Assessing the Relevance of Existing E-Procurement Models and Critical Attributes: A Systematic Literature Review

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Abstract

This systematic review evaluates existing e-procurement models, focusing on identifying the critical attributes that contribute to their effectiveness. As digital solutions increasingly shape procurement processes, understanding these models and their key attributes is essential for enhancing operational efficiency and aligning with organizational goals. The review follows PRISMA guidelines and synthesizes studies published between 2012 and 2022. A thorough search across multiple electronic databases was conducted, focusing on e-procurement models and their critical attributes. The study employs a variety of research designs to ensure a comprehensive analysis, identifying key models and critical attributes such as system integration, user-friendliness, and security features that influence their success. The findings reveal substantial variation in the suitability of different models based on organizational size, industry, and specific procurement needs. This paper uniquely consolidates e-procurement literature by emphasizing model relevance and critical attributes. It provides a structured framework for organizations to evaluate and select e-procurement solutions that best fit their needs, enriching theoretical discussions by linking model selection and critical attributes to procurement effectiveness. The review offers a deeper understanding of how procurement technologies align with business objectives. For practitioners, the review serves as a practical guide for optimizing e-procurement practices by informed model selection and prioritization of key system attributes tailored to specific organizational contexts. By improving procurement processes, the findings contribute to broader economic benefits, such as cost savings and enhanced supply chain management, which are vital for sustainable business practices.

Keywords: *E-Procurement Models, System Integration, User-Friendliness, Security, Digital Procurement, PRISMA*

INTRODUCTION

In an era of rapid technological evolution, the transition towards digital procurement systems is becoming a strategic imperative for modern organizations across the globe. E-procurement systems have gained prominence due to their capacity to streamline procurement activities, enhance organizational efficiency, and secure competitive advantages in the marketplace (Guan et al., 2018; Gupta et al., 2016; Xu & Buhalis, 2012). These systems, characterized by the integration of digital technologies, automate procurement tasks, optimize supplier interactions, and foster substantial cost savings and process efficiencies (Kumar et al., 2019; Nasir et al., 2020).

The effectiveness and sustainability of e-procurement systems, however, are contingent upon the alignment of the selected models with an organization's specific operational needs and the strategic integration of critical attributes that define system performance. E-procurement models encompass a variety of frameworks that guide the adoption and implementation of electronic procurement strategies (Bevilacqua et al., 2018; Singh et al., 2020). These models differ significantly in terms of their architectural complexities, ranging from simple automated systems to comprehensive platforms that support extensive procurement functionalities (Bhattacharya et al., 2019; Cao et al., 2018).

Moreover, the success of e-procurement systems is profoundly influenced by critical attributes such as system usability, supplier integration, data security, customization flexibility, and scalability (Eltayeb et al., 2016; Lee et al., 2021; Zeng et al., 2017). The optimal configuration of these attributes is vital for enhancing the operational capabilities of e-procurement systems, ensuring data integrity, and facilitating seamless interactions with suppliers.

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This systematic literature review is designed to critically assess the relevance of existing e-procurement models and their critical attributes within the context of modern organizational needs. By reviewing scholarly articles and empirical studies published from 2012 to 2022, this study aims to collate comprehensive insights into the current state of e-procurement technologies, highlight the disparities and commonalities across different models, and identify the attributes that significantly enhance system functionality and user adoption. Through this academic endeavor, the review seeks to provide valuable guidelines for organizations contemplating the adoption or enhancement of their e-procurement systems, ultimately contributing to the literature on digital procurement innovations and their impact on organizational performance. Key questions guiding this review include: 1) What are the prevailing e-procurement models that have been discussed in the literature from 2012 to 2022? 2) What critical attributes are identified in the literature as essential for the success and effectiveness of e-procurement systems? 3) How do various e-procurement models and critical attributes align with the strategic objectives and operational needs of contemporary organizations?

