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EXPLORING THE LESSON LEARNT BY IMPLEMENTING E-TENDERING: A REVIEW OF LITERATURE

Kavitha Kajendran[1]

ABSTRACT

For the success of a construction project, the selection of the most suitable contractor is vital. The process of selecting the most suitable contractor is called tendering. Unexceptional to other industries, the construction industry all over the world is also being urged to move to advanced information technologies to compete in the global market. Addressing globalization along with the introduction of Building Information Modelling (BIM), it becomes crucial for the tendering process to move from traditional to electronic tendering (e-tendering). This study identifies the application of e-tendering in different countries and the outcomes and readiness of Sri Lanka to accept e-tender through an extant literature review. It was concluded that e-tendering benefits through high transparency and accountability, less corruption, less cost, time and paperwork, and easy evaluation of submitted tenders if rightly implemented addressing the challenges such as legal and security issues, resistance to change, less investment in Information Technology, unawareness of the process of e-tendering and non-identical software and formats. Further, considering Sri Lanka's readiness in adopting e-tendering, the country's government has considerably progressed towards e-government but not has been fully implemented. This study would be beneficial for the government and private clients who are willing to practice e-tendering.

Keywords: *Construction Industry; E-tendering; Sustainability.*

1. INTRODUCTION

In developed countries, e-tendering has been implemented many years back and applied in a wide range. As per Hui and Yang, 2011, the United States is the pioneer to carry out e-government and many state governments over there have been practicing e-procurement platforms. They have developed an innovative system of public procurement and tendering through government procurement websites. Further, other developed countries such as Singapore, Denmark, Japan, and Australia have implemented e-procurement with a greater level of success. (Neupane, et al., 2012). Not only, developed countries but also some developing countries have originated e-procurement and started to gain benefits through it. As per the report produced by the United States Agency for International Development (USAID) in 2017, the Government of Sri Lanka also has commenced work to institutionalize e-procurement in 2010 but has not yet fully launched an e-procurement system.

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This study aims on exploring the lessons learned in the implementation of e-tendering in different countries, the benefits experienced, the limitations identified, and how they are being mitigated. Further, this study examines the readiness of Sri Lanka in adopting e-tendering for their construction business.

2. RESEARCH METHOD

To fulfil the research's goal, a thorough literature evaluation was conducted. Data was collected using the desk study method. As a result, literature on the experience of implementing e-tendering has been gathered from journal articles from various nations, government publications, websites, newspaper stories and other published reports. Hence, the awareness and readiness of Sri Lankan construction professionals to adhere to e-tendering and the critical grounds of the limitations in implementing e-tendering will be identified and recommendations to overcome the barriers and paths of smooth transferring from traditional tendering to e-tendering will be formed through an interview survey with the industrial experts.

3. E-TENDERING

E-tendering has been redefined with a modern explanation of "an electronic platform/s includes all the project stakeholders and carries and facilitates all the tendering communications, documentation and transactions from the project initiation till the handing over" (Alyahya, 2017). The success of E-tendering highly depends on user-friendliness. Sunmola and Shehu (2021) identify key seven factors which influence the frequency and satisfaction of internet-based platforms self-initiative, commitment, content, availability, speed, aesthetics, ease of use, and effectiveness. While transforming from the traditional tender to e-tendering, above mentioned factors are to be tackled aptly, therefore the users will be adopting the change pleasantly and completing tasks. Their satisfaction can be expressed through feelings of acceptance, happiness, relief, excitement, and delight.

4. CHARACTERISTICS OF E-TENDERING

Before discussing the characteristics of e-tendering, it is important to learn the process of e-tendering. Royal Institute of Charted Surveyors (RICS) has defined distinct stages of the e-tendering progress in a ten-point plan (refer Figure 1).

