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Digital Transformation in Public Procurement: A Literature Analysis on the Role of E-Procurement in Budget Efficiency and Access to Healthcare Services in Remote Areas

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ABSTRACT

Digital transformation in the public sector has become a pivotal aspect of governance reform, particularly in the procurement of goods and services. A key manifestation of this transformation is the adoption of e-procurement systems, which aim to enhance transparency, accountability, and efficiency in public budget management. This study undertakes a literature review to synthesize evidence on the role of e-procurement in improving budget efficiency and its implications for access to public healthcare services, with a particular focus on remote regions. In the healthcare sector, these efficiency gains have the potential to enhance the availability of medicines, medical equipment, and service coverage, especially in areas with limited resources. However, the relationship between e-procurement and improved healthcare access is complex and highly contingent on contextual factors, including digital infrastructure readiness, human resource capacity, and local institutional governance. This study underscores that the successful implementation of e-procurement should not be viewed merely as a technological initiative but as an integral part of broader public governance transformation.

1. INTRODUCTION

Digital transformation has become a central agenda in public sector reform across many countries, including Indonesia. This transformation not only aims to enhance administrative efficiency but also seeks to strengthen governance that is transparent, accountable, and sustainable. The literature indicates that public sector digitalization plays a significant role in improving governance mechanisms through increased process transparency, accountability in public resource management, and data-driven decision-making efficiency (1). One strategic area in public sector digital transformation is government procurement of goods and services. Public procurement is inherently complex, involving large budgets, multiple stakeholders, and high susceptibility to inefficiencies and malpractices. Studies on digital governance in public procurement highlight that conventional procurement systems often face challenges such as slow processes, high transaction costs, and limited transparency, underscoring the need for digital procurement reforms (2). In this context, the implementation of e-procurement is regarded as a key instrument to enhance efficiency and accountability in public procurement. Empirical evidence suggests that e-procurement can reduce transaction costs, accelerate procurement cycles, and increase transparency and competition among suppliers, ultimately contributing to government budget efficiency (3). Nevertheless, several studies emphasize that the efficiency gains are not always substantial and are often influenced by institutional readiness, digital infrastructure, and human resource capacity.

Public procurement plays a crucial role in ensuring the provision of essential services, particularly healthcare. Public health systems heavily depend on the availability of medicines, medical equipment, and logistics, which are acquired through government procurement mechanisms. Health

policy literature indicates that inefficiencies in procurement can directly undermine health system performance and limit public access to quality healthcare services (4). The issue becomes even more pronounced in the outermost, remote, and underdeveloped regions. Studies indicate that these areas face structural challenges, including limited digital infrastructure, low human resource capacity, and high logistical costs, which collectively hinder access to public healthcare services (5). In this context, e-procurement is considered a potential solution to accelerate procurement processes, improve the availability of healthcare goods, and reduce procurement costs, thereby supporting better access to healthcare services in remote areas. However, the literature also notes that the impact of e-procurement on budget efficiency and the improvement of public services is not uniform. Some studies suggest that e-procurement primarily generates administrative efficiency rather than substantial fiscal efficiency, and it does not automatically guarantee direct improvements in public service quality (6).

This highlights the need for a more contextual examination of the relationship between e-procurement, budget efficiency, and public service outcomes. Although various studies have examined the implementation of e-procurement and its impact on public procurement efficiency, most research has focused on administrative and fiscal aspects in general. Studies linking procurement efficiency to public service outcomes, particularly access to healthcare services in remote regions, remain limited and fragmented. Moreover, few studies integrate the perspectives of digital transformation, public procurement, and health policy within a single conceptual framework. Therefore, there is a need for a study that synthesizes cross-disciplinary literature to explain these relationships more comprehensively.

Based on this background, this paper aims to review and synthesize literature on the role of e-procurement in enhancing budget efficiency and its impact on access to public healthcare services in remote areas. By integrating perspectives from digital transformation, public procurement, and health policy, this study seeks to offer both conceptual contributions and policy implications for strengthening e-procurement implementation in resource-constrained regions. The study provides two main contributions: first, a conceptual contribution through the development of a framework that links procurement digital transformation, budget efficiency, and access to public healthcare services; and second, a policy contribution by offering practical implications for reinforcing e-procurement implementation in remote areas as part of broader public service reforms.

