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Ojo-Fafore, Elizabeth; Laryea, Samuel

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2024-07

University of the Witwatersrand, Johannesburg

https://hdl.handle.net/10539/41380

Ojo-Fafore and Laryea. (2024). Barriers to digitalization of procurement – a review In: Laryea, S. et al. (Eds) Proceedings of the WABER SuDBE Conference, 30 to 31 July 2024, Johannesburg, South Africa 989-998

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PROCEEDINGS OF THE WABER SuDBE CONFERENCE 2024

30 – 31 July 2024
University of the Witwatersrand
Johannesburg, South Africa

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ISBN: 978-0-7961-6032-4



In collaboration with:

Proceedings of the WABER SuDBE 2024 Conference

30th – 31st July 2024

University of the Witwatersrand, Johannesburg, South Africa

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ISBN: 978-0-7961-6032-4 (e-book)

The ISBN for this publication was provided by the National Library of South Africa. Legal deposits of the publication have been supplied to the National Library of South Africa, Library of Parliament, and other places of Legal Deposit.

First published in July 2024

Published by:
WABER SuDBE Conference 2024
C/o Professor Samuel Laryea, Conference chair
School of Construction Economics and Management
University of the Witwatersrand, Johannesburg, South Africa
Email: info@wabersudbeconference.com / samuel.laryea@wits.ac.za
Website: www.wabersudbeconference.com

Editors

Prof Samuel Laryea, University of the Witwatersrand, South Africa
Prof Baizhan Li, Chongqing University, China
A/Prof Emmanuel Adu Essah, University of Reading, United Kingdom
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Declaration

All papers in this publication have been through a review process involving a review of abstracts, peer review of full papers by at least two referees, reporting of comments to authors, revision of papers by authors and re-evaluation of the revised papers to ensure quality of content.

WABER SuDBE Conference 2024
30 - 31 July 2024
Johannesburg, South Africa
ISBN: 978-0-7961-6032-4

BARRIERS TO DIGITALIZATION OF PROCUREMENT – A REVIEW

Elizabeth Ojo-Fafore[1] and Samuel Laryea[2]
[1, 2] *School of Construction Economics and Management, University of the Witwatersrand, South Africa*

The concept of digital technology is making waves in the construction industry in developed countries; however, it is not the same story in other nations as there are several barriers militating the progress of adoption of the new concept. This study aims to investigate the barriers militating digitalization of procurement in Construction, to proffer solutions. This study investigated possible barriers affecting the implementation of digitalization of procurement using a descriptive literature review. Several past works were reviewed to fill the gaps and apply new methods that will enable the digitalization of procurement. The study discovered several barriers restraining the digitalization of Procurement, but there are three common barriers to the literature reviewed; insecurity, cost, and Lack of skilled expertise. This industry will bring overall improvements in project time, quality, cost, and safety standards as well as client requirements and satisfaction. This research paper is of the view that digitalization will increase productivity and the competitive advantage in the Construction industry. In conclusion, there is a need to prioritize investment in digital tools and technology to have ease of adoption of procurement digitalization.

Keywords: construction industry, digitalization, procurement, South Africa

INTRODUCTION

There is no doubt that we are in the era of digital and all industries of the economy need to be compliant to stay relevant and be sustainable and competitive. Digitalization is rapidly spreading to all aspects of the economy and in terms of the level of digitization among industries, construction industries are far behind (Schnell et al., 2023).

