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CHALLENGES AND OBSTACLES FACING TENDERERS ADOPTING E-TENDERING IN THE PUBLIC SECTOR OF THE CONSTRUCTION INDUSTRY IN EGYPT

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Abstract: The construction public sector in Egypt, like most countries in the world, is tendering its projects through the traditional paper-based tendering procedure, which has many weaknesses including bureaucracy and lack of transparency. Due to the considerable volume of projects tendered each year, it was essential to study the possibility of implementing another more efficient mechanism “E-Tendering” that overcomes the drawbacks of the paper-based tendering procedure. This on-going research examines the readiness of the construction industry in Egypt to adopt E-Tendering for public tenders and provides recommendations to improve its uptake. This paper provides a model of the barriers, challenges and concerns of the Egyptian tenderers towards accepting and adopting E-Tendering. This is accomplished through extensive review of the literature together with expert identification and analysis. 19 challenges are highlighted and categorized into 4 categories: security challenges, user acceptance and staff resistance, accessibility issues and legal barriers. These challenges are then examined and ranked with respect to their importance by a panel of academic and industry experts to reflect the Egyptian public tendering context. The most important highlighted barriers are the SMEs access difficulties, the expected technical malfunctioning of the portal, the reluctance/resistance to change and the breach of confidentiality of information. These findings present a cornerstone in the development of a framework that presents practical solutions to the success of E-Tendering for the construction public projects in Egypt.

1 INTRODUCTION

The construction industry in Egypt is one of the most active and dynamic sectors of the economy. It accounts for 7% of the Gross Domestic Product (GDP) and by the year 2015, the investments in this sector are expected to reach US\$7.3 billion (General Authority for Investment and Free Zones [GAFI] 2014). Unfortunately, a number of research have shown that bribery and corruption are rampant in the construction sector worldwide according to Transparency International’s 2002 to 2011 Bribery Payers Index (BPI) (Hardoon and Finn 2011). Concerning Egypt, the European Bank for Reconstruction and Development (EBRD) has published a report in 2013 containing a review of its public procurement practices. The report highlights that companies in Egypt face a high risk as the procurement process is burdened with lack of transparency, bureaucracy, ineffective monitoring and review mechanisms together with unethical public procurement officials (Business Anti-Corruption Portal 2013). Moreover, it is argued that the traditional paper-based tendering process in Egypt is full of inefficiencies (EBRD 2013). It is also worth noting that according to the Canadian Construction Association (CCA), in a typical construction

project, the cost of tendering to a client accounts for up to 5.85% of the total cost of a project (Hore et al. 2007).

Consequently, it is imperative to find a more efficient mechanism to replace/complement the traditional paper-based tendering processes of the construction public works in Egypt in order to reduce the considerable cost of tendering, save lots of money wasted due to the inefficiencies of the traditional tendering, increase transparency, and reduce corruption in the public sector. The proposed solution is the adoption of E-Tendering.

2 E-TENDERING IN CONSTRUCTION

2.1 Definition and processes of E-Tendering

According to the Royal Institute of Chartered Surveyor (RICS 2007), the basic principles of traditional tendering are preserved in E-Tendering while enhancing the way of communication through finding an alternative medium through which the tender documents and information are exchanged. This medium is further defined by Amarapathy et al. (2013) as E-Tendering portals that are “secure dedicated websites, specifically set up for the exchange of information and tender documents electronically over the internet”. The ultimate goal/objective of E-Tendering as clarified by Amarapathy et al. (2013) is a complete shift from paper-based manual tendering, to fully automated electronic means of communication. This would significantly decrease or even eliminate paper handling, speeding up interaction and communication between the different parties involved, and hence increases productivity and efficiency (Seah 2004). Technically, the E-Tendering concept/process combines a number of processes that take place before the award of the contract. It mainly involves E-Notification, E-Access, E-Submission, E-Evaluation, and sometimes E-Awarding.

2.2 Advantages/Benefits of E-Tendering

Kajewski and Weippert (2004) cited the NSW Government and Department of Commerce highlighting the benefits that construction professionals and governmental departments/agencies could gain when implementing Electronic Tendering processes. These benefits and advantages are grouped in 3 categories: General Perspective, Industry perspective and Government perspective.

