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Current E-Procurement Platforms (2020–2025): A Systematic Review of Architectures, Capabilities, and Implementation Outcomes

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ABSTRACT

The evolution of e-procurement has moved beyond isolated digitisation projects to comprehensive, platform-based suites that bundle together e-tendering and sourcing, procure-to-pay (P2P), contract-lifecycle management (CLM), automated accounts payable, supplier-risk and sustainability tools, and advanced analytics. Extending the 2020 systematic review that mapped the barriers to public-sector adoption through the Technology-Organization-Environment (TOE) framework, this paper consolidates research published after 2020 to describe today's platform ecosystem and to assess whether emerging capabilities—cloud-native hosting, mobile interfaces, API-first integration, and especially artificial intelligence (AI)-have removed longstanding obstacles or simply transformed them. Following PRISMA-2020, we detail our protocol, search strategy, screening, quality appraisal, and data-extraction methods, capturing both quantitative and qualitative evidence on system functionalities, integration approaches, performance outcomes (shorter cycle times, higher compliance, greater transparency, enhanced supplier enablement, and more robust sustainability reporting), and persistent challenges (integration debt, skill gaps, governance alignment, and regulatory constraints). The synthesis shows a strong consensus that the quality of integration and data stewardship are still the pivotal factors for unlocking value; AI-driven features are becoming more common but are assessed unevenly; and differences between public and private sector governance and implementation speed remain pronounced. We finish by outlining a research agenda that calls for rigorous comparative studies, clearer AI governance frameworks, better cross-platform interoperability, and reliable ESG data pipelines.

KEYWORDS
E-Procurement, Digital Procurement, Platforms, PRISMA, TOE, Cloud, AI, Mobile, Blockchain, Sustainability.

1. Introduction

The procurement department now serves as a litmus test for how well organizations can turn digitisation into concrete performance improvements. In both the public arena and private industry, purchasers are progressively adopting integrated platform suites that blend upstream sourcing with downstream purchasing, all linked to analytics, contract oversight, and ERP integrations. Today's solution is no longer a single-function tool but a full-fledged ecosystem that includes guided-buy interfaces, catalogue and marketplace connectors, adaptable workflows, traceable audit logs, and data structures built to manage spend and supplier relationships at scale [1], [3], [4]. This move toward platform consolidation runs parallel to an architectural shift to multi-tenant SaaS and API-first models, which promise quicker release cycles and reduced total cost of ownership—while simultaneously raising critical questions around data residency, access permissions, and the risk of vendor lock-in.

Nevertheless, even with the evident evolution of these solutions, the evidence on their uptake and results remains mixed. Both case studies and survey research continue to show that the anticipated gains in efficiency and compliance are not uniformly achieved, and persistent points of friction appear—particularly at the interfaces between the platforms and legacy ERP systems, identity-verification and electronic-signature tools, supplier-onboarding workflows, and industry-specific regulatory requirements [6], [7]. Emerging features such as AI-driven spend categorisation and anomaly spotting, mobile-enabled approval processes, and blockchain-supported audit trails have expanded the scope of e-procurement, but they also raise new governance concerns related to model explainability, security, and the traceability of data [4], [8], [9].

Accordingly, this review is guided by three research questions: (RQ1) Which functionalities and architectural patterns characterise today's e-procurement platforms? (RQ2) What technological, organizational, and environmental conditions influence successful implementation between 2020 and 2025? (RQ3) What robust, empirically verified effects can be identified on performance indicators such as cycle-time reduction, transparency, and sustainability? The paper's contribution lies in merging the platform-level findings of recent studies with the traditional TOE framework used in pre-2020 literature, while giving particular attention to post-2020 advances such as artificial-intelligence features, mobile capabilities, and ESG reporting [10], [3], [4].

2. Review Protocol and Method

Reporting standard and protocol: We adopt PRISMA-2020 as the scaffolding for transparent reporting of the review process and outcomes, specifying research questions, eligibility rules, search strings, screening flow, and data items [1]. The protocol covers bibliographic databases (IEEE Xplore, Scopus, Web of Science, ACM DL, ScienceDirect, SpringerLink) and publisher platforms. Reference chaining was applied to capture otherwise missed empirical studies and recent systematic reviews. Where possible, we targeted open-access full texts to support data extraction and replication.

