

The contribution of technology in complex procurement projects in South Africa

Tselane E. Chicks¹ and Makgopa F. Tshehla¹

¹Graduate School of Business Leadership, University of South Africa
tanatswa1@gmail.com; tshehlmf@unisa.ac.za

Abstract:

The purpose of this paper is to demonstrate the contribution of technology in the achievement of public procurement objectives. Exploratory, qualitative approach is used to probe E-procurement and E-tender practices in complex procurement. Major benefits and barriers associated with the adoption of E-procurement are discussed. In addition key success factors required for effective execution of E-procurement are also explored in relation to the research questions which this paper seeks to explore. Data is gathered through peer reviewed documents and analysed using the thematic data analysis method. The findings indicate a positive relationship between E-procurement and the public procurement objectives. The positive relationship is based on the benefits of cost savings, improved delays and quality that can be derived through the adoption of E-procurement. However, despite the potential benefits, South Africa, like in most of Africa, has not fully migrated to E-procurement. This is attributed to barriers associated with the adoption of E-procurement. These barriers are highlighted as key success factor and identified as financial, technology, security, legal, infrastructure capacity and political will. This paper is limited to complex procurement similar to that employed in public infrastructure and construction procurement. The study hopes to contribute to the body of knowledge by providing insight into the benefits and barriers associated with the adoption of E-Procurement technologies and how E-procurement can be used to support the execution of public procurement management in South Africa.

Keywords:

E-bidding, e-procurement, construction procurement, procurement objectives, public procurement technology

1 Introduction

The use of technology is an emerging force in today's competitive world with many businesses employing it to enhance procurement objectives across their supply chains (Bidhandi and Valmohammadi, 2016; Bienhaus and Haddud, 2018; Nganu and Mwangangi, 2019; de Campos Martins, Simon and de Campos, 2020). Declining budgets and economic situation have fuelled the need to focus on cost saving practices making procurement essential since it accounts for a huge portion of public funds. In South Africa, this significant spending includes the procurement involved in construction and engineering projects. Hence a need for a structured procurement management system is a necessity. It is on this background that most governments have had to pay more attention to procurement technologies such as E-procurement systems, to uncover strategic benefits that can offer multiple opportunities for

improved efficiencies and policy outcomes (Roman, 2013). E-procurement is thus viewed as an end-to end solution that can automate, integrate, and streamline various procurement-related tasks to achieve transparency, fairness, efficiency, competition, and cost effectiveness. At the centre of E-procurement is the E- tender or E-bidding process that has the capability to execute complex procurement projects and therefore also worth probing. It is also evident that to achieve procurement objectives of fairness, efficiency, and transparency, there is a need to understand the concept of value for money and the extent to which E-procurement systems support this concept in execution of procurement activities.

This paper therefore aims to examine the impact of E-procurement on procurement practices and objectives, with the intention of addressing the following research questions: What are the key factors influencing the use of E-Procurement technologies? How do these factors contribute to the attainment of procurement objectives? How does E-Procurement support the overall execution of procurement activities? The scope of this paper is limited to public procurement management. In addition, since the focus is on complex procurement, this paper is limited to complex procurement similar to that involved in the South African construction and infrastructure projects. The outcome of the study is useful in providing insights for effective adoption and implementation of E-procurement in the South African infrastructure related projects. The remaining part of this paper is divided into four sections. The first section is the review of literature, followed by the presentation of the research methods and the interpretation of result, respectively. The paper ends with conclusions and recommendation for future studies

2 Literature Review

2.2 Impact of e-procurement on efficiency and cost effectiveness

Public procurement practices centres around the principles of transparency, fairness, cost efficiency, competition and efficiency (South African Government, 1996). Along with other factors which include value for money, the South African government aims to achieve these procurement objectives through transitioning from a traditional paper-based procurement system to an electronic public procurement systems (Hashim, Said and Idris, 2013; Oladimeji and Olusegun, 2018; Bauer and Gobl, 2019; Klünder et al., 2019; Sánchez-Rodríguez, et al., 2019).