2. E-PROCUREMENT AS AN INSTRUMENT OF GOVERNANCE REFORM

Digital transformation in public procurement through the adoption of e-procurement has been recognized as a key instrument in reforming public sector governance. E-procurement serves not only as a technical tool to shift procurement processes from manual to electronic platforms but also as an institutional mechanism that promotes the principles of good governance, particularly transparency, accountability, anti-corruption, and process efficiency (1, 7).

Transparency

Transparency is one of the core principles strengthened through e-procurement. Electronic procurement systems enable all stages of the procurement process from planning, tender announcements, bid evaluation, to award decisions to be conducted openly and digitally documented. This reduces information asymmetry between the government and suppliers and minimizes closed procurement practices that are prone to manipulation (8). The literature shows that e-procurement enhances open access to information for stakeholders, including the public and oversight institutions, thereby strengthening public scrutiny over the use of state budgets (7). In the health sector, procurement transparency is particularly crucial as it directly affects the availability of medicines and medical devices, which in turn impacts the quality of public services (9).

Accountability

In addition to transparency, e-procurement strengthens accountability in public procurement through systematic and traceable digital records. Every decision and activity in the procurement process is recorded in the system, facilitating audits, performance evaluations, and administrative accountability (1). With digital audit trails in place, the risk of misuse of authority and procurement irregularities is significantly reduced. The OECD (2025) highlights that electronic procurement systems integrated with financial and public oversight systems contribute substantially to improving government spending accountability. Local government studies also show that e-procurement encourages compliance with procurement regulations and enhances budget discipline through system-based oversight (10).

Anti-Corruption

E-procurement is widely recognized as a strategic instrument for preventing corruption in the public sector. By reducing face-to-face interactions between procurement officials and suppliers, e-procurement limits opportunities for collusion, nepotism, and bribery in the tender process (11). Digitalizing procurement also restricts individual discretion by enforcing standardized, system-based procedures. Several studies indicate that countries and local governments that consistently implement e-procurement experience lower levels of procurement irregularities and higher public trust in government institutions (1, 7). In the health sector, corruption-free procurement is essential to ensure that budget allocations are effectively used to improve public health services (12).

Process Efficiency

Process efficiency is one of the most tangible operational benefits of e-procurement. Electronic systems accelerate procurement cycles through document automation, reduction of manual administrative procedures, and data integration across organizational units. This leads to shorter procurement times, lower administrative costs, and optimized use of public resources (13). In the context of health sector procurement, process efficiency is critical for ensuring the timely availability of medicines and medical devices. Empirical studies show that e-procurement implementation in public hospitals accelerates procurement processes and enhances service continuity (9). Such efficiency is particularly relevant for remote areas, where procurement delays can significantly affect access to and the quality of healthcare services (14).

3. CHALLENGES OF E-PROCUREMENT IMPLEMENTATION IN REMOTE AREAS

E-procurement offers various benefits in enhancing budget efficiency and public procurement governance, but its implementation in remote areas faces far more complex challenges compared to urban regions or areas with well-established infrastructure. The characteristics of remote regions limited infrastructure, weak institutional capacity, and difficult geographical conditions often hinder the optimal adoption of electronic procurement systems (15, 7).

Digital Infrastructure Limitations

One of the main challenges in implementing e-procurement in remote areas is the lack of digital infrastructure, particularly unstable internet connectivity and limited availability of technological devices. E-procurement systems require reliable connectivity to ensure that all procurement stages can be conducted online and in real-time. However, in many remote regions, network disruptions and limited bandwidth frequently cause delays, failed document uploads, and low participation from local suppliers (13). These infrastructure limitations may create a new dependency on actors with better technological access, undermining the inclusivity that e-procurement is intended to promote. The OECD (2025) emphasizes that without adequate investment in digital infrastructure, the digitization of procurement may inadvertently widen regional disparities.