Table 1. Search Strategy and Eligibility Criteria

Search time window	**Jan 2020 – Sep 2025 (inclusive)**
Core strings	"e-procurement" AND (platform OR suite OR SaaS); "digital procurement" AND (AI OR analytics OR cloud OR mobile); "public e-procurement" AND (implementation OR adoption OR barriers); "blockchain" AND (e-procurement OR public procurement)
Databases	IEEE Xplore; Scopus; Web of Science; ACM DL; ScienceDirect; SpringerLink
Inclusion	Peer-reviewed empirical studies (case/field/survey/experimental); and SLRs extending post-2020 synthesis; public and private sectors
Exclusion	Opinion/marketing without methods or data; studies outside procurement; duplicates

Data items	Venue; sector/country; platform/module scope; deployment; ERP/API integration; outcomes/KPIs; challenges (TOE-coded) [2], [10]

Screening and evaluation: Two independent reviewers first examined titles and abstracts, then proceeded to a full-text review to determine eligibility according to the predefined inclusion criteria. Any discrepancies were resolved through discussion. The methodological quality of each study was judged using the IS systematic-review guidelines, focusing on the articulation of the research problem, the adequacy of the methods employed, the openness of the measurement procedures, and the handling of validity threats [2]. We captured uniform information on system functionalities, integration approaches, and results; obstacles were classified under the TOE framework to enable consistent cross-study analysis [10].

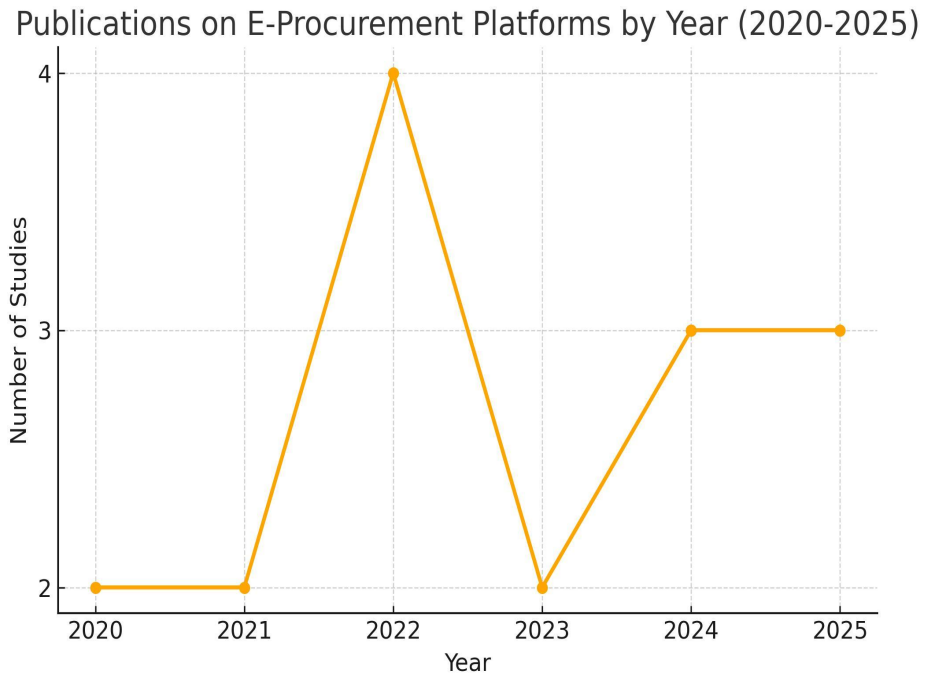

Figure 1. Publications on E-Procurement Platforms by Year (2020–2025)