Several studies have emphasised the major factors influencing the success of the E-procurement as a viable electronic public procurement system with potential benefits. It is estimated that about 40-50% of costs in construction projects can be attributed to procurement, and that E-procurement can render cost savings of between 5 and 10 percent of those procurement costs with substantial improvements in innovation, quality, and speed. There is also a projected 3.9% decrease in procurement price (Onur, Kamil and Ta, 2012) making it imperative to optimise efficiency in procurement activities. E-procurement has emerged as solution to address most of the challenges related to cost saving, time saving and best quality, minimisation of malpractices in complex procurement management practices. It has been reported that the adoption of E-procurement in complex or strategic procurement is more likely to be successful in centralised procurement than decentralised procurement management systems. This is because a central procurement system offers an integrated and

real-time platform to track procurement spending, prevent maverick buying and reduce the burden of supervision thereby contributing to cost savings (Chen et al., 2021).

Perhaps it is on these basis that the decision was made by the National Treasury to adopt E-procurement systems as a means of reducing waste in public funds (Geone, 2016; Anthony, 2019). Since its introduction, the CSD has registered and centralised a total of 95 000 suppliers with an estimated cost saving of R350 million. These cost savings are achieved mainly through improved efficiency in eliminating duplication in the registration of suppliers (SCM Review update, 2016). The adoption of the centralised E-Tender Publication Portal on the other hand has enabled a national price-referencing system, which is aimed at improving the quality of spending in procurement processes. It is projected that the E-portal will save government R700 million a year through administrative costs. Whilst it may seem as that the centralised procurement system is favoured over the decentralised system, it is with noting that an effective adoption of E-procurement is possible in both centralised and decentralised systems. This was demonstrated in a study which was conducted on the effective adoption strategies of electronic technology systems within the construction industry (Chan and Owusu, 2022). The findings revealed that the effective adoption of E-procurement in the execution of complex procurement activities has very little to do with the centralisation or decentralisation of the business model but rather the complexity and management of projects in terms of size, contractual arrangements and other processes related to procurement.

2.3 Impact of e-procurement on transparency and fair competition

At the heart of E-procurement is the E-tendering process that has the capability to provide opportunities for additional benefits of transparency, competitiveness and consequently effective private sector participation (PSP) (Dzuke et al., 2015; Ibem and Laryea, 2016). PSP in this case is enhanced through the reduction of single source procurement enforced by the open competitive procurement process (Ibem et al., 2016; Shehu et al., 2020; South African National Treasury, 2022). Similar to the traditional tender process, the E-tender process includes the activities such as the invitation of tenders, exchanging of project briefs and specifications; submission of tenders and sourcing of product and services. But in the E-tender process these activities are automated.

Whilst it has been reported that not all procurement activities can or should be electronically executed, the activities conducted electronically have been proven to add significant value to the entire supply chain process and related projects (Chan and Owusu, 2022). For instance, the supplier selection phase in the E-tender tendering stage is perceived as the most essential phase in the lifespan of a construction project (Sayed et al., 2019; Taherdoost and Brard, 2019; Kaneriyia and Patel, 2020). Possibly based on its capability to support the execution of more strategic work such as addressing the challenges related supplier competency and the development of critical supplier partnerships. The E- tender submission phase on the other hand has shown the ability to speed up procurement cycle times and eliminates traditional constraints of geographical location (Al-Yahya and Panuwatwanich, 2018; Wimalasena and Gunatilake, 2018). Yet, in South Africa, most bid documents still require that the submission of tenders should be paper-based even though when conducted manually, this phase can be time consuming and error prone (Sirengo and Ndolo, 2019). This can be inconsistent with the

pillars of efficiency, transparency and competitiveness specified in Section 217 (1) of the South African constitution (South African Government, 1996).

2.4 Key success factors in the adoption of e-procurement

Most parts of Africa have also not embraced E-procurement fully (Pitso, Kabanda and Kapepo, 2018; Bauer and Gobl, 2019; Munengami, 2019; Abdullahi et al., 2020). This is allegedly due to the barriers encountered in the implementation of E-procurement, often associated with financial constraints, poor infrastructure, legal challenges and lack of political will (Hashim, Said and Idris, 2013; Alvarez-Rodríguez et al., 2014; Inzofu, 2016; Geone, 2016; Rukuni, Maziriri and Mulaudzi, 2020). It is worth noting that these challenges have not only been the concerns of governments and public organisations but also of private organisations. For instance, in the private sector, a study was conducted to understand the reasons behind the slow implementation of E-procurement in the South African construction industry (Ayegba et al., 2018). Findings that were gathered from the analysis of structured interviews attribute the challenges to the lack of access to the internet, security and legal challenges.

