized document", it means less paper work, all tender documents including drawings and specification are provided in a smart and navigable PDF file. The user does not need to have any special software to open the PDF file developed by E-Tender system.

"Easy access- Navigable File", the PDF file generated by the system is bookmarked according to the tender document table of content. User can easily navigate section by section, clause by clause and page by page. Therefore, users have a better control within the tender document. In addition, users can easily access required information such as "Condition of Contract" or any specific clause within the tender document instantly by searching key words or refer to the document's bookmark.

"No arithmetical error", the document is a Java scripted PDF with auto calculation feature and transferring the amount into the respective pages such as general summary of bill of quantities and form of contract. Therefore, there is no possible arithmetical error during the tendering process.

"Reduce Tender period", the system will significantly reduce tender submission and tender evaluation period by ease the calculation and tender report preparation process.

"Security and Transparency", once the user is comfortable with the rates and tender amount, the document can be locked by the security feature coded within the file. The Locked document will be frozen and modification of all fields will be disabled. The total tender amount will be automatically converted from numeric to wording in the form of tender. Therefore, there will be no discrepancies within the values in the document.

"Move forward to Green Environment", E-Tendering means less paper print and usage of toners. It is a green agent and a step forward to green environment.

## 4 Conclusion

E-Tendering is a way forward in digitizing the construction industry. It is providing more efficient tendering process as well as proper document management. This study was undertaken to evaluate the implementation of the E-Tendering process through a case study. There were some challenges faced when applying the system such as "Lack of IT knowledge" and "Client's uncertainty to implement the innovation". However, benefits of the E-tendering were



evident through this research such as "Reduce tender period", "No arithmetical error" and reduce paper print to move forward to green environment.

## 5 References

1. R. A. Khan, M. S. Liew, & Z. B. Ghazali, Malaysian Construction Sector and Malaysia Vision 2020: Developed Nation Status. *Procedia - Social and Behavioral Sciences*, **109** (2014) 507-513. <https://doi.org/10.1016/j.sbspro.2013.12.498>.
2. M. A. A. Bakar, N. S. M. Fauzi, S. B. Badaruddin, M. Misiran, & Z. Yusof, Malaysia Projection for the Developed Nation Status. **3** (n.d.) 5.
3. A. Fernández-Mesa, J. Luis Ferreras-Méndez, J. Alegre, & R. Chiva, IT competency and the commercial success of innovation. *Industrial Management & Data Systems*, **114** (2014) 550-567. <https://doi.org/10.1108/IMDS-09-2013-0389>.
4. A. Mehdipoor, Facility Management Information System (FMIS) In Support Of Operational And Strategic Facility Management, University of Malaysia, 2015.
5. J. T. J. Ren & S. Kamarudin, APPLICATION OF E-TENDERING IN MALAYSIAN CONSTRUCTION INDUSTRY. *Built Environment*, (2016) 7.
6. E. M. Elias, N. Mahidin, & N. Shiratuddin, *E-Tendering System for Construction Projects* (Universiti Utara Malaysia, 2003).
7. A. Mehdipoor & S. B. M. Ali, Application of Digital Procurement Solution (DPS) For Efficient Document And Contract Management. (Selangor, 2019).
8. RICS, e-tendering RICS Practice Standard. (2010).
9. S. H. bin Mastor & A. Z. binti Azizan, *E-Tender Application and its implication to Malaysian Construction Industry* (Kolej Universiti Teknologi Tun Hussein Onn, 2015).