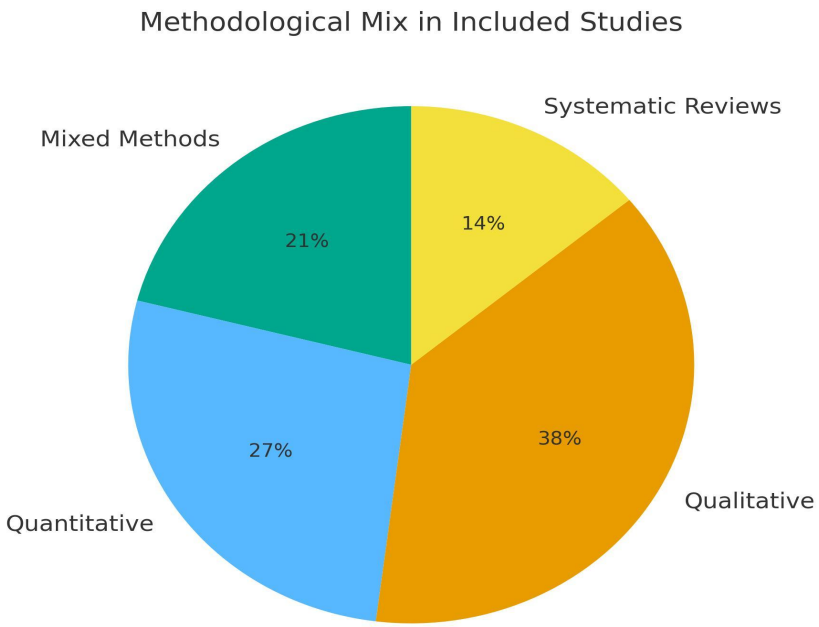

Figure 2. Methodological Mix in Included.

3. Results: The Current Platform Landscape

Modules and functionalities: The studies examined reveal that modern e-procurement suites share a common backbone—sourcing/e-tendering, procure-to-pay, contract-lifecycle management, and accounts-payable automation—while expanding with additional elements such as supplier-risk assessment, sustainability tools, mobile applications, and analytics or AI capabilities. Researchers note an increasing provision of features like guided-buy interfaces, curated product catalogs, automated three-way matching, and contract-analytics, although the depth of these functions varies considerably across providers and industries [3], [4], [7]. In governmental organizations, statutory requirements for transparency and non-discriminatory treatment still dictate the design of processes and user interfaces; in contrast, private-sector adopters tend to prioritise speed of execution and the overall user experience when configuring the system.

Table 2. Comparative Feature Matrix of Representative Platforms (evidence-based features from the literature)

Platform (anonymized)	Deploy	Core Modules	Risk/ ESG	AI/Analysis	Mobile	ERP/API	Notes
Suite A	SaaS	RFx, P2P, CLM, AP	Supplier risk, ESG attestations	Spend AI, anomaly detection	iOS/Android	REST; SAP/Oracle	Mature P2P; strong catalogs
Suite B	SaaS/On-prem	RFx, P2P	-	Guided buying	Mobile web	REST; MS Dynamics	SME centric
Suite C	**SaaS**	RFx, P2P, CLM	ESG questionnaires	Contract NLP	iOS/Android	REST; GraphQL	API-first orientation

Architecture and integration: Today's e-procurement solutions are largely built on multi-tenant cloud infrastructures. The research stresses the importance of an API-first strategy for linking the platform with core ERP systems and identity-management services. Projects tend to be successful when the master data—such as supplier records, product or service identifiers, and cost-center information—is cleaned and fixed early on, and when integration testing is carried out in sandbox environments with a clearly limited scope [6]. Although vendors often promote "plug-and-play" connectors, empirical studies reveal that aligning classification codes and approval workflows still consumes a substantial portion of implementation effort. Consistent security measures—granular role-based access controls, comprehensive audit trails, encryption, and mechanisms for data-residency compliance—are identified as essential, particularly in public-sector deployments [6], [8].

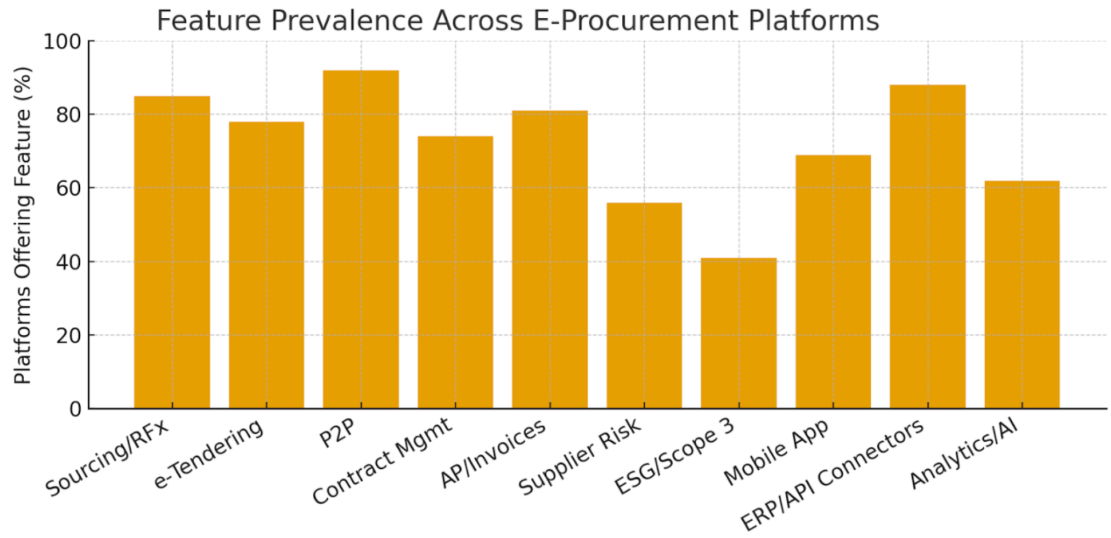

Figure 3. Feature Prevalence Across E-Procurement Platforms.