Another study was conducted to assess the potential of E-procurement in the public sector of Zimbabwean state owned enterprises (SOEs). Results from 50 respondents also identified ‘inadequate legal framework’, “inadequate technological infrastructure” and “security of procurement” as challenges in the adoption of the E-Procurement (Dlakenseni, Kanyepe and Tukuta, 2018). Participants’ in another study that assessed selected performance characteristics of E-Tendering systems correlates with the fact that lack of security is a barrier in the implementation of E-tendering (Shehu et al., 2020). Another study conducted to assess the determinants of successful implementation of E-procurement in Public institutions in Kenya indicates technology along with government support as additional barriers in the implementation and execution of E-procurement (Chebii, 2016). Tsuma, Imbanga and Kanda, (2017) demonstrates how larger organisations are more likely to successfully embrace procurement technologies innovation and adoption over smaller organisations. In their findings, technology infrastructure and financial constraints are stressed as other barriers. Lastly, Hashim, Said and Idris, (2013) classified benefits into tangible, semi tangible and intangible categories. The study identified other intangible benefits of E-procurement as improved product quality, better decision-making capabilities, and access to markets.

Based on the literature reviewed, it is evident that literature regarding the impact of E-procurement on attainment of procurement objectives is centred on few critical factors. These include the benefits, barriers and key factors associated with the effective adoption of E-procurement. With regards to the benefits, E-procurement has emerged as solution to address most of the challenges related to increased costs, delays, and quality. In this light, E-procurement systems are seen as an appropriate means of reducing wastage of public funds.

Literature reveals that even though many studies have demonstrated the benefits of E-procurement, these benefits can be eroded by barriers such as lengthy activities associated with the traditional manual bidding process (Ibem et al., 2016; Kramer, 2016). Moreover, the researcher could not find a legislative that enforces electronic submission of tenders. The lack of such legislation can be perceived as lack of support from the government and can result in

ineffective controls that discourage competition and increase the risks associated with the mismanagement of public funds (Marian, 2020).

3 Research Methodology

An exploratory qualitative research approach was selected to enable the researcher to explore the concept of E-procurement in the South African context. Prior to the commencement of the research study, it was necessary for researchers to familiarise themselves with the topic to be explored. This preliminary literature review stage (PLR) assisted researchers to critically identify the research gaps and to ask the appropriate research questions. The PLR should not be confused with the main literature review (MLR) phase, which followed the PLR and guided the study's methodology structure, including the research paradigm, research design, data collection and analysis. With regards to the research paradigm, the literature review revealed various relationships between the principles that govern the public procurement, applicable legislation, and E-procurement. Due to these multi-faceted elements, the study adopted an interpretivist research philosophy to enable the exploration of the possible multiple perceptions. From the exploratory perspective, this approach allowed for in-depth probing since studies in this area are limited.

During the data collection phase, data was collected through appropriate documents from approved journal articles such as Elsevier, Sabinet African journals, Science Direct, Scielo, Sage, Research gate. The data collected was analysed using thematic analysis (Bartlett and Vavrus, 2017). The use of thematic content analysis in this case complemented the document analysis and enabled the use of both the inductive and deductive reasoning (Vaismoradi and Snelgrove, 2019). Thematic analysis also allowed data comparison from the literature review which resulted in the establishment of themes upon which the discussions and findings were based. These themes along with the relevant sources are outlined in Figure 1.

The validity of the study was achieved through ensuring dependability. This is achieved through adopting a logical and detailed process which can be documented and followed easily (Nowell et al., 2017, Friese, Soratto and Pires, 2018). Furthermore, the possible bias that can arise from use of a single data collection method was mitigated through a balanced selection of qualitative and quantitative studies.

