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Abstract

The value of innovation in the construction industry has grown substantially. Thus, embracing innovative approaches such as the E-tendering system can overcome many challenges in tendering process and promote cost savings, reduce waste, and improve efficiency. E-tendering system refers to an advanced technology that combines the idea of entering and conducting the construction tendering process electronically. Currently, the electronic business has shifted in the current Malaysian scenario coupled with the impacts of the pandemic situation. Thus, this paper explores the acknowledgement of the E-tendering system among developers in the Malaysian construction industry. This paper aims to identify the challenges and benefits of E-tendering, focusing on developers' perspectives. A quantitative approach was adopted by distributing a questionnaire survey to developers in the Klang Valley. A total of 135 respondents participated in this study. Data gathered from the survey was analysed using descriptive analysis via the Statistical Package for Social Science (SPSS) version 26 software. The results summarised that the E-tendering system provides significant resource savings to a substantial portion of the construction supply chain. The primary advantages of this method are improved communication and considerable cost and time savings. However, a sizeable segment of the sector continues to be sceptical of this new technology adoption, with reluctance to change seen as the main obstacle. The findings from this study are beneficial for private-sector construction practitioners to understand the benefits of increasing the usage of E-tendering to ease the construction tendering process. This study has highlighted the significance of E-tendering to become generally accepted in the Malaysian construction industry, enabling it to transform into one of the most technologically advanced industries.

Keywords: E-tendering, Developers, Challenges, Benefits, Construction Industry.

Introduction

The Malaysian Government has deliberately highlighted innovation as a crucial factor to increase sustainable economic growth. In today's fast-changing business landscape,

innovation has become the backbone of every industry. In the construction industry, embracing innovative approaches such as the E-tendering systems can overcome many challenges in the tendering process. For many years, the tendering process was part of the traditional contractual procurement method, separating the design and construction phases. A conventional approach in preparing a tender document and tendering process using a paper-based system has been used for a very long time. Unfortunately, this process involved more labour-intensive, high cost of production, more effort and time needed (Ashaari et al., 2018). The growing demand for efficiency in the construction industry has prompted a transition toward E-tendering implementation for a construction project which offers substantial opportunities for increased interactions between different parties, increase productivity and saved substantial resources.

In this era of globalisation, it is crucial to use new technologies to ease the development process and increase construction business profitability. Accordingly, there are three main factors highlighted by Al-Yahya et al (2018); Betts et al (2006) which led to the growing application of electronic tendering, including 1) the increasing use of technology within the construction industry; 2) the exchange of information between parties, and; 3) highly concern for the environment by minimising the use of paper and resources. Thus, with growing technological advancement, different types of procurement methods, and high client expectations, the conventional tendering approach has begun to change (Ciribini et al., 2015). Ashaari et al (2018) further clarified that the current traditional paper-based system and the E-tendering system can be improved with innovation in the management of information technology (IT) and understanding of how the system works.

Importantly, E-tendering is a growing and developing system that is available to both the public and private sectors in the construction industry for efficient project tendering. Nowadays, the practice of E-tendering has already existed and has been widely adopted by the Malaysian Government in tendering public projects (Ashaari et al., 2018). Unfortunately, the adoption of E-tendering among the private sector specifically the developers is still lacking. Hence, it is worth examining more closely on the challenges they had encountered. In fact, the existing literature, on E-tendering has paid more attention on the government sector and very few focusing on the private sector (Kassim and Hussin, 2013; Ashaari et al., 2018). Whereas the private sector had contributed significantly to economic growth and meeting the demand for residential and non-residential projects to assist the government in achieving its development goals. Evidently, they continued to lead the construction activities. In the third quarter of 2020, the private sector had accounted for 50.7% of the value of construction work done (RM15.9 billion), compared to 49.3% for the public sector (RM15.5 billion). Meanwhile, in terms of numbers, the number of construction projects awarded within five years (2015 to 2019) indicated that the private sector accounts for 70% to 75% of the total projects awarded, compared to the public sector 20% to 30%. As of December 2019, 8,731 projects valued at RM107.5 billion were recorded, compared to 8,265 projects valued at RM140.1 billion in 2018. They secured 70% (6,104 projects) as compared to 30% (1,764 projects) by the public sector (CIDB Annual Report, 2019).