Public vs. private deployments: Studies identify persistent contrasts in governance and cadence. Public-sector projects are bounded by statute and auditability and thus exhibit lower configurability and slower release cycles; centralised structures are more likely to adopt e-procurement as procurement complexity grows, while coordinated structures sometimes rely on intra-organizational collaboration rather than formal platform adoption [6]. Private deployments emphasise speed and user experience; yet even in industry settings, sustained value depends on data quality, supplier enablement, and change management [3], [4]. Sustainability and ESG reporting are increasingly salient topics, with platforms encoding supplier questionnaires and attestations, but coverage and verification are still uneven [7].

4.Discussion: Technological Innovations and Evidence

AI and analytics: Post-2020 evidence maps rapid diffusion of AI across spend classification, supplier discovery, guided buying, and risk detection. A recent state-of-the-art review synthesises eight research directions and cautions that demonstrable outcome gains are still lagging behind capability claims [4]. Mixed-methods work in 2024–2025 further broadens the agenda to include LLM-based copilots for specification drafting, fraud pattern discovery, and supplier-risk horizon scanning but underscores the governance gap around bias controls, explainability, and human-in-the-loop escalation [11].

Mobile enablement: Field-intensive contexts (e.g., hospitality, facilities management, construction) illustrate the strengths and trade-offs of mobile procurement: faster approvals and better data capture

versus small-screen collaboration frictions and new training demands. Evidence from China's restaurant sector shows that human coordination remains central even as platforms streamline routine activities [5].

Blockchain and verifiable audit trails: Case-derived frameworks for blockchain adoption in public procurement argue for a staged approach that begins with governance readiness and clarity about data-sharing incentives [8]. Construction-sector studies highlight tangible barriers—stakeholder coordination, standards, and integration with existing tendering processes—and caution that benefits accrue only when legal recognition and process redesign accompany the technology [9].

5. Implementation Challenges and Success Factors (TOE)

Technological: Across settings, integration with legacy ERPs and identity/signature infrastructure dominates risk. Data quality defects propagate through guided buying and analytics, yielding mis-classification and exception churn. Studies emphasize investment in master-data governance, interface testing, and incremental scope as mitigations. Usability—role-appropriate screens and low-latency workflows—remains critical to avoid reversion to email and spreadsheets [3], [6].

Organizational: Change management and capability maturity consistently separate successful programs from stalled ones. Centralized purchasing structures can accelerate standardization where procurement complexity is high, while decentralized or coordinated models demand stronger coalition-building and training to reach comparable outcomes [6]. Leadership sponsorship, role-specific enablement, and measurement against clear KPIs (cycle time, maverick spend, on-time payment) are recurrent success patterns [3], [4].

Environmental/contextual: Procurement legislation, digital signature regimes, data-protection law, and vendor market depth drive timelines and scope. Sustainability reporting requirements create demand for new data flows and assurance methods; however, supplier burden and limited coverage in upstream tiers remain obstacles [7], [18].

Table 3. Implementation Challenges Mapped to TOE with Mitigations

Challenge	TOE	Representative evidence	Mitigation	Residual risks
ERP & identity integration	Technological	[6]	Sandboxed APIs; phased rollout; master-data stabilization	Data sync breaks; compliance gaps
Skills & adoption	Organizational	[3], [6]	Role-based training; change champions; UX simplification	Turnover; shadow workflows
Regulatory & ESG fit	Environmental	[7], [8], [9], [18]	Legal design; digital signatures; staged scope; external assurance	Delays; reporting gaps