4 Findings and Discussion

There is consensus in the findings that E-Procurement in construction related procurement has the capability to achieve efficiency and cost effectiveness through benefits such as cost savings, lead time reduction and improved quality (Hashim, Said and Idris, 2013; Laryea et al., 2015; Chan and Owusu, 2022). The procurement system in public procurement is also found to be more effective than the traditional paper-based tender process in achieving value for money, since it supports the control of excessive spending and budgetary control. This is demonstrated in the significant savings achieved by the e-Tender Portal and CSD through strategic spend analysis. The centralisation of procurement processes and practices such as the e-Tender Portal and CSD have again demonstrated potential to enhance transparency, in the strategic activities of the procurement process such as the selection and contracting of competent and dependable suppliers. This relates to the untapped strategic benefits that can

offer multiple opportunities for improved efficiencies and policy outcomes (Roman, 2013). In all this, competition can still be maintained to ensure lower prices and fair competition between public and private sector businesses. Therefore, E-procurement not only has the capability to achieve efficiency and cost-effectiveness but also transparency and competitiveness as required by section 217 of the Constitution. Fairness is also addressed by E-tender process which enables ensuring equal access to bids and to contract opportunities.

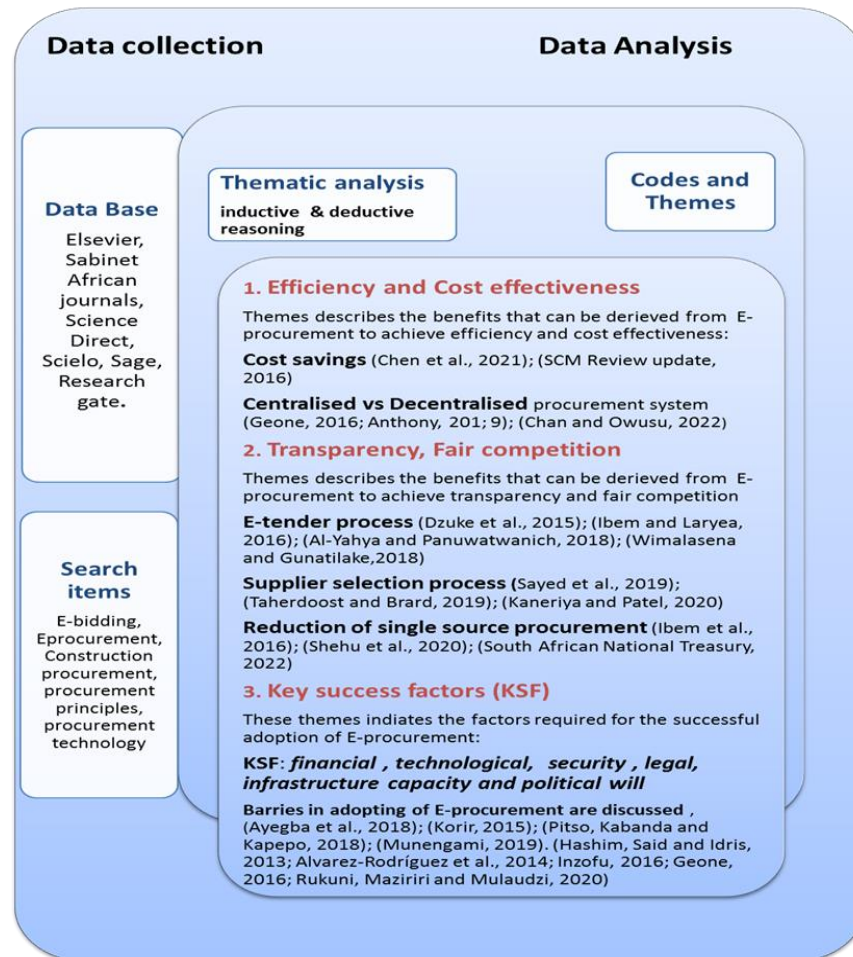


Figure 1: Data collection and analysis framework

Despite the benefits of E-procurement systems to support the execution of procurement activities, literature indicates a limited use of such technological systems (Korir, 2015; Pitso, Kabanda and Kapepo, 2018; Bauer and Gobl, 2019. In the South African context, this challenge is attributed to the unavailability of the infrastructure, poor technology and legal issues. This finding appears to be in support of literature that perceives technology and its infrastructure as key in the implementation of E-procurement (Chebii, 2016; Geone, 2016). Unreliable infrastructure seems to have the worst impact on small scale businesses, placing an obligation on the government to establish electronic centres for SMMEs to enable them to also benefit from E- procurement (Rukuni, Maziriri and Mulaudzi, 2020). Other findings indicates legal challenges amongst key factors in the successful adoption of E- procurement (Laryea et