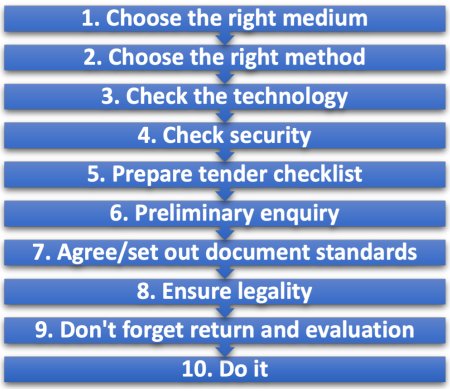

Figure 1: The tendering ten-point plan

Source: RICS (2010)

While following the provided ten- point plan process, there are several characteristics of e-tendering that have been identified as benefits by the practitioners if rightly utilized.

4.1 HIGH TRANSPARENCY AND ACCOUNTABILITY

The main benefit of e-tendering shall be the increased transparency and accountability of the procurement process. This factor is highly lacking in the traditional tender. Especially, most of the developing countries are suffering a high level of corruption in the planning process of the public sector construction projects. The higher authorities might be working on hidden agendas on the approval of projects, disclosing some confidential details, or adding unnecessary scopes considering their benefits. However, when it comes to e-tendering, it discloses all information related to tendering, makes the process more transparent and accountable, and prevents any malpractices. Further, there might be unethical practices that happen during the selection of the contractor due to the paper-based traditional tendering. Even, the influential contractors might stop the participation of other qualified tenderers, by threatening. Since e-tendering reduces face-to-face interaction, there are minimal chances for bribing (Neupane, et al., 2012).

However, Hashim, et al. (2020) argues that still, certain stages of the e-tendering process remained hidden to the public, which leads to another fear for ethical issues. It was evidenced with the cases reported in Madhya Pradesh, India, that e-tendering was being exploited as a tool for extortion, depravity, and fraudulence.

Further, regarding integration, Hui and Yang (2011) highlight that the e-tendering platform needs to be designed to accommodate different organizations together, if not, the expected integration will not be achieved due to unified planning and coordination.

As per the above findings, there are still loopholes in e-tendering when it is implemented. They reveal that appropriate designing of e-tendering is vital to achieving high transparency and accountability unless it will lead to more confusion or abounded.

4.2 LESS COST, TIME, AND PAPERWORK

As Sydorenko (2017) annotates e-tendering cut down tender cost and get rid of bureaucratic obstacles. Since e-tendering saves the time that the traditional method usually spent on repetitive and worthless tasks such as re-keying of information. Hence, the organizations could handle a larger amount of work at once and the highly qualified staff could focus on more laborious tasks to enhance their values. Further, it is explained, that the paperwork is reduced and this will minimize human errors such as incomplete information in the documents, insufficient number of copies, a disorder of documents, leakage of information, a large volume of documents, and others. Also, this will reduce the need for storage places for bulk paper documents. Arslan et al. (2006) evidence this as the paper-based tendering took an average of 16 days from the time of receipt of tender documents and completion and submission of tenders whereas e-tendering took an average of between 24 and 48 hours for the process to be completed. The authors further elaborate, around 87% of the time was saved and approximately 98% of the cost was saved through e-tendering.

Moreover, this is beneficial unexceptionally for the tenderers. Since, all documents are to be submitted by tenderers, in soft copies in the provided e-tendering web base, no need to print bulk documents and sort them or produce and submit various items like presentation materials, brochures, and estimating resources. Yet, the expenses associated

with packing and delivering the hard copies through postal or transportation will be nil. In addition, the online submission will avoid the tender getting unqualified due to unnecessary postal delays. Further, the tenderers can upload any time before the deadline from anywhere, even after office hours and holidays (Patil, et al., 2016). As per the latest research by e-Market Services, an organization engaging in electronic procurement could cut procurement costs by 8 to 15% (Omran, 2020).