General Perspective: streamlines the entire tendering process; provides secure and improved access to tender documents; makes it easier for businesses to obtain tender documentation and to submit an offer online on time as the postal system is no longer needed (Lavelle and Bardon 2009); maintains an audit trail of all communication (RICS 2007); virtual elimination of errors due to strict process (MERX 2014); ability to automatically eliminate noncompliant bids, hence saves time (MERX 2014); saves money and time as the electronically submitted tenders are downloaded in a suitable form that facilitates evaluation without requiring the client’s representatives to re-enter the data manually.

Industry perspective: increases tender opportunities, competitiveness and promotes transparency; provides easy and fast access to private and public tender information; facilitates remote accessibility to the tendering system which improves access for geographically isolated industry practitioners/organizations (Amarapathy et al. 2013), and hence assures fairness regardless the tenderers’ geographical area (MERX 2014); reduces the cost of printing and copying which saves time and resources (Lavelle and Bardon 2009).

Government perspective: better value for the money of the taxpayers; increases effectiveness and efficiency; standardizes the tendering processes across the government; promotes E-Government initiative; environmentally friendly due to a predominantly paperless process, so no waste generated (RICS 2007).

In addition, Lavelle and Bardon (2009) demonstrated additional benefits for E-Tendering such as the reduction in administration processes via providing one single source of information. Consequently, duplication of documents does not occur and any revisions to the documents are kept track of and notified to the tenderers as audit trail/log is provided through the system. Moreover, Tindsley and Stephenson (2008) indicated that E-Tendering can provide full automated assessment with computerized analysis, hence, fairer and faster evaluation of the tenders submitted. Also, the system could automatically identify incomplete or unusual entries, thus reduction in communications and faster analysis

as well. Furthermore, according to the International Data Corporation (IDC) (2013), EU public contracts tendered electronically and processed with electronic submission were 13% lower on average than public contracts traditionally tendered.

3 RESEARCH AIM AND SCOPE OF THIS PAPER

In many developing countries, E-Tendering is regarded as unnecessary and unfeasible given the number of social, cultural and economic barriers that are expected to hinder its implementation. So this on-going research investigates the readiness of the construction industry in Egypt to adopt E-Tendering and provides recommendations for its implementation.

The scope of this paper is limited to the identification of the barriers, challenges and concerns of the tenderers towards accepting/adopting E-Tendering in Egypt.

4 RESEARCH METHODOLOGY

Since this is an exploratory research in nature, qualitative approach is adopted in identifying from the literature a list of the most common challenges that influence the tenderers' acceptance/adoption of E-Tendering worldwide. These challenges are then categorized in 4 categories: Security Challenges, User Acceptance and Staff Resistance, Accessibility Issues and Legal Barriers. The list of identified challenges is then presented in a form of a survey questionnaire to a panel of 15 knowledgeable experts in the field of tendering in Egypt in semi-structured interviews. The experts were required to mark/check on a 5-scale Likert item the probability/likelihood that a tenderer considers the challenges as obstacles against the adoption of E-Tendering in Egypt. The survey output is analyzed using the adjusted relative importance index to identify and rank the highest obstacles against the tenderers. Hence, the sampling design used is non-probability sampling and more specifically purposive sampling. The expert interviews are conducted since their expertise and experience add more depth to the research taking place. The panel of experts is composed of academic and industry professionals, which included consultants and contractors. The experts are selected based on their expertise in the field of tendering in Egypt and based on the criteria and they carried out/participated in more than 50 tenders.

5 THE IDENTIFIED CHALLENGES/CONCERNS OF THE TENDERERS

The preliminary findings for the barriers, challenges and concerns of the tenderers are grouped in the following 4 categories: security challenges, user acceptance and staff resistance, accessibility issues, and legal barriers. These challenges/barriers were developed and grouped after extensive review and analysis of the literature in order to identify the barriers hindering the adoption of E-Tendering.

