InCAF PROCEEDING OF INTERNATIONAL CONFERENCE ON ACCOUNTING AND FINANCE

Volume 4, 2026, PP: 262-278

Public procurement fraud: a systematic review and bibliometric analysis of global evidence

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Abstract

Public procurement fraud remains a pervasive issue undermining governance and economic efficiency worldwide. This study conducts a systematic literature review to identify the determinants of public procurement fraud and assess its impacts. Given the critical role of public procurement in government spending, understanding the factors that drive fraud and its consequences is essential to improving procurement systems and governance. Using the PRISMA methodology, this study systematically analyzes 86 academic articles published between 2010 and 2024 from the Scopus database. The findings show that procurement fraud is primarily drive by inadequeate regulatory oversight, excessive discretion in decision-making, and limited use of monitoring and transparency. Its impacts are far-reaching, including significant financial losses, reduced quality of goods and services, and diminished public trust in government institutions. The lack of accountability and transparency further exacerbates these challenges. This review offers a comprehensive synthesis of contemporary research, providing valuable insights for policymakers, procurement practitioners, and scholars. It clarifies the complex nature of procurement fraud, strengthens understanding of the issue and lays a foundation for future strategies to curb fraud and improve procurement practices.

Keywords: accountability; determinant; fraud; impact; public procurement

INTRODUCTION

Public procurement is a fundamental aspect of government administration, involving the allocation of national budgets for goods, services, and infrastructure projects. In many countries, this sector accounts for 12 % - 30 % of GDP, making it vital component of economic governance (Basheka et al., 2013; Dávid-Barrett & Fazekas, 2019; Ferwerda et al., 2017; Langr, 2018; Lyra et al., 2022). However, the complexity of procurement processes, insufficient oversight, and lack of transparency create significant opportunities for corrupt practices, including collusion, bribery, and inflated contract pricing (Detkova et al., 2018; Mizoguchi & Van Quyen, 2014; Tkachenko et al., 2017).

Key drivers of corruption in public procurement include political pressure (Dávid-Barrett & Fazekas, 2019; Khamitov et al., 2023), institutional weaknesses (Mizoguchi & Van Quyen, 2014; Williams-Elegbe, 2018), and entrenched patronage cultures (Davis et al., 2024; Hessami, 2014; Waxenecker & Prell, 2024). In countries such as Indonesia, Kazakhstan, and Russia, limited competition and weak institutional integrity further distort resource allocation, which raises procurement costs and reducing project efficiency (Detkova et al., 2018; Harpe, 2013; Hessami, 2014; Langr, 2018; Yustiarini & Soemardi, 2020). In others cases, such as Costa Rica and the Czech Republic, corruption manifests in the manipulation of tenders through repeated contract awards to the same suppliers, enabling collusion between officials and corporations (Langr, 2018; Murillo et al., 2023; Tkachenko et al., 2017).

Corruption in public procurement has severe financial and social consequences. Beyond inflating service costs by as much as 25%, it diverts funds from critical sectors such as education

and healthcare toward projects that benefit particular individuals, thereby limiting public access to essential services (Ateljevic & Budak, 2010; Ferwerda et al., 2017; Mizoguchi & Van Quyen, 2014; Tkachenko et al., 2017). These effects are especially pronounced in developing countries, where corruption contributes to delayed or abandoned infrastructure projects which hinders economic development and deepening social inequalities (Langr, 2018; Murillo et al., 2023; Yustiarini & Soemardi, 2020).

In this study, the terms "fraud" and "corruption" in public procurement are closely related but not entirely synonymous. While corruption broadly refers to the abuse of public office for private gain, fraud typically involves deliberate deception intended to secure unlawful advantage. However, in the context of public procurement, these phenomena often overlap—such as in collusive bidding, bribery, or bid rigging—where both fraudulent mechanisms and corrupt intent are present. For the purpose of this review, the study treats them as interrelated components of a broader integrity failure in procurement systems. As such, both terms are used interchangeably when discussing patterns, causes, and consequences of misconduct in public procurement, unless otherwise specified in specific studies reviewed.