METHOD

This systematic review adheres to the PRISMA guidelines to ensure structured and unbiased reporting, enhanced by techniques to prevent unilateral decision-making and biased reporting (Gurevitch et al., 2018; Gough, Thomas and Oliver, 2019; Page et al., 2021). The PICOS framework was used to define research questions and streamline the review process (Amir-Behghadami and Janati, 2020).

Search Strategy

The search strategy, crafted by the primary author with support from a data management specialist, utilized a keyword approach outlined in Table 1. This approach involved searching electronic databases for terms related to "e-procurement," "informal economy," and their roles in "low- and middle-income" countries, specifically within the African context. The period of research extended from February 2010 to April 2021.

Table 1:Search Terms

Constructs	Search terms
Procurement	Procurement," OR " procurement processes," OR "procurement procedures," OR " procurement models," OR "attributes," OR "critical attributes," AND "procurement attributes" in the context of Africa
e-Procurement	"e-procurement models" OR "Online procurement models" OR "attributes of e-procurement" OR "critical attributes of e-procurement" OR "Digital procurement" AND "Africa"
Critical Attributes	*"Cost" OR "Value for Money" OR "Corruption" OR "Compliance" OR "Non-compliance" OR "Transparency" OR "Digitalization of procurement process" OR "Transparency" OR "Accountability" OR "Public procurement delivery" AND "Africa"*
Setting*	*Africa countries included in the list are Ghana, Burkina Faso, Cameroon, Cape Verde, Côte D'Ivoire, Gambia, Mauritius, after South Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, Togo, and Uganda.*

Eligibility Criteria

Inclusion of studies was contingent upon their adherence to the PICOS criteria. The following is a comprehensive depiction of the inclusion and exclusion criteria, as presented in Table 2.

Table 2: Summary of the Inclusion and Exclusion Criteria

Population	Studies conducted in Africa
Intervention	The implementation of e-Procurement or the digitalization of procurement processes aims to enhance the efficiency and effectiveness of public procurement, while also addressing issues such as corruption, ensuring optimal utilization of resources, promoting transparency, fairness, and accountability.
Comparator	Various types of comparators can be identified in the field of procurement, such as traditional e-procurement, online procurement, electronic procurement, and procurement attributes associated with e-procurement, including critical attributes.
Outcomes	The current literature encompasses various models of procurement, including those specifically tailored to electronic procurement (e-procurement). Additionally, scholars have identified critical attributes associated with e-procurements. Furthermore, the field of e-procurement presents both promising opportunities and significant challenges.
Study designs	Mixed methods , qualitative and quantitative designs

Article Identification, Screening and Inclusion

The review began with a comprehensive search in databases like SCOPUS, Web of Science, ERIC, and ProQuest, retrieving 100,709 records.

After removing duplicates, 1,014 unique records remained. Title and abstract screening excluded 608 records, and 406 full-text articles were then assessed for relevance, with a thorough evaluation to determine their eligibility for inclusion in the review.

Exclusion Criteria

In evaluating 406 full-text articles, 277 were excluded due to non-conformity with eligibility criteria, including 23 theoretical or commentary articles and 77 unrelated to procurement. Ultimately, 29 papers met all criteria for primary analysis (see figure 1).