5.1 Security Challenges

- Document tampering i.e. when a person makes unauthorized and unfair modifications to the tender (Eadie et al. 2010).
- Problems with data integrity after reassembly - possibility of inaccurate, incomplete, corrupted data after reassembly (Davila et al. 2002).
- Confidential documents getting leaked to competitors (Davila et al. 2002).

5.2 User Acceptance and Staff Resistance

- High investment costs to adopt and maintain E-Tendering with no substantial benefits realized (Samuelson 2008).
- Reluctance/Resistance to change i.e. general attitude that old ways of doing things have worked well throughout the years and changes are unnecessary (Olukayode and Adeyemi 2011).
- Unethical investors and corrupted officials will fight to continue with the traditional paper-based tendering which is full of leaks (fear of potential loss of bribery) (Mastor et al. 2006).
- Automation is a threat to the employees' jobs.

- E-Tendering is more time consuming than traditional tendering.
- E-tendering is an additional workload with no compensation/reward.
- Lack of leadership/upper management support (Eadie et al. 2010)

5.3 Accessibility Issues

- Fear of using non-compatible software with the client/consultant system hence tender submission could get rejected "noncompliance" (Samuelson 2008).
- Irregular electric power supply will affect the E-Tender processes especially the tender submission (Olukayode and Adeyemi 2011).
- A fear that a technical malfunctioning of the portal could cause disturbance to the electronic submission of the tenders.
- Poor telecommunications infrastructure will affect the E-Tendering processes (Olukayode and Adeyemi 2011).
- E-Tendering requires-high speed expensive internet services.
- A large portion of the Small Medium Enterprises "SME's" especially in Upper Egypt are computer illiterate hence will face difficulty to apply, prepare and submit tenders electronically.
- The contractors will bear the costs and responsibility of copying and printing the drawings for the subcontractors.

5.4 Legal Barriers

- Complex, time consuming and onerous regulatory procedures (IDC 2013).
- Problems with proof of intent of the tenderer (Eadie et al. 2010).

6 THE CONDUCTED SURVEY QUESTIONNAIRE

After being introduced to the list of identified challenges from the literature, the experts were asked to check/mark on a 5-scale Likert item, the probability/likelihood that a tenderer considers the challenges presented in the list as obstacles against the adoption of E-Tendering specifically in Egypt. In addition, the experts were asked to identify more challenges/barriers if any.

The scale consisted of the following 5 points:

Table 1: Scoring numbering and description

| Scoring Number | Scoring Description |
|-----------------------------|--|
| Score 1 - Strongly Disagree | The challenge will strongly motivate tenderers to accept E-Tendering |
| Score 2 - Slightly Disagree | The challenge will slightly motivate tenderers to accept E-Tendering |
| Score 3 – Neutral | The challenge will neither motivate nor prevent tenderers from accepting E-Tendering |
| Score 4 - Slightly Agree | The challenge will slightly prevent tenderers from accepting E-Tendering |
| Score 5 - Strongly Agree | The challenge will strongly prevent tenderers from accepting E-Tendering |

It is debatable whether the distance between each response in a 5-scale Likert item is equal or not since numerous research provided different conclusions as highlighted by Holt (2014). In this research, the Likert items are symmetric (5-scale) and interval in nature, hence the difference between each response can be considered equal in distance (Holt 2014).

6.1 Data Analysis

The survey output is analyzed using the adjusted relative importance index (RII) to identify the rank (relative importance) of each barrier/challenge hindering the uptake of E-Tendering in Egypt in order to address and tackle them. The adjusted RII equation used in this research is shown in Eq.1 (Holt 2014).

$$[1] \text{ Adjusted percent equation} = \text{RII \% adjust}_{(5)} = 125 * [\sum P_i \text{ (from } i=0 \text{ to } i=N) / N * n] - 25$$

RII = Relative Importance index

RII % adjust₍₅₎ = Relative Importance Adjusted Per cent using scale (Rmin=1 to Rmax=5)

P_i = Participant's rating of the barriers/challenges hindering the uptake of E-Tendering

N= Total number of experts

n = Highest attainable rating for one trial = 5

The above equation yields "the true percentage for scales where Amin = 1 and, achieve unity (i.e. 0-100 per cent)" as shown below (Holt 2014).