Accordingly, with the growing number of awarded projects undertaken by the developer, applying the E-tendering system can contribute significantly to improve the existing practices in the traditional tendering process. Currently, IT-based methods are revolutionising the

construction industry. The key to success in this established and fragmented approach is embracing change (Al-Yahya et al., 2018). In today's global market, the developer must now adapt to changes, or they might be left behind. Thus, they need to understand the benefits of this system to ensure that all parties contribute to improving the quality of services undertaken. The usage of an E-tendering system in construction projects offers various benefits, including improved communication, real-time data input and availability, centrally located applications, large databases, configurable user accessibility, and enhanced uptime (Mastor & Azizan, 2012). In addition, the system can handle the need for special requirements, advertising process, bid gathering, and tender assessment which saves time in the tendering process.

Thus, this paper explores the acknowledgement of the E-tendering system among developers in the Malaysian construction industry. The study focuses on the perspective of Malaysian developers in exploring the challenges including the benefits gained by them in adopting the E-tendering system. This study significantly contributes to motivating the implementation of the E-tendering system among developers to become broadly accepted in the Malaysian construction industry and to evolve into one of the most technology-driven industries.

Understanding the E-tendering System

Tendering process in construction refers to an organisation (referring to the developer) in need of goods or services inviting other parties (in this case referring to contractor firms) to participate or bid on the tender and then assisting in selecting a suitable contractor for carrying out the construction services for a project (Sunmola & Shehu, 2020). The tendering phase in the construction industry is deemed the most critical and important throughout the construction project's lifecycle (Ashaari et al., 2018). Electronic tendering, or E-tendering, brings together the idea of entering and conducting a tender or a tendering process through an online internet-based platform with the advancement of IT (Alsagoff et al., 2006; Nawi et al., 2018). This approach facilitated a more efficient way of selecting the contractor liable for the project. E-Tendering normally consists of the announcement of calling for tenders, the receipt of calls for tenders, the filing of bids, and the notice of the tender award, all of which are conducted electronically and securely over the internet (Sunmola & Shehu, 2020). The usage of E-tendering has been widely acknowledged in the public sector. Thus, it is crucial to determine whether this approach has also been favourable among the developers.

Challenges of E-Tendering system among the Developers

When it comes to adopting a new technology that acts as a substitute for the traditional method, construction users are often impacted by its implementation. The lack of highly skilled individuals is the main obstacle cited by most studies. In order to assist an increasing number of knowledgeable employees who can run such a system, the top management needs to exercise some trust and assign a few employees to participate in such events (Nawi et al., 2017). When project members are involved from the early stage of the process, they can gain valuable insights into the project from the beginning. In addition, having a better understanding of the project leads to a greater likelihood of utilising a collaborative environment during its execution (Lou & Alshawi, 2009). Technological risk in business refers to IT skills. Organisations must have the requisite IT infrastructure before deploying E-tendering (Al-Yahya et al., 2018). Thus, inadequate technical infrastructures affect effective E-tendering implementation. Without the acceptance of the technology, process standards

would cause innovative approaches such as E-tendering systems to remain slow and fail to provide promising benefits.

Another widely mentioned difficulty in e-tender deployment is the missing system integration and standardisation (Alsagoff et al., 2006). The absence of such things arises since this approach is still deemed fresh and has not been adopted by developers in Malaysia. This raises the issue of the system's reliability and so forth. According to Al-Yahya et al. (2018), a lack of support from leaders and top management is one of the many obstacle developers must overcome to utilise the electronic tendering process successfully. This is mainly due to resistance to change by many construction players who were comfortable with the traditional approach (Ashaari et al., 2018). The Malaysian construction industry has used the paper-based tendering procedure for many years. Thus, it will be a big change for the employees as they must change not only their mindset but also their way of work to ensure this implementation will succeed (Alsagoff et al., 2006). People opposed to the technology are regarded as the greatest obstacle to the E-tendering application (Aziz & Salleh, 2011). These individuals are set to the old traditional ways of tendering as they are more confident and have fully adapted to it. However, the lack of curiosity and openness in wanting to improve their work productivity shows that change is highly feared. Therefore, it is very important to expose and develop IT awareness among all parties to shift their mindset from traditional to innovative approaches.

Benefits of E-Tendering in the Construction Industry

The widespread use of electronic documentation (also known as e-documentation) can provide a solution to most of the issues described above. Through the E-tendering system, all documentation and drawings gathered in a softcopy format will be available to be uploaded into the system. Thus, E-tendering provides more cost-effectiveness and time savings than traditional methods (Ashaari et al., 2018). E-tendering results in a marked reduction in inventory costs and a decrease in the time required to fulfil the bidding process (Nawi et al., 2016). Furthermore, E-tendering improves efficiency in the preparation of the tendering process, which is a time-consuming and paper-based approach (Tindsley & Stephenson, 2008). At this stage, the employees have improved motivation and positive attitudes about their jobs. Hence, compared to the old approach, the E-tendering system needs fewer workers. Low and Alshawi (2009); Ashaari et al (2018) noted that e-tendering systems potentially reduce the number of man-hours spent on the procurement process's estimating and tender enquiry phases.