Nevertheless, the legal systems are not being updated along with the technology. Therefore, the lagging in the legal system will cause the organizations to maintain both soft and printed documents to address any legal issues (Sydorenko, 2017). The participants might not be confident in the legal acceptance of electronic communications. This will automatically destruct all the benefits of e-tendering. As this is an external barrier, which cannot be controlled by the organizations but the government could.

In addition, the security of the e-tendering platform might be a threat in case of any cyber-attacks or system crashes (Sydorenko, 2017). This might make it difficult to retrieve the data saved. Also, Eadie et al. (2010) and Khalil and Waly (2015) noticed that people were concerned about persons making unauthorized and unfair modifications of tender documents (document tampering), while others have expressed fears over the integrity and confidentiality of data in e-tendering systems. Due to such an insecure feeling, the organizations tend to have printed hard copies as backup plans.

As an outcome, the governments must accelerate the process of enforcing the digital laws, which will encourage the organizations to move towards e-tendering and restrict cybercrimes.

4.3 EVALUATION MADE EASY

Since the analysis of submitted tenders is automatically generated. (Sunmola and Shehu, 2021), it would be time-saving, accurate, and refrain from any human interference or malpractices.

5. CHALLENGES IN E-TENDERING IMPLEMENTATION

Even though, it is evident that e-tendering addresses the shortcomings of the traditional tender, there are some challenges in implementing successful e-tendering. Without eliminating such challenges, the benefits cannot be accomplished. It is not surprising that there is hesitation to enforce e-tendering in action even though lots of discussions done on its benefits (RICS, 2010).

5.1 RESISTANCE TO CHANGE

There might be resistance among organizational staff who are opposing the technical advancement (Sydorenko, 2017). In addition, some employers might not be willing to risk themselves by introducing or investing more money into new technologies in their projects. In such cases, they should be made aware of the benefits of e-tendering over the traditional method by the practitioners and make them feel comfortable in adopting new systems. According to the study done by Hashim, et al. (2020), in Malaysia, the resistance to change ranked as the major challenge.

5.2 LESS INVESTMENT IN IT

Most of the entrepreneurs are not willing to invest in new Information Technology due to the high cost and are not confident regarding the outcome that could be achieved. Still, if the government of the country initiates e-tendering for public projects, the entrepreneurs will be herded to move towards e-tendering naturally. Conjointly, the government of the country could encourage the pioneers through providing necessary training, awareness programs, offering awards, and tax exemptions.

5.3 UNAWARENESS OF THE PROCESS OF E-TENDERING

In accord with Budianto, et al. (2020) contractors' unawareness of the process of e-tendering was the main cause for the e-tender failures in Jakarta, Indonesia. As per the study, the main issues identified are submitted tender documents were incomplete and complex prequalification requirements. He further outlines that the employees with sufficient knowledge of IT need to be recruited and the competency levels of tender administration and IT knowledge of the existing staff to be increased through training.

5.4 NON-IDENTICAL SOFTWARE AND FORMATS

Patil, et al. (2016) identify different software currently used in e-tendering in India such as Coupa Procurement, E Bid e Xchange, Panacea, Promena e-Sourcing, Sourceit, Bid Sync e Procurement, Web Req, Buyer Quest e Procurement, Procurement Software and e Invoicing and Basware Procurement. Since different organizations tend to use different software, it might be hard to synergize the outcomes in a common platform minding the supportability of different software. Furthermore, Hui and Yang (2011) point out non standardized formats of documents such as the form of the internet files, the process of e-tender, evaluation method, and others is one of the major issues in China when it comes to the application of e-tendering.These could be eliminated by making sure that the tenderers applying are made aware of the preferred software, formats, and process by including in the tender invitation itself.

Table 1 summarises the analysis of benefits and limitations of e-tendering as per the several studies done in different locations. It is known from these studies that, among other benefits, cost and time savings, transparency, less paperwork, and reduced delivery issues are considered the most important advantages, while security, legal difficulties, not ready to invest on IT and resistance to change are the most common barriers to e-tendering in construction. As per the literature reviewed, it could be summoned as the e-tendering is fruitful if rightly implemented.