- The minimum rating is RII % adjust₍₅₎ = 125*[15*1 / 15*5] - 25 = 0
- The maximum rating is RII % adjust₍₅₎ = 125*[15*5 / 15*5] - 25 = 100

Initially, 5 experts were only selected to conduct this survey questionnaire, but since there was variance in the data they provided and each expert added valuable information to the research, it was essential to conduct more expert interviews in order to reach the point where the data converges i.e. limited variance and hence good coverage of the research in consideration. As highlighted earlier, the final number of interviewed experts is 15.

6.2 Results and Discussion

The below table shows that all the experts agree that 16 challenges (RII above 3 or above 50%) out of the 19 identified from the literature can be considered as obstacles against the widespread adoption of E-Tendering in Egypt; whereas 3 challenges (RII below 3 or below 50%) are considered a motivation to the tenderers in Egypt. It is important to note that no more barriers were identified by the experts other than the ones that were provided in the list of preliminary challenges provided to them.

The highest challenges against the widespread adoption of E-Tendering in Egypt are the SMEs access difficulties (RII% = 88.33%), the expected technical malfunctioning of the portal (RII% = 86.67%), the reluctance/resistance to change (RII% = 80%), the breach of confidentiality of information (RII% = 76.67%), the electronic signature problems (RII % = 76.67%) and the document tampering (RII% = 75%).

Table 2: Ranking of the challenges and concerns of the tenderers

| Challenge/Concern | RII Adjusted Percent | Rank |
|--|----------------------|------|
| SMEs Access Difficulties | 88.33% | 1 |
| Technical Malfunctioning of the Portal | 86.67% | 2 |
| Reluctance/Resistance to Change | 80.00% | 3 |
| Confidentiality of Information | 76.67% | 4 |
| Signature Issues | 76.67% | 4 |
| Document Tampering | 75.00% | 6 |
| Lack of Support | 73.33% | 7 |
| Irregular Electric Power Supply | 70.00% | 8 |
| Poor Telecommunications Infrastructure | 70.00% | 8 |
| Software Non-Compatibility Issues | 68.33% | 10 |

| | | |
|--|--------|----|
| Corruption Seekers | 66.67% | 11 |
| Subcontractors Dependency on Contractors | 65.00% | 12 |
| Bureaucratic Regulatory Requirements | 61.67% | 13 |
| High Speed Expensive Internet Services | 60.00% | 14 |
| E-Tendering High Investment Cost | 55.00% | 15 |
| Data Integrity | 51.67% | 16 |
| Time Consuming | 35.00% | 17 |
| Additional Workload | 33.33% | 18 |
| Automation Job Threat | 28.33% | 19 |

Shown below is a detailed analysis of each of the challenges together with its corresponding RII adjusted percentage.

1. SMEs Access Difficulties (RII% = 88.33%)

There is a great concern that the small and medium enterprises will be unable to participate in the E-Tendering processes especially that smaller enterprises in Egypt are probably computer illiterate and lack the basic needs (computer, internet, etc.) which are necessary for the participation in the E-Tendering processes.

2. Technical Malfunctioning of the Portal (RII% = 86.67%)

Given the fact that Egyptians lack trust in any governmental provided service, there is a strong fear that the portal could malfunction (i.e. broken links, service unavailability, slow page load,...) especially during the submission of the tenders. Furthermore, if technical malfunctioning of the portal occurred and it was impossible for the tenderers to submit their tenders, many will be suspicious and will file claims of corruption against the entity running the portal especially that Egyptians nowadays believe in conspiracy theories.

3. Reluctance/Resistance to Change (RII% = 80%)

This is a very strong cultural trait in the Egyptians and humans in general. It is always perceived that if old ways of doing things are good, there is no need for going the extra mile and doing something unconventional (i.e. moving to paperless processes) to the norms is unnecessary.

4. Confidentiality of Information (RII% = 76.67%)

The experts have a great fear that the confidential data sent to the government personnel before the deadline are prone to breach and leak to other competitors even if the tenders were password protected. This stems from a number of reasons, mainly, that the corrupted people will always find a way and that hackers are unstoppable as they always infiltrate through finding vulnerabilities/weaknesses in the system.