This revolution resulted in innovative technologies like artificial intelligence, more advanced robotics, wearable, and digital fabrication as known as additive manufacturing such as 3D printing, smart devices such as processors and other smart hardware to collect, send, and analyze data, virtual and augmented reality, changing the process of production and prototypes of businesses across different industries. Transformation; intelligent sensors, automatons, robotics, the internet, and the like (Adekunle et al., 2021). In developed countries, the notion of digital technology is spreading within the industry; however, it is opposite in the developing countries as there are several barriers affecting the progress of adoption of the new concept (Aighimien et al., 2019). While other industries such as those in the field of banking, manufacturing, and retail have started adopting technological innovation, it is slow within the construction industries impacting their comparative advantage compared to other industries (Castagina et al., 2016, Osunsanmi et al., 2018). Construction is known to be sluggish in

[1] Elizabeth.ojo-fafore@wits.ac.za
[2] Samuel-Laryea@wits.ac.za

adopting technology (Aliyu and Oke 2023). Previous studies by scholars reveal that there are chances for the construction industry to be transformed and become more productive through digital environments (Windapo, 2021), Oke and Arowoiya, 2022 noted several barriers to adopting digital technology. Ifije and Aigbavboa, 2020 research also supported this assertion. There is a need to digitalize companies in developing countries.

There are several studies on electronic procurement, but few on the Digitalization of procurement. Digitalization goes beyond e-procurement. Digitalization occurs when digital tools are actively used throughout the entire procurement. This paper will investigate the factors affecting the digitalization of procurement in the construction. The specific objectives below guided the research.

(i) To outline the barriers restraining the adoption of digitalization of procurement - Construction Industry.
(ii) To state the benefits as it offers solutions to these barriers

RESEARCH METHOD

This study examines the barriers impacting the digitalization of procurement in the construction industry. A qualitative approach was utilized using a literature review. This study adopted a descriptive review, which is to examine the opinion of the research topic as it discloses any comprehensible pattern on trend concerning pre-existing recommendations (King and He, 2005, Pare et al., 2015). Recent publications also provide a better discourse on the research topic, to check its relevancy to pinpoint future research needs (Graulich et al., 2021). Engine Scopus and ResearchGate were used to gather relevant research articles, as they are credible search tools. At first, was getting more e-procurement which dates way back to 2015. Finally, digitalization from 2020, emerged after the Covid-19 pandemic. The barriers analysed in this paper range from the year 2020 till date. A descriptive review thinks that the findings represent the state of the art in the area of study (King and He 2005)

Article Selection (Data Sources)
Engine Scopus and ResearchGate were used to gather relevant research articles, as they are credible search tools. Earlier searches were getting more of e-procurement which dates way back to 2015. Finally got digitalization in 2020, which emerged after the COVID-19 pandemic. Researchers like Hallinger and Kovacevic (2019); and Mongeon and Paul-Hus (2016), Empirical research indicate that Scopus provides a broader range of sources compared to the Web of Science, particularly in fields beyond medicine and the physical sciences. The analysis comprises various document formats. The lack of a specified start date for the search allows the engine to retrieve the oldest literature publications. Relevant terms and combinations of terms were used in the search. Only Twenty-Four (24) papers are not relevant to the scope of the study. An advanced investigation was performed on ResearchGate in the study and a total of eleven (11) papers on Barriers to the Digitalization of procurement in the Construction Industry were identified. Other papers on mainstream Procurement were reviewed to get a view of Digitalization in Procurement and its barriers. A total of forty-three (43) studies from Scopus and Research Gate were reviewed for this paper.

Data analysis
According to Allen and Reser (1990), subject investigation has been used prolifically in a range of research applications in information and library science (ILS). The subject investigation was undertaken to review the selected papers to identify the general view of procurement,

Procurement in the Construction Industry, Digitalization of Procurement, and Barriers affecting the Digitalization of Procurement in the Construction Industry.

Procurement

Procurement is defined in so many ways depending on the authors' perspective. According to Schwalbe, 2013, Procurement is a procedure of acquiring goods and services from outside the organization. It is an institutional structure approved by the client for the application and occasionally subsequent operation of a project (Odhigu et al., 2012). It is a requisite through which the clients generate the requirement for the achievement of project-specific objectives (Rooke et al., 2023). Organizations involved in procurement in the industry are constantly looking for ways of improvement (Ibem and Laryea, 2015).