Coding and Analysis

After the exclusion phase, 29 articles were analyzed, extracting details such as author, publication year, and study design. The synthesis identified themes and attributes crucial to e-procurement models, enriching the understanding and guiding the systematic review's conclusions.
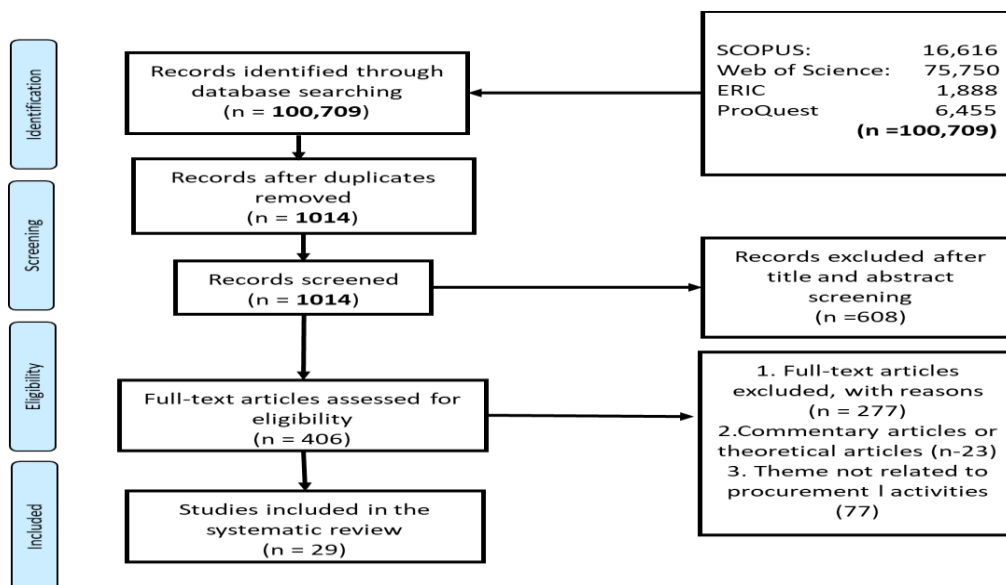

Figure 1: PRISMA Framework

Quality Appraisal

The quality of studies was appraised using the Critical Appraisal Skills Program (CASP) tool and the Drummond checklist, tailored for evaluating e-procurement models in Africa. The CASP tool rated studies on a scale, with scores reflecting high (20 points), moderate (16-19 points), or low quality (≤15 points). The Drummond checklist assessed the economic evaluations across seven criteria, scored on a 4-point scale for a total of 24 points, categorizing studies as poor (4-8 points), average (12-16 points), or good (20 points). Only studies rated as average and good were retained after the final PRISMA framework analysis, ensuring the inclusion of high-caliber economic appraisals in the review. These tools helped systematize the quality assessment, aligning the evaluation with the study's goals and policy relevance.

Journals Quality Appraisal (Journal and Year)

The analysis of publications related to e-procurement models in Africa reveals a focus on recent research from 2021 and 2022, indicating the topic's relevance and ongoing scholarly interest. Journals such as Sustainability, Entrepreneurship, Innovation and Sustainability (EIS), and Frontiers in Sustainable Cities emphasize

sustainable and innovative procurement strategies, reflecting an alignment with global trends towards sustainability and technological integration. Furthermore, the International Journal of Data Network Science and International Journal of Construction Supply Chain Management discuss the critical roles of data networks and construction supply chains in enhancing procurement practices. Publications in African Affairs and Africa Journal of Management provide region-specific insights, highlighting the unique challenges and opportunities within the African context, such as adapting e-procurement to local cultural and economic conditions. The range of publication years from 2016 to 2022 underscores the dynamic and evolving nature of e-procurement research, demonstrating its sustained academic and practical importance. This spread of research across years and disciplines illustrates the depth and breadth of academic exploration into e-procurement models, contributing significantly to understanding and improving procurement processes in Africa.