5. Signature Issues (RII% = 76.67%)

Most of the experts do not accept putting their handwritten signatures on a document and sending it online (i.e. electronic signature) since their signatures could be copied and pasted on other documents by unethical government personnel or unethical competitors.

6. Document Tampering (RII% = 75%)

Almost all the experts agree that sending tender documents online is not safe since their data could be altered/modified by unethical government personnel or by hackers who could infiltrate into the system.

7. Lack of Support (RII% = 73.33%)

The interviewed experts believe that in Egypt the upper management of the companies would not support adopting E-Tendering. This stems from the fact that most of the upper management figures are old people that are not used to have a computerized system; they do not know how to run an electronic system nor have the time to learn it. In addition, it is also important to note that the decision-making figures of the companies, before submitting their tender envelopes to the client, make last second changes (addition or reduction of a certain percentage) to their tenders. Mainly, this happens because they want to make sure no one knows the submitted tender price especially that they fear the presence of corrupted personnel in their companies who could inform their competitors of the submitted tender price. Consequently, these decision-making figures, in case they will not be capable of using the E-Tendering system (i.e. due to complexity, computer illiteracy, etc.) will never trust an employee to deal with a system on their behalf without their full control and awareness.

8. Irregular Electric Power Supply (RII% = 70%)

Unfortunately, there is irregular power supply nowadays in Egypt especially during summer time and this is expected to continue for few more years. The electricity goes down without any notice, for different durations, and in different areas unequally. Consequently, most of the interviewed experts (more than 70%) believe that this irregular electric power supply could disturb the tendering process especially if the tenderers were unable to submit their tender responses before the deadline due to electricity shortage. It is important to note that not all the tenderers have an Uninterruptible Power Supply (UPS) and also the UPS have time limit capacity.

Moreover, sometimes, when there is electricity shortage, the landlines (internet) stop working. Hence, the usage of a UPS will not help in submitting the tender online; unless a USB internet modem is used in addition to the UPS.

9. Poor Telecommunications Infrastructure (RII% = 70%)

This is one of the very important challenges that need to be carefully addressed by the government since most of the experts believe that there is a serious problem with the network of telecommunications in the different governorates in Egypt, which will seriously impact the adoption of E-Tendering. It is argued that some areas do not have internet services at all in Egypt.

10. Software Non-Compatibility Issues (RII% = 68.33%)

Given the fact that the tender response will be electronic/softcopy, not a hardcopy, most of the experts believe that a problem of software non-compatibility between the tenderers' computers and the computer of the client will arise, which will seriously affect the submitted tender documents. In other words, the documents sent from the tenderers, will not open on the computer of the tender evaluators due to software non-compatibility issues (different software, different version of the software, etc.).

11. Corruption Seekers (RII% = 66.67%)

In Egypt, although most of the plans proposed by the different governments are always important to be implemented, one of the major problems that hinder their implementation is that there is always a strong resistance from within the governmental entities in order to not adopt such plans that could have major impact on the unethical personnel working in the different entities. Also, this problem aggravates when such proposed plans impact negatively the unethical investors and the illegal tycoons who control the market and who would exert all the necessary efforts to halt such plans.

12. Subcontractors Dependency on Contractors (RII% = 65%)

Most of the experts believe that always the subcontractors depend on the contractors in the transmission of the tender documents; in other words, there is no difference in the transition from traditional paper-based to electronic tendering. The experts believe that this dependency negatively affects the contractor as he loses both time and cost.

13. Bureaucratic Regulatory Procedures/Requirements (RII% = 61.67%)

All the experts stress on the fact that the bureaucratic regulatory procedures required by the government are a major reason that makes the Egyptian tenderers uninterested, unwilling and unable to participate in governmental tenders. Almost one-third of the experts believe that the introduction of E-Tendering will not have any positive impact to solve these bureaucratic requirements (the problems will persist in both traditional and electronic tendering). Another third believe that E-Tendering will actually make the process more complex (especially for the proof of intent and authentication of the tender documents - signature) and the last third believe that E-Tendering will make the process much easier (especially concerning the discovery of the tender opportunities and the submission of the tender documents).