Moreover, when the E-tendering system is implemented, each step of the bidding process will be executed online, and all parties involved can access, modify, and perform other functions on the information. (Ashaari et al., 2018). The application of E-tendering can provide quick and easy access to public and private tendering information, increase tender opportunities, improve access for geographically isolated industry organisations, increase market share and competitiveness, and reduce the cost of printing, simultaneously saving time and resources (Mastor & Azizan, 2012). Furthermore, E-tendering provides extra security and confidentiality with a fully automated assessment and computerised analysis (Al-Yahya et al., 2008). As a result, the review of the bids that are filed can be completed more equitably and expediently. The E-tendering system allows bidders to view the documents in softcopies or print them as they like, allowing bidders to access the system at any time, regardless of

location (Lou & Alshawi, 2009). Tender enquiries involve both the consultant and the tenderer. Sunmola and Shehu (2020) stated that the E-tendering system allows a more timely and organised response to tender inquiries and the correction and replacement of bids, among other things.

Methodology

The unit of analysis of this study is professionals working at developer firms or consultants involved in the tendering process as part of the developer's representatives, which operates through their main office in the Klang Valley. Thus, this study used a quantitative method through an online survey using Google Forms to this target population to obtain their perceptions in answering this research questions. According to the Real Estate & Housing Developers' Association (REHDA) Malaysia, there are 1,000 developers across Peninsular Malaysia. The list of developers obtained from REHDA shows that Selangor has the highest number of developer companies representing 55% of the total population. Furthermore, most of the developers concentrated their development projects within Klang Valley. The sample size was calculated using (Krejcie and Morgan, 1970). Therefore, a sample size of 226 was needed in this study to represent a given population. Thus, a total of 450 questionnaire surveys were distributed among the respondents, and 135 usable responses were received from all sources, indicating a 30% response rate considered acceptable. The collected data were analysed using descriptive analysis with SPSS version 26.

Analysis and Findings

This section presents the respondents' information, data analysis, and discussion results. This study used a 5-point Likert scale to measure each construct in the survey. The scale utilised ranges from 1 indicates that the respondent "strongly disagrees", 2 indicates that they "disagree", 3 indicates that they are "neutral", 4 indicates that they are "agree", and a score of 5 indicates that they are "strongly agree" on the challenges and benefits on the adoption of E-tendering among the respondents. The questionnaire consisted of four (4) sections: Section A: Demographic background, Section B: The level of awareness of E-tendering system in the construction industry. Section C: Challenges of E-tendering system in the construction industry, and Section D: Benefits of E-tendering system in the construction industry. Descriptive analysis was employed to analyse this data. This study produced invaluable insights into the progress of the E-tendering system among the developers in the Malaysian construction industry.

The Respondents' Background

There were 135 total respondents who participated in this study. The majority of respondents with 38% were the Consultant Quantity Surveyor. The Consultant Engineers come in second with a proportion of 26%, followed by Consultant Project Managers and Architects accounted for 18% and 14%, respectively. Property developers contributed 4% of the total respondents. All respondents in the survey had been directly involved in the tendering process, demonstrating that they were suitable for this study.

The Level of Awareness of E-Tendering System in the Construction Industry

In the first part of the questionnaire, the respondents were asked about their firm's level of knowledge or familiarity with the use of the E-tendering system in project development. The highest mean score of 3.94 indicated the firm's willingness to use the E-tendering system in

tendering process. In addition, most of the respondents were aware and familiar with E-tendering applications in project development, as shown by the mean score of 3.88. The reason was most of the public projects had been done through the E-tendering system. However, the lowest mean indicated that in terms of the firm's experience with the usage of the E-tendering system still lacking (lowest mean score of 3.50).