In Construction Procurement is the client's effort to purchase construction products and services (Charvat, 2000). Procurement is the procedure of finding, picking, and confirmation of the contributions required for the execution stages of the project (Building, 2011). The procurement method means the various awarding of risk and responsibility to attain the project's goals. To choose the appropriate method for the project procurement process, it should consider the characteristics of the project, and the project and client requirements.

Procurement strategy involves three major key factors which can be seen in Figure 1 and are major determinants of a successful project (Construction Excellence, 2015)

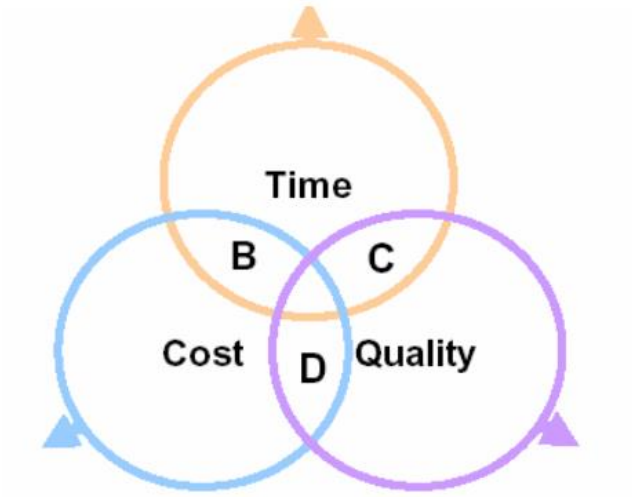


Figure 1: Procurement Strategy (Source: constructingexcellence.org.uk, 2015)

Digitalization and procurement

The construction industry has a role in the socio-economic development of a country and is thus regarded as an agent of growth (Gounden, 2000). Procurement is used to advance efficiencies within the construction industry or to advance socio-economic objectives (Watermeyer and Band, 1994). Utilizing procurement policy, the government aims to improve efficiencies and promote specific socio-economic objectives in the construction sector, with a focus on developing countries (Aziz and Ofori (1996), Abeysekera and Dezylva, (1997).In the Public sector, procurement has been utilized to improve economic activities (Govender and Watermeyer 2001). Digital Technologies are demonstrated to give a competitive edge concerning productivity, communication, and efficiency from the sectors that have endorsed the concept

RESULTS

Benefits of procurement digitalization

- Digital Procurement plays is vital to the construction
- Improves productivity and sustainability (Barbini, et al., 2020)
- Enhances the quality and operation performance (Alaloul et al., 2020).
- Efficiencies of tasks, simplify decision making and assist strategic activities (Bienhaus and Haddud 2018).
- Process efficiency and effectiveness, Competitiveness, and cost reduction (Motaung and Sifolo 2023)

Barriers to Digitalization of Procurement - Construction Industry

Twelve (12) papers were reviewed, and the findings are enumerated in Table 1 below.