6. READINESS OF THE SRI LANKAN CONSTRUCTION INDUSTRY FOR E-TENDERING

USAID conducted the electronic Government Procurement (e-GP) readiness assessment conducted in Sri Lanka in 2017. As per the results, there is a favourable alignment of essential factors to support a successful transition to e-GP. Information and Communication Technology (ICT) infrastructure and online services have been dramatically grown and are now in a position to successfully support a range of e-Government services including e-GP. Nonetheless, there are still several readiness gaps that have been identified that need to be bridged timely and orderly to allow a successful transmission towards e-GP (refer to Figure 2).

Table 1: Summary of the analysis of benefits and limitations of e-tendering as per the several studies done in different locations

	Researcher/s	Sunmola and Shehu, 2021	Gupta, et al., 2020	Omran, 2020	Hashim, et al., 2020	Sydorenko, 2017	Ibem and Laryea, 2017	Patil, et al., 2016	Tan and Suhana, 2016	Neupane, et al., 2012	Townsend, 2018	Hui and Yang, 2011
	Origin	Hertfordshire, UK	New Delhi, India	Lattakia, Syria	Malaysia	Kyiv, Ukraine	South Africa	Malaysia	Malaysia	Toowoomba, Australia	Melbourne, Australia	Xuzhou, China
	Benefits											
B.1	Less cost	√		√		√	√	√	√	√		√
B.2	Increases transparency of the procurement process		√	√		√	√			√	√	√
B.3	No delivery issues	√	√	√		√	√	√	√			
B.4	Less paperwork	√		√		√	√	√	√			
B.5	Less time	√		√			√	√		√		√
B.6	Improved process of evaluation and decision making	√		√		√		√		√		√
B.7	Less corruption	√					√	√			√	√
B.8	Clear communication	√		√		√	√		√			
B.9	Less labour intensive	√				√	√		√			
B.10	Security of information						√	√	√	√		
B.11	Wider market	√		√			√					√
B.12	Easy submission					√	√	√				
B.13	Less human errors	√				√	√					
B.14	Increase competition	√					√			√		
B.15	Reduced collusion	√									√	√

	Researcher/s	Sunmola and Shehu, 2021	Gupta, et al., 2020	Omran, 2020	Hashim, et al., 2020	Sydorenko, 2017	Ibem and Laryea, 2017	Patil, et al., 2016	Tan and Suhana, 2016	Neupane, et al., 2012	Townsend, 2018	Hui and Yang, 2011
	Origin	Hertfordshire, UK	New Delhi, India	Lattakia, Syria	Malaysia	Kyiv, Ukraine	South Africa	Malaysia	Malaysia	Toowoomba, Australia	Melbourne, Australia	Xuzhou, China
B.16	Consistency			√			√			√		
B.17	Less waste	√						√				
B.18	Automation							√		√		
B.20	Best quality		√							√		
B.21	Less storage	√										
B.22	Single source of information					√						
B.23	Increases productivity					√						
B.24	A key strategy to develop different electronic procurement system					√						
B.25	Reduce bureaucratic obstacles					√						
B.26	Monitor and tracking											√
B.27	Effective market mechanism	√										
B.28	Control and collaboration									√		
	Limitations											
L.1	Security			√	√	√	√	√	√			
L.2	Legal difficulties	√		√		√	√		√			
L.3	Less investment in IT	√			√	√	√		√			
L.4	Resistance change				√		√		√			

	Researcher/s	Sunmola and Shehu, 2021	Gupta, et al., 2020	Omran, 2020	Hashim, et al., 2020	Sydorenko, 2017	Ibem and Laryea, 2017	Patil, et al., 2016	Tan and Suhana, 2016	Neupane, et al., 2012	Townsend, 2018	Hui and Yang, 2011
	Origin	Hertfordshire, UK	New Delhi, India	Lattakia, Syria	Malaysia	Kyiv, Ukraine	South Africa	Malaysia	Malaysia	Toowoomba, Australia	Melbourne, Australia	Xuzhou, China
L.5	Unawareness	√				√						√
L.6	Adopting changes	√				√	√					
L.7	Limitations of the information shared											√
L.8	Different standards											√
L.9	Not using identical software					√						
L.10	Concerns of interoperability	√										
L.11	Company culture	√										