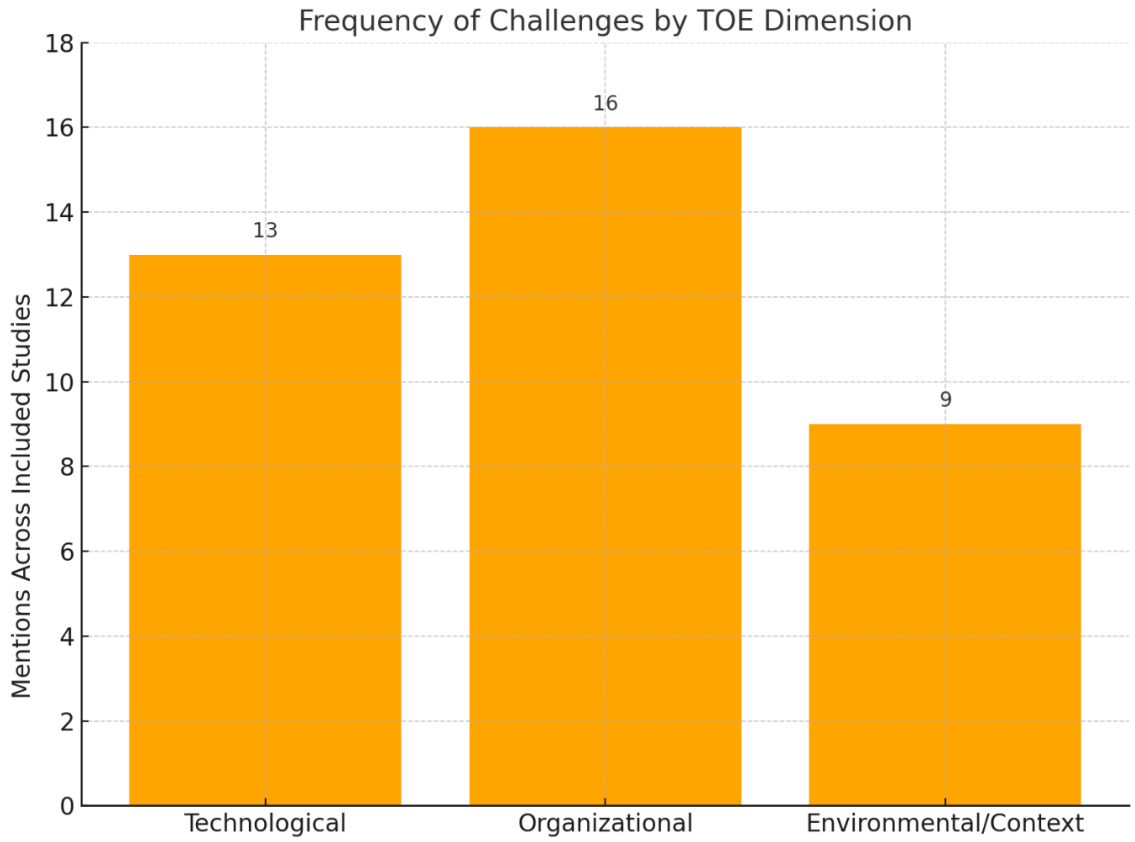

Figure 4. Frequency of Challenges by TOE Dimension.

Table 4. Public vs. Private Deployments: Salient Contrasts with Implementation Implications

Dimension	Public sector tendency	Private sector tendency	Implementation implication	Key sources
Governance & cadence	Statutory controls; auditability; slower change windows	Results-driven; faster sprints	Prioritize compliance & transparency controls; plan phased releases	[6], [8], [9]
Configuration scope	Lower configurability; open tendering	Greater UX latitude	Balance audit trails with usability; ensure bidder access	[6]
Outcomes focus	Compliance & transparency	*Cycle-time*, cost, enablement	Tailor KPIs and training to context	[3], [4]

Table 5. Sustainability and Compliance Capabilities Observed in Platforms

Capability	How supported	Data sources	Limitations	Evidence
Scope-3 estimation	Supplier questionnaires; emission factors; spend-based models	Supplier data; LCI databases	Coverage and verification gaps	[7]
Supplier diversity & human-rights	Metadata capture; attestations; alerts	Registries; open-data sources	Self-declaration bias; data freshness	[18]
Modern-slavery checks	Attestations; watch-list screening; workflow blocks	NGO lists; government advisories	Jurisdictional variance	[9]

6. Conclusions and Future Work

The 2020–2025 literature depicts e-procurement as a platform story: integrated suites where outcomes hinge less on any single feature and more on the quality of integration, data stewardship, and organizational readiness. Public-private contrasts endure, though both sectors converge on API-first architectures and an expanding role for analytics and AI. Empirical evidence is strongest for cycle-time and compliance improvements; proof of durable cost and sustainability gains is promising but not yet universal. Research priorities include comparative evaluations across platforms and sectors, governance for AI-assisted decision-making, and robust supplier-data pipelines that support ESG reporting without undue burden or bias.

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