al., 2015; Anthony, 2019). Whilst the draft procurement bill in South Africa encourage the use of technology in procurement practices as far as possible, this bill is not yet legally binding (SA National Treasury, 2009). Furthermore, a legislation that enforces full adoption of E-procurement was also not found.

We can therefore make inferences that whilst there are good intentions for the legal regulation of E-procurement in South Africa, it remains vital that a legally binding legislation must be enacted to drive E-procurement to avoid possible gaps for legal dispute. Regulating E-procurement through legislation will go a long way in also ensuring that trust amongst contractors and partners involved in the procurement process. To a certain extent this will address the security concerns articulated by Ayegba et al., (2018) with regards to the hesitation by contractors in construction industry to submit tenders electronically in protection of supplier information. The inadequate adoption of technology use in the procurement process is attributed to the investments associated with the implementation and maintenance of the procurement technology and infrastructure. In this regard, government support becomes vital in making provision for funding the implementation of innovative procurement practices. Although investments are often characterised as being extremely hard to evaluate due to struggle in quantifying the relevant costs, benefits and the high degree of uncertainty of the expected technology value (Hashim, Said and Idris, 2013). It should be acknowledged the investment will, in the future outweigh the challenges associated with the significant investments required for the implementation of E-procurement.

5 Conclusion and Further Research

The purpose of this paper is to demonstrate the contribution of technology in the achievement of public procurement objectives. The study established that the success of complex procurement can benefit significantly from the effective adoption and implementation of procurement technologies such as E-procurement. Yet, despite this knowledge, some of the procurement processes remain manually driven. Government's critical role in influencing the adoption of E-procurement through financial injection, infrastructure development and legal and regulatory infrastructure is required. This paper focused on the systematic literature review of the adoption of the various electronic systems and the key factors for executing E-procurement. Given this fact, future studies can examine the adoption and implementation of E-procurement using quantitative methods in case-specific or different context or industry.

6 References

- Al-Yahya, M. and Panuwatwanich, K. (2018) 'Implementing e-tendering to improve the efficiency of public construction contract in Saudi Arabia', *International Journal of Procurement Management*, 11(3), pp. 267–294.
- Anthony, A. (2019) 'The Use of E-procurement in South African Public Procurement Law: Challenges and Prospects', *Law, Democracy & Development*, 22(1), pp. 39–47.
- Ayegba, C. et al. (2018) 'E-Procurement Implementation in the South African Construction Industry', in *2018 SACQSP 10th International Research Conference*, pp. 224–231.
- Bartlett, L. and Vavrus, F. (2017) 'Comparative Case Studies: An Innovative Approach', *Nordic Journal of Comparative and International Education (NJCIE)*, 1(1).
- Bauer, F. and Gobl, M. (2019) 'The influence of digitalisation on procurement efficiency',