Table 3: Journals Quality Appraisal

Journal Name	Year of Publication
Africa Journal of Management	2020
African Affairs	2021
Australasian Journal of Construction Economics and Building	2017
CESifo Economic Studies	2018
Community Development Journal	2017
Corporate Communications: An International Journal	2020
Ecological Economics	2022
Entrepreneurship, Innovation and Sustainability (EIS)	2021
Eurasian Research Journal	2018
Frontiers in Sustainable Cities	2022
Industrial and Corporate Change	2021
Information and Communications Technology Law	2016
International Journal of Construction Supply Chain Management	2017
International Journal of Data Network Science	2020
International Journal of Health Policy and Management	2021
International Journal of Numerical Methods for Heat & Fluid Flow	2019
International Journal of Procurement Management	2020
International Journal of Productivity and Performance Management	2015
International Journal of Project Management	2016
International Journal of Public Sector Management	2016
Journal of Applied Business and Economics	2018
Journal of Banking & Finance	2022
Journal of Contemporary Drama in English	2017
Journal of Development Economics	2022
Journal of Development Effectiveness	2017
Journal of Industrial Engineering and Management	2017
Journal of Industrial Relations	2022
Journal of Industrial Relations	2021
Journal of International Political Discourse	2016
Journal of Open Innovation: Technology, Market, and Complexity	2021
Journal of Peace Research	2015
Journal of Political Economy	2016
Journal of Purchasing and Supply Management	2022
Latin American Economic Review	2016

NISPAcee Journal of Public Administration and Policy	2019
Organization and Environment	2016
Production and Operations Management	2019
Public Administration	2016
Research in Transportation Economics	2021
Review of Business and Public Policy	2021
Review of Business and Public Policy	2017
Separation and Purification Technology	2022
Separation and Purification Technology	2020
Social Science & Medicine	2016
Supply Chain Management: An International Journal	2017
Sustainability	2022
Sustainability	2021
Sustainability	2019
Sustainability	2018
Sustainability	2017
Total Quality Management & Business Excellence	2016
Virulence and Host Immune Responses	2019
Work, Employment and Society	2018

RESULTS

The systematic review spanning from 2012 to 2022 provided extensive insights into e-procurement models, uncovering their broad impacts across innovation, infrastructure, NGO operations, corruption, compliance, and sustainability. Key findings reveal that public procurement significantly fosters innovation, as evidenced by Crespi and Guarascio (2019), although its effectiveness is somewhat diminished by the degree of import penetration. This underlines the necessity of finely balanced procurement policies to fully leverage the potential of public demand in stimulating innovation and shaping productive ecosystems.

The role of Public-Private Partnerships (PPPs) in infrastructure development was emphasized by Bwanali and Rwelamila (2017) as a strategic approach utilized by African governments to integrate private sector efficiencies and improve service delivery. This collaboration between public and private sectors is pivotal in enhancing infrastructure quality and accessibility. The study by Tian and Chuang (2022) on NGO operations in China reveals how governmental interactions can significantly influence NGO advocacy, particularly in sensitive areas like sex worker rights. This points to the complex dynamics that NGOs navigate in response to government procurement practices.

Additionally, corruption was highlighted as a critical factor affecting e-procurement systems, with Vendrell-Herrero, Darko, and Vaillant (2022) illustrating its moderating role in the relationship between firm productivity and government contracts. This underscores the imperative for robust governance mechanisms to enhance transparency and reduce corruption's detrimental impacts. Adeniyi et al. (2020) shed light on the compliance challenges within procurement processes in local governments, revealing a direct correlation between the level of compliance and the knowledge of procurement regulations, indicating an urgent need for comprehensive training and regulatory enforcement.

Moreover, the integration of Building Information Modeling (BIM) for energy efficiency in construction projects, as discussed by Samuel, Joseph-Akwara, and Richard (2017), advocates for broader adoption of technology to optimize building energy use, contributing significantly to sustainability goals. Studies conducted in Ghana by Ibrahim et al. (2017) and Boadu et al. (2022) pointed out considerable gaps in compliance and the critical need for health and safety measures in public procurement processes, emphasizing the importance of these factors in safeguarding ethical standards and enhancing project outcomes.