Human Resource and Institutional Capacity

Another significant challenge is the limited capacity of human resources (HR) to operate e-procurement systems. Low digital literacy, insufficient technical training, and high staff turnover in remote areas impede the sustainability of electronic procurement implementation (15). In many cases, procurement officers in remote regions still rely on manual procedures or external assistance. Weak institutional capacity, including the absence of standard operating procedures and managerial support, further affects e-procurement effectiveness. Kadhila et al. (2025) highlight that leadership commitment and organizational backing are key factors in the successful adoption of e-procurement. Without strong institutional support, digital systems tend to be perceived as an additional administrative burden rather than a tool to improve performance.

Market Access and Supplier Participation Challenges

In remote areas, the limited number and capacity of local suppliers also pose challenges for e-procurement adoption. Although theoretically e-procurement can broaden market access by enabling participation from suppliers outside the region, in practice, local suppliers often face technical and administrative barriers to active participation in electronic systems (11). This situation can lead to dependency on larger external suppliers. While this may increase efficiency, it risks weakening the local economy and raising logistical costs, particularly in healthcare procurement, which requires rapid and continuous distribution (12).

Implications for Healthcare Access

The challenges of implementing e-procurement in remote areas have direct implications for access to healthcare services. Delays or failures in the procurement process can result in shortages of medicines and medical devices, negatively affecting the quality and continuity of public health services (16). In remote regions, where alternative healthcare services are limited, procurement disruptions can exacerbate disparities in healthcare access across regions (14). Thus, the success of e-procurement in remote areas depends not only on technological availability but also on institutional readiness, supportive policies, and adaptive strategies that take local conditions into account. Without a contextual approach, digital transformation in procurement risks failing to achieve equitable healthcare service delivery and fair budget efficiency (7).

4. STRENGTHENING HEALTHCARE PROCUREMENT IN REMOTE AREAS

Strengthening healthcare procurement in remote areas requires a holistic approach, which goes beyond digitalizing procurement processes to include the reinforcement of institutional capacity, infrastructure, and cross-sector coordination. Remote regions often face geographical constraints, limited human resources, and restricted market access, making the successful implementation of e-procurement dependent on adaptive strategies that consider local contexts (14, 15).