- Journal of applied leadership and management*, 7(2194–9522), pp. 50–65.
- Bidhandi, R. and Valmohammadi, C. (2016) ‘Effects of supply chain agility on profitability’, *Business process management journal*.
- Bienhaus, F. and Haddud, A. (2018) ‘Procurement 4.0: factors influencing the digitisation of procurement and supply chains’, *Business Process Management Journal*, 24(4), pp. 965–984.
- De Campos Martins, F., Simon, A. T. and de Campos, R. S. (2020) ‘Supply Chain 4.0 challenges’, *Gestao e Producao*, 27(3), pp. 1–22.
- Chan, A. and Owusu, E. K. (2022) *Evolution of Electronic Procurement: Contemporary Review of Adoption and Implementation Strategies*.
- Chebii, L. D. (2016) ‘Determinants of Successful Implementation of E-Procurement in Public Institutions in Kenya’, *International Journal of Economics, Commerce and Management*, 4(4), pp. 1125–1136.
- Chen, Y. *et al.* (2021) ‘E-procurement system adoption in local governments: the role of procurement complexity and organisational structure’, *Public Management Review*.
- Dlakuseni, S., Kanyepe, J. and Tukuta, M. (2018) ‘Working towards a framework for enhancing public E-procurement for Zimbabwe State Owned Enterprises (SOEs)’, *International Journal of Supply Chain Management*, 7(6), pp. 339–348.
- Geone, K. (2016) ‘Electronic Public Procurement As A Tool Of Reform In South African’, *African Public Procurement Law Journal*, 3(1), pp. 1–42.
- Hashim, N., Said, I. and Idris, N. H. (2013) ‘Exploring e-Procurement Value for Construction Companies in Malaysia’, *Procedia Technology*. Elsevier B.V., 9, pp. 836–845.
- Ibem, E. O. *et al.* (2016) ‘Factors influencing e-Procurement adoption in the Nigerian building industry’, *construction economics and building*, 16(4), pp. 54–67.
- Inzofu, K. (2016) *Challenges to implementation of electronic procurement in the construction sector*.
- Kramer, G. (2016) ‘Electronic public procurement as atool of reform in South African public procurement’, *African public procurement law journal*, 3(1).
- Laryea, S. *et al.* (2015) ‘Electronic procurement in the South African construction sector: case study of government departments in the Gauteng Province’, in *Proceedings of the DII-2014 Conference on Infrastructure Investments in Africa*.
- Marian, A.-I. I. (2020) ‘Towards Efficient Public Procurement in Romania: A Practical Risk Management Approach’, *International Journal for Research in Applied Science and Engineering Technology*, 8(7), pp. 774–782.
- Munengami, E. (2019) *The Factors that affect the adoption of electronic procurement (e-procurement) in three government ministries*.
- Nganu, D. and Mwangangi, P. (2019) ‘Influence of procurement practices on performance of state corporations in Kenya’, *International journal of supply chain and logistics*, 3(1), pp. 79–100.
- Nowell, L. S. *et al.* (2017) ‘Thematic Analysis: Striving to Meet the Trustworthiness Criteria’, *International Journal of Qualitative Methods*, 16, pp. 1–13.
- Roman, A. V. (2013) ‘Public policy and financial management through eprocurement: A practice oriented normative model for maximizing transformative impacts’, *Journal of Public Procurement*, 13(3), pp. 337–363.
- Rukuni, T. F., Maziriri, E. T. and Mulaudzi, H. (2020) ‘Assessing electronic procurement at a state-owned enterprise in South Africa’, *Journal of Contemporary Management*, 17(2),

- pp. 393–415.
- SA National Treasury (2009) *Republic of South Africa, Local Government and Metropolitan Regions in Federal Countries*.
- Sayed, A. M. Z. *et al.* (2019) ‘Drivers of e-bidding implementation in the Saudi Arabian construction industry’, *Built Environment Project and Asset Management*, 10(1), pp. 16–27.
- SCM Review update (2016) *SCM Review Update - 2016*.
- Shehu, Y. U. *et al.* (2020) ‘A Case Study on Performance Features of Electronic Tendering Systems’, in *30th International Conference on Flexible Automation and Intelligent Manufacturing (FAIM2021)*. Elsevier B.V., pp. 1586–1591.
- Sirengo, N. and Ndolo, J. (2019) ‘Influence of electronic procurement on operational performance of county government of Kakamega’, *The strategic Journal of business and change management*, 6(2), pp. 1788–1806.
- South African Government (1996) *The Constitution of the Republic of South Africa, Government Gazette*. Available at: <https://www.justice.gov.za/legislation/constitution/SAConstitution-web-eng.pdf>.
- Tsuma, Imbanga, V. and Kanda, M. (2017) ‘Factors Affecting the Adoption of e-Procurement Systems among International Non-Governmental Organisations in Kenya’, *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 7(2), pp. 164–176.
- Vaismoradi, M. and Snelgrove, S. (2019) ‘Theme in qualitative content analysis and thematic analysis’, *Forum Qualitative Sozialforschung*, 20(3).