DISCUSSIONS

The comprehensive systematic review on e-procurement models spanning from 2012 to 2022 provides significant insights into the interrelations across various operational aspects such as innovation, infrastructure, NGO engagement, corruption, compliance, energy usage, and legal frameworks. Notably, public procurement emerges as a pivotal factor enhancing innovation. The study by Crespi and Guarascio (2019) demonstrates this through empirical analysis using patent data, which reveals that public procurement can stimulate innovation but is moderated by import penetration. This suggests that a balanced approach to domestic and international procurement is crucial for fostering optimal innovative outcomes.

In the context of infrastructure, the use of Public-Private Partnerships (PPPs) is highlighted as a crucial element for enhancing service delivery and utilizing private sector resources, particularly in African regions where such collaborative models can significantly address infrastructure deficits (Bwanali & Rwelamila, 2017). Additionally, the dynamics between NGOs and governmental procurement practices are critically examined. Tian and Chuang (2022) provide insights into how NGOs in China navigate government interactions, which significantly affects their advocacy and operational strategies. This underscores the complex relationship between NGO activities and government procurement, influencing both policy and practical outcomes in advocacy efforts.

Furthermore, corruption is identified as a significant disruptor of e-procurement efficacy. Studies such as those by Vendrell-Herrero, Darko, and Vaillant (2022) highlight the moderating role of corruption between firm productivity and government contract awards, emphasizing the need for robust governance and transparency to curtail its impact. The issue of compliance is also addressed, with Adeniyi et al. (2020) revealing challenges in adhering to procurement regulations within local governments. This finding is linked closely with the knowledge and understanding of procurement laws, suggesting an urgent need for enhanced training and capacity building. Lastly, the importance of integrating health and safety (H&S) considerations into procurement practices is examined, with Boadu et al. (2022) advocating for a holistic approach to procurement that prioritizes safety and sustainability, thereby safeguarding project outcomes and worker welfare.

CONCLUSIONS

The comprehensive review of e-procurement models from 2012 to 2022 elucidates significant factors that shape the effectiveness and success of e-procurement systems. Public procurement is pivotal in enhancing innovation, stimulating innovation activities, and shaping production systems, although its potential is somewhat moderated by import penetration. This emphasizes the necessity for a balanced management approach to domestic and international procurement. Additionally, Public-private partnerships (PPPs) are highlighted as beneficial for improving service delivery and leveraging private sector efficiencies, particularly in addressing infrastructure challenges in developing regions.

The dynamics between non-governmental organizations (NGOs) and government procurement practices reveal a complex relationship where government procurement and state certification can significantly influence NGO activities, especially in advocacy. This underscores the critical need to understand the role of government procurement in shaping NGO effectiveness. Corruption emerges as a notable concern, potentially undermining the fairness and efficiency of e-procurement systems. This highlights the importance of robust governance and anti-corruption measures to maintain the integrity of the procurement process.

Compliance with procurement regulations is essential for transparency and accountability in procurement processes. There is a noted need for increased awareness and understanding of procurement regulations to improve compliance and ensure effective procurement practices. Additionally, the integration of health and safety considerations into the procurement process is emphasized as crucial for ensuring the safety and well-being of all stakeholders involved in projects.

Furthermore, the systematic review has identified critical attributes that significantly impact the functionality and success of e-procurement systems. These include the role of public procurement in fostering innovation and the use of PPPs for effective project delivery. The analysis also highlights the impact of governmental

procurement practices on NGO operations and the pervasive issue of corruption, which can alter the effectiveness of government contracts.

Addressing these critical attributes by enhancing public procurement practices, optimizing PPPs, ensuring the depoliticization of NGO activities, combating corruption, and adhering to strict compliance and health and safety standards are essential. These measures will contribute to the success and effectiveness of e-procurement implementations, fostering more transparent, accountable, and efficient procurement systems across various organizational and governmental settings.

Recommendations

The review highlights crucial strategies to enhance e-procurement systems and suggests recommendations aimed at maximizing the benefits of e-procurement practices. To stimulate innovation, organizations must adeptly manage import penetration in public procurement. This involves striking a delicate balance between domestic and foreign procurement, thereby maximizing the innovative potential of public demand. Enhanced management and strategic openness towards non-domestic procurement could significantly elevate the effectiveness of public procurement in driving innovation and industrial renewal.