Table 1: Barriers affecting digitalization of procurement

S/N	Barriers	Study area	Ref
1	(i)Lack of confidence (ii) absence of belief (iii) inadequate data resources (iv) Expensive and intricate nature (v) Non-standardized data (vi) poor grasp of blockchain technology (vii)low support from high-level management (viii) low awareness of related legal issues	Blockchain Technology Adoption in Construction	(Otasowie et al., 2023)
2	Talent incapability, Insecurity, Immature Processes, Cost, and Resistance to change.	Benefits & Barriers of Digital Procurement: Lessons from an Airport Company.	(Motaung and Sifolo, 2023)
3	(i) Insufficient Management policy and commitment (ii) Inadequate teamwork (iii) Lack of legislation (iv) Absence of incentives (v) Insufficient training (vi) Inadequate enforcement.	Barriers to achieving sustainable construction Project procurement in the private sector	(Ershadi et al., 2021)
4	(i)Data (ii) Lack of Core Technology (iii) inadequate Digital Infrastructure Allocation (iv) shortage of Technical Personnel (v) Shortage of Technical Standards."	Digital Transformation in the Chinese Construction	(Zhang *et al.*, 2023)
5	(i) Market-based risk (ii) High cost of maintaining sustainability (iii) Usage in the underground economy	Investigating barriers to blockchain adoption in Construction supply chain management:	Singh et al., 2023
6	(i)organizational management (ii) technical (iii) regulatory (iv) economic barriers	Barriers to the adoption of digital technologies for sustainable construction	Oke et al., 2023
7	(i)Status Quo Industry standards (ii) Lack of client interest (iii) Lack of financial needs and drive for using DTs	Regression analysis of barriers to digital in the construction industry.	Chen et al. (2023)
8	(i) Lack of data & Information sharing (ii) lack of regulatory compliance (iii) lack of data ownership	Smart Technologies in the Construction Industry:	Hwang et al. (2022)
9	(i)Lack of Acceptance (ii) Lack of Control (iii) Competence barriers	Implementation of Digital Technologies in Construction	Schnell et al. (2022)

10	(i)technological immaturity (ii)infrastructure decisions (iii)lack of professional expertise (iv) lack of cultural adaptation (v) stakeholder compliance	Realizing the need for the digital transformation of stakeholders' management	Prebanic and Vukomanovic (2021)
11	(i)Resistance by the consultant team (ii) lack of training and skills required (iii) costs involved when adopting innovative technologies on projects (iv) current legislation (v) clients' lack of knowledge.	The construction industry transformation and the digital divide	Windapo (2021)
12	(i) Budget (ii) Fear of innovation (iii) Fear of unknown (iv) Security issues (v) System Development.	Top 5 Barriers to Procurement Digitalization & How to overcome them	Anne (2020)

DISCUSSION

Benefits of procurement digitalization

The benefits are the advantages of digitalizing Procurement. According to the Igros et al. (2022) study, digital procurement is essential to the construction industry since it synchronizes the building schedule with inventories.

According to Barbini et al. 2020, computerized evaluations at the procurement stage utilizing BIM demonstrated an increase in productivity and sustainability. Hallikas, Immonen, and Brax (2021) found that digital procurement skills improve supply chain performance. It emphasizes the need to acquire data through a digitalized process and how data utilization improves an organization's operational effectiveness.

The system integrator may quickly detect project characteristics, and project implementers can see and use the frequency findings (Choi et al., 2021). Building information management, cloud-based computing, and augmented and virtual reality technologies are being used to modernize and affect the building industry's stability (Alaloul et al., 2020). Bienhaus and Haddud's (2018) conclusions on the benefits of digitalizing procurement processes include the following: (1) Improved efficiency in everyday administrative operations; (2) Simplified the complex decision-making process; and (3) Assisting in shifting procurement's focus to strategic activities. Motaung and Sifolo's (2023)

Barriers to digitalization of procurement

The barriers to the digitalization of procurement refer to factors that affect the easy implementation of digital technology use in the goods and services of construction processes. Past literature on the barriers to digitalization will be reviewed in this section.

Motaung and Sifolo (2023), found the following barriers in their study; Benefits and barriers of Digital Procurement: Lessons from an airport Company (i) Lack of Talent Capabilities (ii) insecurity (iii) Immature Processes (iv) Cost (VI) Resistance to change.

Ershadi et al. (2021) study on barriers to attaining sustainable construction project procurement in the private sector found the following as a barrier to sustainable procurement in the construction Industry. (i) Insufficient Management policy and commitment (ii) Inadequate teamwork (iii) Lack of legislation (iv) Absence of incentives (v) Insufficient training (vi) Inadequate enforcement.

Dineo et al. (2023), study provided important perceptions into factors that influence e-procurement preparedness in South African government departments. Technology, legal

framework, organization's finance, procurement structure, leadership, and procurement policy are some of these factors.

