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The influence of the implementation of E-tendering on the competitiveness of small and medium enterprises in construction industry

Abstract
The rapid pace of technological progress during the last years has influenced the construction industry greatly. Due to the increasing electronic integration of the construction processes, the participants have no choice but to embrace all the latest electronic technologies. The E-tendering system was introduced with the aim to provide higher transparency in each stage and transaction of a procurement process, as well as to reduce paperwork. However, the successful implementation of the information and communication technologies, such as E-tendering, requires the particular attention and great effort from the companies. This article identifies the main trends in construction industry regarding electronic technologies and potential benefits that participants can gain from implementing E-tendering system.

Keywords
E-tendering, implementation, SME, subcontractors, procurement

1 Introduction

The widespread introduction of advanced information technologies at different stages of the process of sharing resources is an integral feature of globalization. Construction industry was not ignored by the technological progress as well. Fundamentally new opportunities continuously appear in the market, and the inability of the company to embrace them will definitely result in lagging behind the main competitors.

Over 40 years have been already passed since the initial resources and funds had been invested in research & development and the first ICT tools and systems were introduced for the construction industry. However, the majority of the organizations are still not able to benefit from the ICT investments. Furthermore, the construction industry overall has been identified as 'slow' in promoting and implementing innovative ICT tools and systems, such as e-Commerce, e-Tendering and others [15].

The present paper-based method of tendering has been a common practice within the industry for a long period of time, but this traditional process is gradually becoming obsolete due to the current technological advancements [16]. E-tendering has been considered as one of the most potential tools than can help to change the adversarial culture of the whole industry and to improve its inefficient internal processes [11].

However, despite the numerous benefits and advantages of the innovative ICT tools and systems overall and E-tendering as well, that construction companies can potentially embrace, the rate, at which they are put into practice so far by the construction practitioners, leave much to be desired. Based on the given argument, it can be stated that the process of implementation of E-tendering into practice conceals the numerous pitfalls and uncertainties, which deter both, the construction clients and contractors, from using this tool in practice.

2 Statement of the problem

According to The World Justice Project, which

was held in 2008, construction was named as one of the most corrupt industries worldwide. The construction environment, itself, is much more susceptible to ethical issues than any other industries by virtue of its low-price mentality, fierce competition and low profit margin.

Many authorities have agreed on the inefficiency of the traditional paper-based collaborative exchange of data between different participants of the construction project. Moderate and gradual use of ICT can definitely enhance the productivity of the industry overall. Nowadays central governments in many developed countries set specific targets for appropriate public sector bodies to introduce the electronic procurement systems. As a result of such Public Procurement Directives, the mandatory implementation and application of e-procurement methods have been achieved in public body organizations. Thereby, the use of E-tendering increased dramatically by local councils and other public bodies in recent years [13].

The reduction of the cost of doing business and the delivery of more efficient services to the community are among the main objectives that government agencies aim to achieve from implementing E-tendering. Both, government bodies and the participants of the construction industry have a general opinion, that the implementation of E-procurement systems and e-Tendering process in particular can enhance and develop the overall quality, opportuneness and cost-effectiveness of a tender process.

As it was clearly stated before, the main purpose for the application of E-tendering is to increase the transparency of the procurement process and to decrease the administrative expenses. No less attention is also given to the issues related to corruption and ethical behaviour of participants as well as the mechanisms of avoiding the corruption schemes in the procurement process. The corruption in construction industry tends to occur due to the human's behaviour, while the transparency of E-tendering system can be seen as one of the main barriers for the use of unethical behaviour and fraudulent actions [17].

3 The main purpose of the research

The main purpose of this work is to identify how the advancement in the E-tendering could affect the performance and competitiveness of the SMEs in construction industry with a specific attention given to subcontractors. Also, it is necessary to understand whether the implementation of E-tendering can provide the equal benefits for all the parties involved in the execution of the construction projects and to examine the extent to which E-tendering can support small and medium companies in the construction industry.

4 Main findings

4.1. BENEFITS OF E-TENDERING FOR SMEs

Nowadays, E-procurement is seen as a powerful tool that can help to increase the transparency of the procurement process, as well as reduce the transaction cost for the companies. This in turn will inevitably lead to the improved process of decision-making and provide better value in the procurement output. ICT can act as an initial driver for the improvements of productivity, if it is implemented correctly. E-tendering should act as a key strategy in the development of different electronic procurement systems and initiatives inside organization. Such an approach at the micro level should offer additional opportunities for various businesses in the construction industry, as well as contribute to a globally competitive economy and maintain a sustained economic growth.