Public-Private Partnerships (PPPs) are identified as pivotal in delivering infrastructure projects effectively. It is recommended that governments and organizations intensify their use of PPPs to not only improve service delivery but also to leverage private sector resources and expertise. Adopting PPP models can facilitate more efficient and successful infrastructure development, enhancing service delivery and project outcomes through collaborative efforts with the private sector.

Addressing the depoliticization of NGOs, especially those advocating for rights in contexts influenced by government procurement, is essential. Governments should foster environments that support the operation of NGOs transparently and inclusively, allowing for more effective advocacy and improved policy outcomes. Additionally, implementing robust anti-corruption measures is imperative to combat the adverse effects of corruption on e-procurement systems. This includes enforcing strict procurement guidelines, ensuring transparency, and promoting fairness to mitigate corruption risks effectively.

Furthermore, adherence to procurement regulations is vital for maintaining transparency and accountability. Enhancing the understanding and implementation of these regulations through targeted training programs and capacity-building initiatives can significantly improve compliance and foster an equitable procurement environment. Lastly, integrating health and safety considerations into procurement processes is paramount. Organizations must prioritize worker safety by embedding comprehensive health and safety measures into all stages of procurement, from contractor selection to project execution, ensuring a safe and sustainable work environment.

These recommendations are intended to guide organizations and policymakers in refining e-procurement strategies to achieve more effective, transparent, and sustainable procurement outcomes.

Implication of the Research to Literature, Policy and Practice

This systematic literature review significantly enriches the academic discourse surrounding e-procurement models by synthesizing research conducted from 2012 to 2022, thus providing a detailed understanding of the variables that dictate the success and effectiveness of e-procurement initiatives. It affirms and broadens earlier studies with fresh insights that encourage further scholarly investigation into the nuanced dynamics of e-procurement systems.

On the policy front, the findings are particularly relevant to policymakers engaged in crafting procurement strategies. The demonstration of public procurement's influence on innovation underscores the necessity for policies that foster innovation while managing the balance between local and international sourcing. The research advocates for the strategic adoption of public-private partnerships (PPPs) to improve infrastructure delivery, suggesting that policy frameworks should facilitate PPPs to maximize private sector competencies in public projects.

In practice, the study offers tangible guidance for organizations active in procurement. It stresses the importance of adhering to procurement regulations and integrating health and safety measures, suggesting that organizations enhance training and compliance to boost procedural transparency and safeguard stakeholder welfare. The recommendation to embrace PPPs provides a strategic avenue for leveraging private expertise, which is crucial for enhancing the efficiency of infrastructure projects and achieving sustainable outcomes in procurement practices.

Limitation of the Study and Future Research Directions

Limitation

This systematic literature review on e-procurement models offers important insights but has limitations. It restricts its analysis to literature published from 2012 to 2022, potentially overlooking critical studies outside this period. Furthermore, it may not encompass all existing or emerging e-procurement models and attributes, given the field's ongoing evolution. Additionally, the applicability of the findings is confined to the contexts and scopes specifically examined in the reviewed studies.

Future Research Directions

Future research in e-procurement should extend beyond 2022 to capture recent developments and reflect contemporary e-procurement models and attributes. Investigating how public procurement influences innovation across different industries and innovation processes will enrich understanding of its strategic roles. Additionally, examining NGO-government procurement dynamics and their effects on NGO effectiveness in policy advocacy is crucial. Research into anti-corruption strategies within e-procurement systems and their operational impacts is also essential. Further studies should assess the implications of compliance with procurement regulations on organizational performance. Moreover, exploring the integration and challenges of health and safety standards in e-procurement, particularly within construction projects, would provide valuable insights into best practices and implementation hurdles.

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