14. High Speed Expensive Internet Services (RII% = 60%)

Most of the experts believe that E-Tendering does not require a high speed internet services in order to have smooth operations, however, a number of experts (27%) expect that small tenderers will face difficulties and will have to subscribe in higher bundles than the ones they use.

15. E-Tendering High Investment Cost (RII% = 55%)

Almost 50% of the interviewed experts agree that there is a high investment cost needed in order to operate/function adequately on the E-Tendering Portal. This investment cost includes buying new computers, specific software, licenses, hiring competent personnel, training sessions, etc.

16. Data Integrity (RII% = 51.67%)

Problems with data integrity, which includes possibility of inaccurate, incomplete or corrupted data after reassembly since the tender response is not sent as a hardcopy, is only perceived by 27% of the experts as a challenge/obstacle towards the adoption of E-Tendering. On the other hand, some experts argued that whenever there are problems with the submission of a tenderer, they get contacted by the client representatives to clarify the ambiguities/unclear data in their tender response.

17. Time Consuming (RII% = 35%)

27% of the interviewed experts believe that E-Tendering is more time consuming than the traditional tendering and hence this will be an obstacle against its adoption by the Egyptian tenderers.

18. Additional Workload (RII% = 33.33%)

27% of the interviewed experts believe that E-Tendering is an additional workload since they expect that, after finishing their tender response, they will be required to fill in different forms in order to comply with the tender electronic submission; hence, wasting time without compensation/reward. Furthermore, all the experts affirm that structuring the tender documents in Egypt is too hard to be accomplished.

19. Automation Job Threat (RII% = 28.33%)

Automation of the tendering processes is only perceived by 27% of the experts as an obstacle towards the adoption of E-Tendering since the automation of the processes will have a negative impact on a limited number of jobs within the company (i.e. the secretaries, the drivers, etc.).

7 FUTURE RESEARCH DEVELOPMENT

The next step of this research is to develop a set of recommendations to tackle the obstacles and concerns perceived by the experts. Then verification and validation to the recommendations and solutions should be accomplished.

The verification will examine whether or not the proposed solutions and recommendations are applicable and doable technically. The verification should be accomplished qualitatively through introducing the recommendations to a panel of experts from different fields (computer experts, construction engineering experts, finance experts, etc.).

The validation will tackle the effectiveness of the proposed solutions to address the concerns of the Egyptian tenderers. The effectiveness of the developed recommendations should be validated quantitatively through introducing them to a bigger sample that represents the whole population of the construction industry practitioners to examine whether or not the presented solutions will address their concerns. The sample should include different construction professionals (project managers, quantity surveyors, designers, etc.) and different construction entities (contractors, subcontractors and suppliers).

8 CONCLUSION

This research provides an identification of the barriers, challenges and concerns that are expected to face the Egyptian tenderers when the government reveal its plans of the full adoption of E-Tendering. Further to thorough examination of the literature, 19 challenges were identified and categorized in 4 categories: security challenges, user acceptance and staff resistance, accessibility issues and legal barriers. Then 15 semi-structured interviews with academic and industry experts were conducted and the qualitative analysis showed that 16 challenges (RII above 50%) out of the 19 identified from the literature can be considered as obstacles against the widespread adoption of E-Tendering in Egypt; whereas 3 challenges (RII below 50%) are considered a motivation to the tenderers in Egypt. Furthermore, the highest challenges against the widespread adoption of E-Tendering in Egypt are the SMEs access difficulties (RII% = 88.33%), the expected technical malfunctioning of the portal (RII% = 86.67%), the reluctance/resistance to change (RII% = 80%), the breach of confidentiality of information (RII% = 76.67%), the electronic signature problems (RII % = 76.67%) and the document tampering (RII% = 75%). This research is a cornerstone in the development of a framework that aims to identify and address the barriers, challenges and concerns of the Egyptian tenderers towards the adoption of E-Tendering, hence improving the uptake of E-Tendering specifically for the construction public works in Egypt.

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