Web-based tendering is an effective method that can help to reduce bid costs and get rid of bureaucratic obstacles. At the same time, it provides companies with better clarification of information. Web-based tendering also helps organizations to cover a larger amount of work at once, in comparison with traditional method of tendering. Such time savings are also very important and significant from the standpoint of the employer. The time, which is usually wasted for such repetitive and worthless tasks as re-keying of information, can be used more effectively. The highly qualified staff should use their time and efforts for the execution of more laborious and challenging tasks that can enhance their value [12].

Apart from considerable time savings, E-tendering also tends to be more cost-effective than the traditional method. Average cost of the traditional tender procedures for the contractor was approximately 1.17% of the value of the work. The possibility of instantaneous elimination of such amount of expenditures is even more attractive for the contractors than time and coordination issues. Organizations can save a substantial amount of monetary expenditures, due to establishing and optimizing of direct links between the technology infrastructure of organization [10].

The reducing of the influence of human factor on the preparation and carrying out of tendering procedure in any form is also worthy of serious attention. Such problems are always emerging during process. Human errors during the process of preparing documents clearly stand out among the other human factor issues [6]. The abolition of paper-based format should allow to avoid such problems, as: incomplete information in the documents, mix up or disorder of documents, insufficient number of copies, leakage of information

with restricted access, large volume of documents and many others. No less important features of E-tendering include the shortening in levels of tender administration and providing a single source of information [11]. This in turn should help to remove the unintentional duplication of various documents, including sending frequentative e-mails. Sizable savings also can be obtained from reducing the administration and printing costs. Electronic tendering can save the contractors the trouble of printing and copying the documents and sorting them afterwards [16]. The problems of miscommunication and misinterpretation can also be added in addition to the abovementioned.

Together with printing costs, the expenses, associated with packaging and delivering documentation in hard copy format can be eliminated. Thereby, avoiding the postal system can reduce the period of the tender [11]. In addition, the time, which was always left in advance for the delivery issues, can be used more affectively, which can allow to concentrate on the production of the tender. Contractors invest significant amount of resources in the producing and submitting various items like presentation materials, brochures and estimating resources. In addition, the delivery issues, which sometimes arise due to the incompetence of postal services, can be eliminated. Paperwork held in electronic format is less likely to get lost or sent to the wrong place by post, during the process of delivering.

4.2 EXTERNAL BARRIERS FOR IMPLEMENTATION E-TENDERING BY SMEs

With the increasing technological advancement within the industry overall and the introduction of electronic tendering system in particular, the matter of increasing concern and apprehension is related to the issues of legality. Legal difficulties can be considered as the main barriers to E-tendering. Complete and successful implementation of E-tendering within the construction industry is highly dependent on the current legal status of electronic communications. However, the legislatures are usually characterized as typically 'lagging' behind the technological change and innovations. The technology that facilitates the application of E-tendering is comparatively new and tends to be continuously updated. As a result, the legal mechanisms simply cannot keep up the pace in order to provide confidence of enforcement for electronic transactions [2].Also, the lack of experience and practice in the legal scope can be identified as one of the initial barriers for SME in construction industry [11]. All the project participants, including the clients, consultants and contractors, still do not have a clear understanding, whether the electronic communications are suffice from a legal point of view or not. That is why all the parties still prefer to receive an important documentation in hard copy format. The lack of specific legal regulations, which can govern different approaches and methods of enforceability of E-tendering can act as the additional concerns for the potential users [9]. However, in course of time, the legal issues may overtake the rapid development of electronic procurement systems and these concerns will disappear by themselves.

Security is also one of the major issues, for both the providers of the service and the end-users from the construction industry [8]. Security is considered as the important aspect of the projects, where E-tendering is used. The parties involved in the project strive to appreciate trustworthiness and security of the software used, before the commencement of the project [16]. The traditional method of tendering is no longer able to provide the tenderers with a sense of confidence that their information is fully protected. In addition, the exchange of data and information in electronic form is evidently more secure than the use of paper [6]. However, there is still some mistrust to the transmission of restricted and confidential documents electronically. The electronic transfer of information is no more secure than the traditional telephone call or e-mail messages, because they all are routed between the providers of internet service and over public telephone networks [1].

Tendering online is seen by the majority of huge players in the market as an important tool in the future of procurement. It is stated, that there has been no substantial shifts towards E-tendering from the client side. Some clients still refuse the implementation of exchanging tender documents in electronic format instead of paperwork. It is significantly important that initial impetus to the use of electronic procurement tools should come from the client side. If clients can convince their main contractors and subcontractors to tender online, potential savings of up to 15% at every level in the supply chain can be achieved. Such indicators of savings should be persuasive enough for the clients in order to understand the role of E-tendering in the project's performance and choose online tendering instead of the traditional method.