Assessment Components	Readiness Levels
Leadership and Strategy	■■■ 3
Human Resource Management	■■ 2
Policy	■■ 2
Planning and Management	■■ 2
Legislation and Regulation	■■ 2
ICT Infrastructure and Online Services	■■■ 3
Standards	■■ 2
Private sector integration	■■ 2
Environmental Influence	■■■ 3
OVERALL READINESS RATING	2.5

Figure 2: e-GP readiness assessment in Sri Lanka (USAID, 2017)

USAID has developed the e-GP readiness roadmap by the objectives of the ongoing Public Finance Management reform and in support of the Sri Lankan Government's strategic general goals, namely: cascading good governance to all strata of society, increasing government revenue through more effective tax collection, rationalizing unnecessary government expenditure, achieving higher economic performance, digitalizing the economy, enhancing investment and business climate in the country as a result of good governance, exploring the possibility of entering into free trade agreements with countries, following more transparent market-oriented policies, and fostering the development of Micro/Small and Medium Enterprises. Table 2 presents the progress of e-GP readiness in Sri Lanka since 2004.

Table 2: Progress of e-GP Readiness in Sri Lanka since 2004 (USAID, 2017)

Year	Progress
2006	Procurement Guidelines were released by the government, which becomes a standard to be adopted by all parties in the public sector. Further, it has been mentioned in the document that the advertising process, publishing of procurement invitations, an inspection of pre-qualification applications and tendering documents, and interaction with procurement officers for obtaining clarification can be done through online services.
2009	Information and Communication Technology Agency of Sri Lanka (ICTA) published "e-Government Policy". This legal framework includes a range of crucial components that directly impact e-GP i.e., as electronic transactions and data protection. Further, covering procurement procedure, ICT technical evaluation committee, budget and procurement plan, contractual issues in procurement, and intellectual property rights.
2011	ICTA published a concept paper titled "e-Sri Lanka: An integrated Approach to e-Government Case Study", presenting a high-level and strategic view for e-Sri Lanka.
2015	An amendment to the Constitution of the Democratic Socialist Republic of Sri Lanka, where Chapter XIX.B establishes the foundation and main function of the National Procurement Commission (NPC)
2016	The budget law was introduced by an official speech that is publicly available on the parliament's website including some announcements on the establishment of a Central Procurement Secretariat, which will oversee the awarding of tenders and

Year	Progress
	will handle all purchases over a specific value; b) appointment of a committee to provide education and guidance to companies and contractors.

ICTA is engaged in enabling digital laws since 2003 such as Electronic Transactions Act, Digital Signature and Authentication Regime, Computer Crimes Act, Data Protection Legislation, Cyber Security Act, and Intellectual Property Rights (ICTA, 2022).

In addition, each year, ICTA encourages the start-ups through the Tech Start-up Support Program called "Spiralation" and provides seed funding of 5000USD per start-up along with training by industry experts. A tender alert services website has been benefited through this program (ICTA, 2016) and it indicates the interest of the government is moving towards e-tendering.

The development of Artificial Intelligence (AI) is another measure of the government's readiness towards the advancement of ICT. A national AI strategy creates a unified definition of ambitions and priorities for AI in a country in response to the cross-sector, cross-departmental opportunities and challenges that AI presents. Figure 03 shows the AI strategies globally, which indicates that there are more Asian countries and African countries that are lagging behind the global AI strategies (Oxford Insights, 2021).