Table 1

The Awareness Level of the E-tendering System among the Developers

The level of awareness of the E-tendering System	Mean	Std. deviation
The firm's willingness to adopt the usage of an E-tendering system.	3.94	0.912
The firm's awareness or familiarity with the application of the E-tendering system in project development.	3.88	0.931
The firm's level of knowledge on the matter of E-tendering.	3.62	0.921
The firm's experience with the usage of an E-tendering system.	3.50	1.177

The Challenges of E-Tendering System among the Developers

The main challenge encountered by the developers is resistance to changes from the conventional paper-based tendering process to the E-tendering system with a mean score of 4.32. Most of the developers are more familiar and comfortable with the traditional system instead of an e-tendering system which is relatively new to them. This finding is consistent with Tan and Suhana (2016), that the adoption of an E-tendering system is hindered by traditional and tenacious beliefs, behavioural issues, and the lack of support from top management. This led to the next challenge of whether or not management support plays an essential part in implementing the E-tendering system was given a mean score of 4.28. This demonstrates that obtaining a significant level of support from the management team is the most important thing to consider whenever an organisation wants to adopt and normalise the use of a new technologically sophisticated system. A similar finding was similar to Ashaari et al (2018), that the system could be implemented effectively with the collaboration of the firm's top management by providing essential training and guidelines for the system. Inadequate IT infrastructure was ranked in third place, with a mean score of 4.24, as a potential barrier to using the e-tendering technique in the event it was adopted. According to Al-Yahya et al (2018), poor IT infrastructure will affect the E-Tendering processes. Moving on, the respondent was asked about the possibility of a shortage of highly qualified persons being an issue that might hinder the adoption of the E-tendering process. This question received a mean score of 4.21, placing it fourth among the others. Regarding lack of confidence in IT as one of the primary obstacles that make it difficult to apply the E-tendering system had the lowest mean score of 4.03. The majority of the respondents believe that IT is one of the promising instruments that can enhance the tendering process.

Table 2

The Challenges of E-Tendering System in the Construction Industry

The Challenges of E-tendering System Implementation	Mean	Std. deviation	Rank
Resistance to changes from conventional tendering process to E-tendering system.	4.32	0.546	1
A firm's management support plays an important role in implementing E-tendering system.	4.28	0.698	2
Inadequate IT infrastructure interrupts the usage of the E-tendering system.	4.24	0.767	3
Lack of highly skilled individuals affects the adoption of the E-tendering system.	4.21	0.847	4
Lack of confidence in Information Technology (IT) in the adoption of E-tendering system such as the security aspect, the confidentiality matters etc.	4.03	0.922	5

Benefits of E-Tendering System in the Construction Industry

The majority of the respondents implies that they believe E-tendering has the potential to significantly increase tender preparation efficiency and simplicity with the highest mean score of 4.40. Next, the statement that ranks second by the respondents with a mean score of 4.25 indicates that the application of E-tendering may aid in minimising the amount of time required throughout the tendering process. As supported by Ashaari et al (2018), reducing the tendering period is one of the crucial benefits. The respondents had a mean score of 4.18 and agreed with the statement that employing this approach may simplify the bidding process. This resulted in third place. Aside from that, using the E-tendering process may assist in overcoming any geographical obstacles, which places it in the fourth position with a mean score of 4.16. Next, the E-tendering technique was recommended as an additional security measure, and it comes in at number 5 on the list with an average score of 4.08. A good proportion of the people who responded to the survey agreed with this assertion. With a mean score of 4.01, the allegation that E-tendering is more cost-effective than traditional tendering comes in last place overall. The findings show that most of the respondents were more concerned about the high initial cost of E-tendering adoption than the overall cost savings the system could provide in the long run. As Tan and Suhana (2016) clarified, the initial installation and maintenance expenses are costly to assure the future functionality of the system.

Table 3

The Benefits of E-Tendering System in the Construction Industry

Benefits of E-tendering	Mean	Std. deviation	Rank
Improve efficiency and simplicity in the preparation of tendering process.	4.40	0.765	1
Minimise the amount of time needed during the tendering process.	4.25	0.826	2
Provide timely and organised responses in the tendering process by practicing the E-tendering system.	4.18	0.888	3
High assessments of the system among the user participations.	4.16	0.845	4
Providing extra security and confidentiality.	4.08	0.966	5
E-tendering is a more cost-effective approach.	4.01	0.910	6

Conclusion

The E-tendering system saves money and improves efficiency throughout the bidding process. E-tendering significantly reduces tendering processing time and is more transparent than conventional tendering. The technology provides private entities with fast access to bid and tenderer information. The awarding procedure will be structured and precise since decision committees will have greater bid information and can negotiate to obtain better pricing and save needless expenses. In order to improve the E-tendering implementation, the developers should invest more in the IT infrastructure. ICT tools encourage productivity and efficiency. To expand the adoption of the E-tendering system in private agencies, they need to emphasise on business communications, business processes, cost reduction and cycle time, exploring new markets and business prospects, and increasing contract transparency and overall competitiveness. Furthermore, they need to enhance the awareness and knowledge of their employees to embrace the innovative technology approach at every stage of the construction process.

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