4.3 INTERNAL BARRIERS FOR IMPLEMENTATION E-TENDERING BY SMEs

The construction industry has the lowest rate of investments in IT among other major industries. This is due to the inertial nature of the industry. The majority of organizations were found to be slow in adapting e-construction methods and principles overall, and E-tendering in particular. Many organizations still perceive the use of

E-tendering with caution and try to evaluate its practical advantages before implementation in order to get reinsured [14].

It is obvious, that huge companies often can afford to have the advanced infrastructure at its disposal that can help to provide the required training for such innovative systems. The availability of own IT departments can significantly facilitate the process of implementation and development of E-tendering within organisation. Without the above attributes, the process of adaptation of E-tendering in SME lags behind large construction companies and construction consultancies. Smaller companies usually do not have the required technology or systems in place that can allow them to share the information electronically. As a result, they are not able to take part in e-tendering [11]. The cost implications of the implementation of E-tendering can be significant for the small companies. For the majority of SME the initial capital investments for installation and set-up of the system can be very hard to cover from its own resources.

The contractors, overall, are more concerned over the issues of sharing the information. Usually large contractors have necessary technology and capabilities to accomplish tenders online, while the majority of subcontractors often do not possess the required IT infrastructure and systems in place that can allow them to deal with tendering data and information in electronic format. It always imposes the additional costs on the contractor. It includes the printing of any drawings or documents, as well as sending them to the subcontractor [11].

The industry overall should realise that investing in ICT is not just the buying of the hardware, but the promotion of the technologies between all the participants of the construction supply chain [4]. SMEs, in turn, should understand that investment in electronic technologies, such as E-tendering, is a long-term investment in the process of change itself, which can allow to stay competitive and not to lose out.

The technology issues should not be underestimated, as they may have significant impact on the operation of collaborative environment [12]. It is important that all the relevant parties have a clear understanding of the practices, procedures and potential pitfalls of the system, if E-tendering is desired to be fully implemented throughout the whole supply chain of the construction industry. Unfortunately, a considerable part of the companies still not have the adequate software and hardware capabilities, which results in continuing practice of issuing hard copy documents [16].

Sometimes different companies do not use identical software, which in turn can lead to the problems of compatibility of different systems. Interface and simplicity of the E-tendering systems play an important role in providing a system, which is easy to use and making work practices more accurate and efficient. On the other hand, the complexity and confusion of the system can only frighten off the potential users. The exchange of data between different systems and different departments of the organization must be integral and inseparable to provide smooth data integration [12].

People, which opposed the technological advancement, can be considered as the main barrier to the adoption of electronic procurement systems in the construction industry. They are resistant to introduce and adopt changes to their everyday activities and hence do not want to notice the potential benefits of advanced use of electronic technologies [12]. However, it is important that implementation of such innovative technologies as E-tendering has been agreed between all the members of organizations and has been conducted gradually. Radical changes of the process may destroy the current processes inside organization and paralyze the activities of the company. The implementation of new technologies will inevitably result in changes in the organizational life. Employees will be obliged to change the way they work in order to suit the technology. This process may lead to disorganization, low morale, the lack of motivation and fear of losing the job [12]. It is natural for the employees to feel the threat of losing their jobs, when new processes or new software are introduced in any organization. They need to be sure that the new methods of doing things are not worse, or even better, than the current methods. Such issues are especially relevant to the construction industry, which is well known for being slow to adapt to changes.

The possible impact, which E-tendering system may have on the personnel of small and medium companies in the construction industry, can raise a certain level of concern. The electronic exchange of tender documentation can allow the employees to use their full potential and skills on valuable and challenging tasks, instead of wasting time on the administration work. Implementation of electronic exchange of data in the organization teaches staff to use their skills and capabilities more effectively, rather than in clerical fashion. This in turn can provide the employees with the empowerment, which can increase the motivation and commitment of the staff and undoubtedly improve the overall service to the client. Satisfaction of the staff can result in the increased IT interest and improved attitude towards the process overall [12].

In addition, the particular attention should be given to the suitable training provisions in order to facilitate the successful implementation of E-tendering [14]. The issues related to education

and training of the potential users of E-tendering and the availability of technical assistance are likely to occur and it shouldn't surprise the management of the company. Education, training and support from the senior management play significant role and are among the most important requirements, which can allow E-tendering to save the strong positions in the construction industry in future [16]. The participants of the construction industry nowadays have no choice, but to move towards a complete range of new sets of skills and to rethink the current way in which the construction education is organized nowadays. Such an approach should allow the companies to understand the importance and potential benefits of adapting the new technologies into their organizational activities.