Anne (2020), a business strategist stated that there are five major barriers affecting the digitalization of procurement. The barriers are (i) Budget (ii) Fear of innovation (iii) Fear of the unknown (iv) Security issues (v) System Development.

Windapo (2021), analysis of the transformation and digital divide in the construction industry argued that obstacles to using innovative technologies in construction such as hostility by the consultant team, the necessary training and skills, the cost implications when adopting innovative technologies on projects, current legislation and lack of knowledge by clients.

Zhang (2023), in his study, discovered that barriers are impactin the digitalization of procurement in the Chinese construction industry

Singh et al. (2022), found Barriers to include contractor hesitancy, inefficiency, delays, and budget overruns, hindering the sector's adoption of modern tools for improved performance.

Prebanic and Vukomanovic (2021), study shows that barriers to digitalizing procurement in construction include technological maturity, infrastructure decisions, professional expertise, cultural adaptation, and stakeholder compliance, as highlighted in the paper.

Schnell et al. (2022), found barriers such as Acceptance, Control, and Competence hinder the digitalization of procurement in the construction industry, as identified in the paper's holistic digital-technology-implementation process.

Chen et al. (2023), identified barriers for construction organizations to adopt digital technologies as demonstrated relationships between organizational characteristics and the perceived DTs adoption barriers by using an explanatory sequential design by combining the advantages of quantitative and qualitative data.

The results of the literature review show some common barriers highlighted in the studies. The three major common barriers are Security, Cost, and Lack of Technology Expert

Insecurity: Data security and privacy hinder the use of Digital technology (Goyal et al., 2019). Also, some policies restrict workers from being tagged to track location and movements (Edirisingle, 2019). The study of Handan Kunkacu et al. (2023), relates their concerns on the security of confidential data in smart contacts.

Cost: This is the most significant impediment to the adoption of innovative construction safety solutions. The initial investment, operational costs, and maintenance costs all have an impact on the economic and financial risks that an organization faces. (Bademosi and Issa, 2021).

Lack of Technology experts: According to Pradhanga et al. (2021), the shortage of professionals is a major technical obstacle that is preventing their widespread application in buildings. Nnaji et al. (2020) define new technology as requiring features, support, training, durability, technology, efficacy, reliability, and versatility.

CONCLUSION AND RECOMMENDATION

The paper looked at what Digital Technology is all about to the concept of Procurement and was narrowed down to Procurement as South Africa's construction industry is moving towards digitalization

This paper revealed that there are few works on the Digitalization of Procurement in this industry as evident in a Scopus search for papers specifically on Digital Procurement. From the literature, it was evident that Digitalization of Procurement has a great impact on the South African Construction industry. Digitalization will maximize a competitive advantage which will increase effectiveness and reduce construction costs. It will improve the operational performance of an organization.

Despite the inherent benefits of digital procurement, various limitations prevented the technology from being widely implemented in the South African construction industry. Three major common factors were ascertained to be Security, cost, and lack of technology experts. To combat these barriers, the Issue of Security is of great concern to any industry. The implementation of overhaul security protocols and ensuring compliance with industry standards and regulations are the foundations of protecting data.

The industry needs to prioritize investment in digital tools and technologies that will have a great impact on their operations and deliver the most value. Also, there is a need to provide training and education programs to develop the necessary digital skills.

This study is limited as there is not much empirical study done in assessing the digitalization of Procurement, specifically for the study area. With this gap, it will be recommended to have a further empirical investigation of the benefits and barriers to the digitalization of Procurement. This study is a preamble for the main investigation of the adoption of Digital procurement and its impact on the Industry. Also, to synchronize the words e-procurement and Digital Procurement, as was revealed during the data sourcing for this paper. Most papers before 2020 were e-procurement, while the advent of the COVID-19 pandemic brought about Digital procurement.

ACKNOWLEDGMENT

This research is supported by the WITS CIDB Centre of Excellence

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