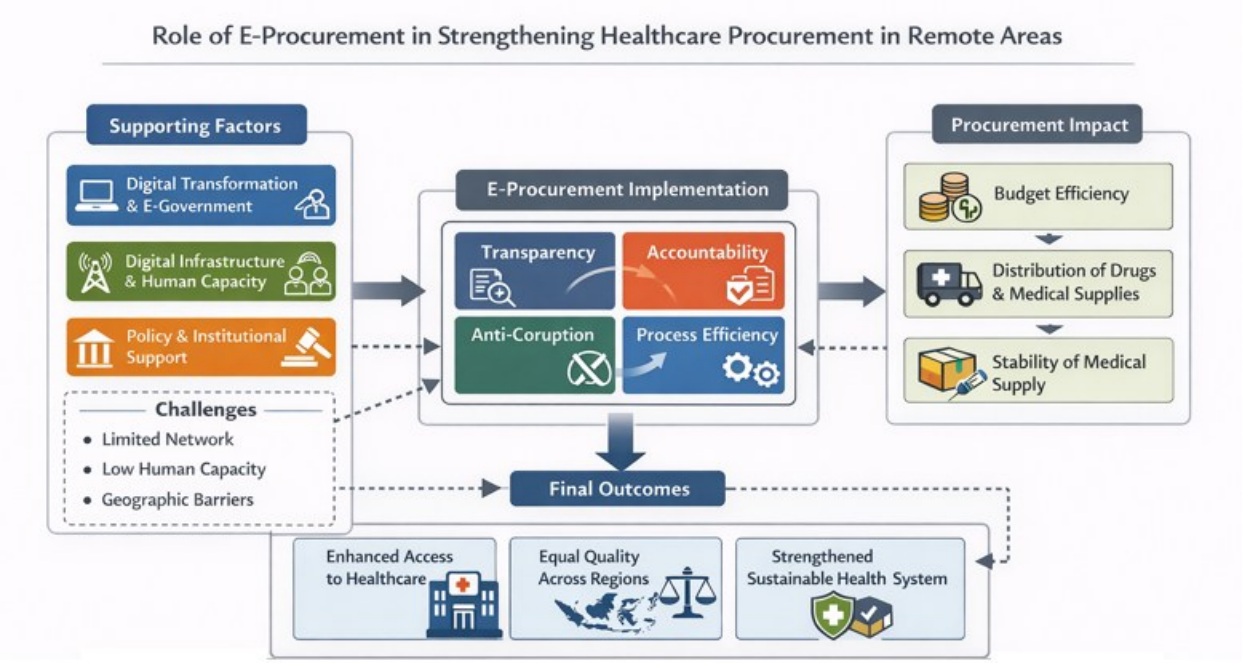

Figure 1: This figure illustrates how supporting factors (digital transformation, infrastructure, HR, and policy) enable e-procurement implementation (transparency, accountability, anti-corruption, efficiency), leading to improved healthcare procurement impacts and outcomes in remote areas.

Enhancing Infrastructure and Human Resource Capacity

Digital infrastructure readiness serves as the cornerstone for strengthening healthcare procurement in remote areas. Stable internet connectivity, availability of technological devices, and integration of information systems across units are prerequisites for the optimal functioning of e-procurement systems (13). In addition, strengthening human resource capacity through training and technical guidance is crucial to enable procurement personnel to operate electronic systems effectively, reduce procedural errors, and ensure sustainable system use (15).

Process Optimization and Supplier Network Expansion

Procurement efficiency can also be enhanced through the optimization of digital processes and the expansion of supplier networks. E-procurement enables the procurement of medicines and medical devices to be conducted more efficiently, transparently, and rapidly, thereby minimizing the risk of stockouts in remote healthcare facilities (9). Furthermore, integrating the system with regional or

national suppliers helps overcome the limitations of local providers while maintaining competitive pricing and product quality.

Strengthening Governance and Local Policies

Beyond technical aspects, strengthening governance and local policies is also critical. The implementation of standard operating procedures, digital-based monitoring, and cross-agency coordination enables more efficient and accountable use of budgetary resources (7, 8). This approach ensures that healthcare procurement not only accelerates the distribution of medical logistics but also promotes accountability and equitable access to healthcare services.

Impact on Healthcare Access

A comprehensive approach to procurement strengthening directly improves access to healthcare services in remote areas. The availability of medicines, medical devices, and healthcare resources becomes more stable, enhancing service quality and reducing disparities between regions (16). When supported by adequate infrastructure, trained personnel, and adaptive local policies, e-procurement serves as a strategic instrument to reinforce healthcare procurement systems in remote regions.

5. CONCLUSION

The implementation of e-procurement in public procurement has proven to play a strategic role in enhancing budget efficiency, strengthening transparency and accountability, and preventing corruption, particularly in the healthcare sector. These benefits become even more significant in remote areas, where limitations in infrastructure, human resource capacity, and market access often hinder the availability of medicines and medical devices.

The literature indicates that strengthening procurement through digitalization, process optimization, human resource capacity development, and adaptive local policies can improve the timeliness of procurement, stabilize supply chains, and ensure equitable access to healthcare services, thereby reducing regional disparities. However, the success of e-procurement implementation in remote contexts heavily depends on technological readiness, institutional support, and context-specific strategies capable of addressing geographical and administrative challenges. Thus, e-procurement should not be viewed merely as a technical tool but as an integral policy instrument for achieving efficient, transparent, and equitable healthcare procurement across all regions.

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CONFLICT OF INTEREST

The authors declared there is no conflict of interest.

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AUTHORS' CONTRIBUTION

Conceptualization of the framework: ASR & AUF. Data analysis, synthesis of the findings, and drafting of the manuscript: ASR. All authors contributed and approved the final version of the manuscript.

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