5 Conclusions

The concept of E-tendering, which is seen by many researchers and practitioners as more effective alternative to the traditional tendering procedure, can undoubtedly provide the participants of the industry with multiple benefits. It can allow companies to reduce the administrative overhead expenses, accelerate the tender process, and provide additional security to the process. However, the organizations should be fully prepared to adopt changes and link them with their long-term strategy prior to the implementation of E-tendering. In order to achieve the maximum benefits from E-tendering the organizations should have a clear understanding of how to accept, appreciate and implement the technological change and innovation within its structure and daily activities. Active support from the senior management, as well as the appropriate education and training opportunities, are an integral part of the process of implementation of E-tendering system, because they help to reduce the negative attitudes of the staff against the new technologies processes.

Unfortunately, it was identified, that not all the companies have the ability to implement the E-tendering and thereby to obtain all the potential benefits from this process. Small and medium contractors and especially subcontractors are lagging behind other participants of the industry in the implementation of E-tendering. It should be noted, that SMEs in the construction sector have not yet embraced the electronic technology to the extent, required by the current trends of the construction industry. Therefore, it can be stated that general concern refers not only to E-tendering, but to the advancement of electronic technologies overall. One of the main reasons for such deceleration is the inability to realize the potential benefits of E-tendering. Small companies usually tender for small projects and the amount of the projects they deal with is very minor. The illiteracy in IT was also seen as a significant barrier for the small companies.

However, to receive all the potential benefits from E-tendering, the whole supply chain, including the small and medium companies, should realize the importance of the given system. It is still very difficult to assess the capability of SMEs to use the E-tender system to their complete satisfaction, mainly due to the required initial investment, that can be very significant for small companies. On the other hand, for the majority of other participants it is a major step forward and it allows them to benefit from E-tendering system. The construction industry should undoubtedly strive to promote such innovative technologies that can improve the efficiency and the overall image of the industry.

References

[1] Anumba C, Ruikar K 2002 Electronic commerce in construction – trends and prospects *Journal of Automation in Construction* **11**(3) 265-75
[2] Betts M, et al. 2006 Towards Secure and Legal E-tendering *Journal of Information Technology in Construction* Special Issue e-commerce in construction **11** 89–102
[3] Buch K, Wetzel D 2001 Analysing and realigning organizational culture *Leadership & Organization Development Journal* **22**(1) 40-4
[4] Cleveland Jr A 1999 Knowledge Management: why it's not an information technology issue *Journal of Management Engineering* **15**(6) 28–9
[5] Deng S, et al. 2001 An application of the internet-based project management system *Journal of Automation in Construction* **10** 239–46
[6] Du R, et al. 2004 Defining security services for electronic tender *Proceedings of the second workshop on Australasian information security, Journal of Data Mining and Web Intelligence and Software Internationalization, Dunedin, New Zealand* **32** 43-52
[7] Eadie R 2007 Drivers and barriers to public sector e procurement within Northern Ireland's construction industry *Journal of Information Technology in Construction* **12** 103-20
[8] Eriksson P, Laan A 2007 Procurement effects on trust and control in client-contractor relationships *Journal of Engineering, Construction and Architectural Management* **14**(4) 387–99

[9] Hornle J 2000 The European Union Takes Initiative in the Field of E-Commerce', Commentary 2000(3) *The Journal of Information, Law and Technology (JILT)* **00**(3)
[10] Hughes W 2003 Cost of Tendering *Contract Journal* **03**(4) 321
[11] Lavelle D, Bardon A 2009 E-tendering in construction: time for a change? *Northumbria Working Paper Series: Interdisciplinary Studies in the Built and Virtual Environment* **2**(2) 104-12
[12] Lou E, Alshawi M 2009 Critical success factors for e-tendering implementation in construction collaborative environments: people and process issues *Journal of Information Technology in Construction* **14** 98-109
[13] Nitithamyong P, Skibniewski M 2007 Key success/failure factors and their impacts on system performance of web-based project management systems in construction *Journal of Information Technology in Construction* **12** 39–59
[14] Seah E 2008 Dos and don'ts for e-tendering - a quantity surveying perspective *Journal of Project Control Professional* **46**(5) 18
[15] Stewart R, Mohamed S 2002 Strategic Implementation of IT/IS Projects in Construction: A Case Study *Journal of Automation in Construction*
[16] Tindsley G, Stephenson P 2008 E-tendering process within construction: A UK perspective *Journal of Tsinghua Science & Technology* **13** 273-8
[17] Zakaria R, et al. 2014 Ethical Behaviors in E-Tendering Process For Construction Project In Malaysia *Journal of Theoretical and Applied Information Technology* **70**(1)