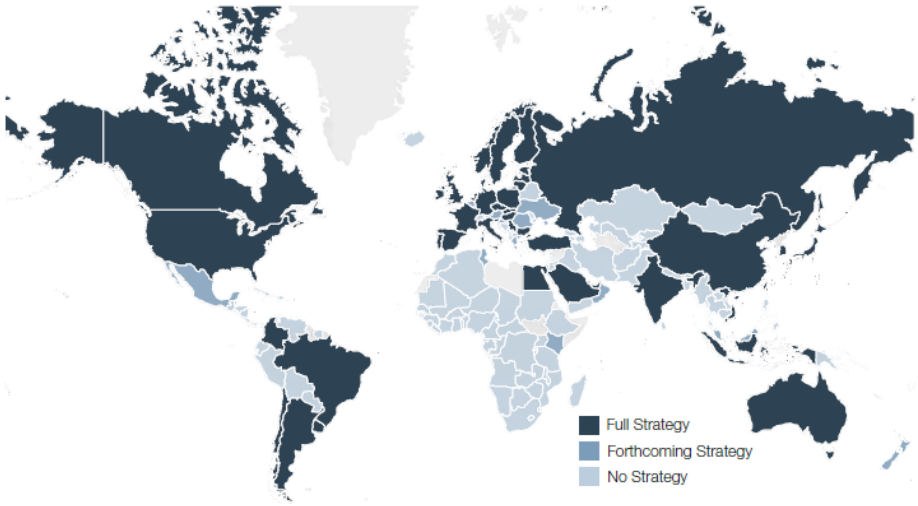

Figure 3: National AI strategies

Source: Oxford Insights (2021)

According to the Government AI Readiness Index released in 2021 by Oxford insights, Sri Lanka has gained 41.12 out of 100, which is below the global average of 47.42. India leads the countries in South and Central Asia with 56.11 (refer Figure 3). The United States capture the first rank (88.16) in the global position, whereas Singapore, one of the Asian countries ranks second (82.46) as a result of its institutional strength and government digital capacity.

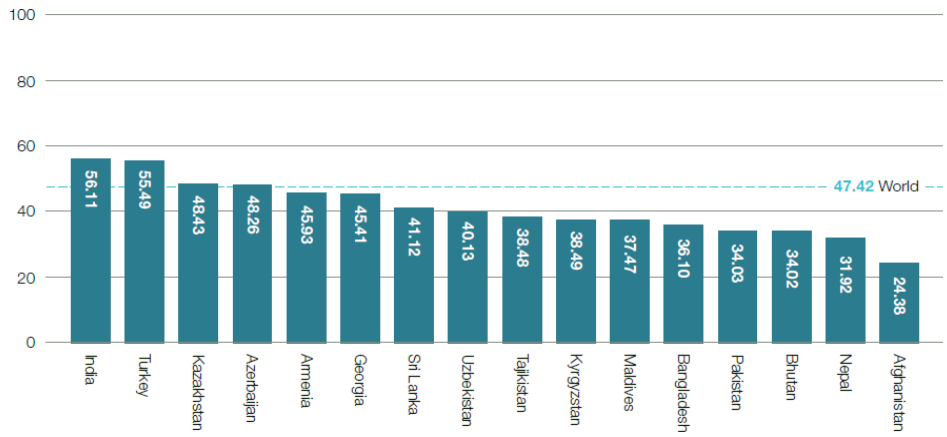

Figure 3: Government AI readiness index - South and Central Asia

Source: Oxford Insights (2021)

As per the survey on the E-participation index (EPI) done by United Nations (2020), Sri Lanka has been categorized under the high EPI level category. A country's EPI reflects the e-participation mechanisms that are deployed by the government as compared to all other countries. The E-Participation Index (EPI) is derived as a supplementary index to the United Nations E-Government Survey. It extends the dimension of the Survey by focusing on the government's use of online services in providing information to its citizens or "e-information sharing", interacting with stakeholders or "e-consultation" and engaging in decision-making processes or "e-decision-making".

In addition, Dhayalan and Davidrajuh (2005) recommend some micro-projects (refer Figure 4) to improve the e-readiness of the country minding the e-readiness of the Norwegian government.

As per the author's opinion, it is highly believed that COVID-19 Pandemic was one of the major causes, which forced Sri Lanka to move towards online services. Due to the self-quarantine and isolation, the suppliers were not able to meet the consumers physically. Online services became a medium to communicate among suppliers and consumers starting from basic commodities such as food, groceries, all home need goods, medicine, furniture, electronic goods, nursery plants, medical consultations, medical reports, banking, education, online travel visa, government services including obtaining vehicle license renewals, and more. The government and suppliers had to initiate websites with appropriate systems to address the users' needs. Even though this is not directly connected with construction e-tendering, this made lots of the citizens to get aware of online systems which would encourage the construction to move towards online services indirectly. Adding to this Amarapathy (2013) indicates that this transition is highly an economic and political challenge rather than a technical or a technological challenge, therefore this cannot be overcome without strong commitment at the highest political level.

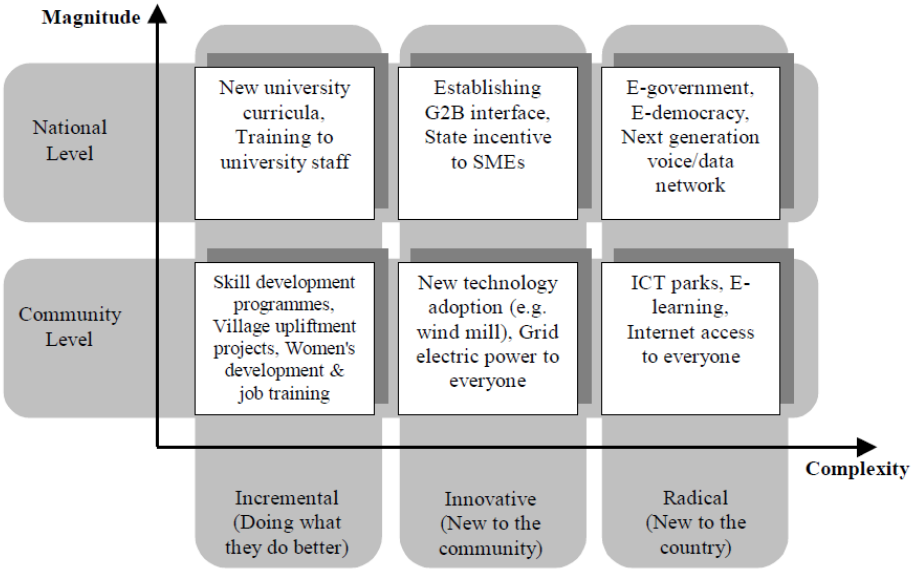

Figure 4: Classification e-readiness improvement projects for Sri Lanka

Source: Dhayalan and Davidrajuh (2005)

7. CONCLUSION AND THE WAY FORWARD

One of the milestones of adapting the advanced information technology in construction is implementing e-tendering in construction. Several developed countries and some developing countries have already started practicing e-tendering at a greater level of success. The stakeholders in the construction industry globally are embracing e-tendering for its high transparency and accountability, less corruption, less cost, time and paperwork, and easy evaluation of submitted tenders. Meanwhile, there are challenges in e-tendering implementations due to legal and security issues, resistance to change, less investment in Information Technology, unawareness of the process of e-tendering, and non-identical software and formats. This reveals that e-tendering is fruitful if rightly implemented addressing all these challenges.

Further, considering Sri Lanka's readiness in adopting e-tendering, the country's government has considerably progressed towards e-government but not has been fully implemented. However, a strong commitment at the highest political level is necessary in order to progress further. The study could be a way forward by investigating the barriers to implementing e-tendering and paths of smooth transferring from traditional tendering to e-tendering in the Sri Lankan construction industry.

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