Efforts to combat corruption in public procurement require comprehensive strategies that leverage contemporary technologies such as blockchain to enhance transparency and accountability (Agustin F, & Susilowati, 2019; Alves Batista, 2024). In several European Union countries, the introduction of e-procurement systems and the use of data-driven risk indicators have proven effective in reducing opportunities for collusion and manipulation (Fazekas et al., 2021; Murillo et al., 2023). Additionally, institutional reforms, including the strengthening of internal and external monitoring systems, improve resource allocation and help restore public trust in government performance.

Since 2010, the global nature of procurement fraud has evolved in both scope and complexity. The increasing globalization of supply chains, growth of cross-border infrastructure projects, and rise of digital procurement platforms have transformed how fraud is committed and concealed. While traditional forms of fraud such as collusion and bribery persist, recent years have seen the emergence of more sophisticated tactics—such as algorithmic manipulation of tender platforms, use of shell companies in multiple jurisdictions, and abuse of emergency procurement regulations during crises like the COVID-19 pandemic. This evolution justifies the need for a time-bound review starting in 2010, capturing both conventional and emerging global dynamics of procurement fraud.

This study contributes novelty by integrating a systematic literature review and bibliometric analysis to examine public procurement fraud through both institutional-level and individual-level perspectives. While most prior studies predominantly focus on institutional weaknesses and regulatory failures, this research also highlights underexplored individual-level drivers such as personal motivations, behavioral tendencies, and ethical considerations. Furthermore, the mapping of emerging technologies—such as blockchain, artificial intelligence, and machine learning—offers a forward-looking lens to strengthen fraud detection and prevention strategies. By combining these levels of analysis with bibliometric mapping, this study provides a more comprehensive and nuanced understanding of procurement fraud across diverse global contexts.

METHODS

This study examines fraudulent practices in the procurement of public goods and services and evaluates their impacts using a systematic literature review (SLR) approach. It further analyzes how accountability and transparency contribute to addressing procurement fraud. The study aims to provide comprehensive insights by answering the following research questions (RQs):

RQ1: What are the factors that influence the occurrence of fraud in public procurement?

RQ2: What are the impacts of fraud in public procurement?

This study employs a Systematic Literature Review methodology, utilizing two primary techniques: the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

protocol (Liberati et al., 2009; Page et al., 2021) and bibliometric analysis through VOSviewer. PRISMA is implemented in four stages — identification, screening, eligibility, and inclusion — using explicit criteria to select relevant articles from the Scopus database, as follows:

1) Identification:
   Relevant articles were identified using the keywords "public procurement" AND (fraud OR corruption OR crime). These terms were chosen based on prior literature and expert input to capture the main aspects of procurement fraud. An initial search returned 153 articles. Articles published before 2010 (n=16) were excluded, leaving 137. The 2010 cut-off year reflects a shift in the literature toward data-driven approaches such as machine learning and network analysis, which became more prominent after this period. The search was limited to the Scopus database due to its wide coverage of peer-reviewed literature and compatibility with bibliometric tools such as VOSviewer. However, this may exclude relevant studies from regions less indexed in Scopus, particularly some developing countries. This limitation is acknowledged and discussed in relation to the geographical concentration of research in later sections.
2) Screening:
   Document types were filtered to include only journal articles, conference papers, and reviews, while excluding book chapters, books, and other formats. This reduced the dataset to 102 documents. To ensure consistency and ease of interpretation, only English-language publications were retained, resulting in 86 articles after excluding 16 non-English entries.
3) Eligibility and Inclusion:
   The remaining articles underwent a full-text review to assess relevance and quality. All 86 articles passed this stage and were included for data extraction and synthesis. These studies were analyzed to explore fraud patterns, contributing factors, impacts, and mitigation strategies in public procurement.

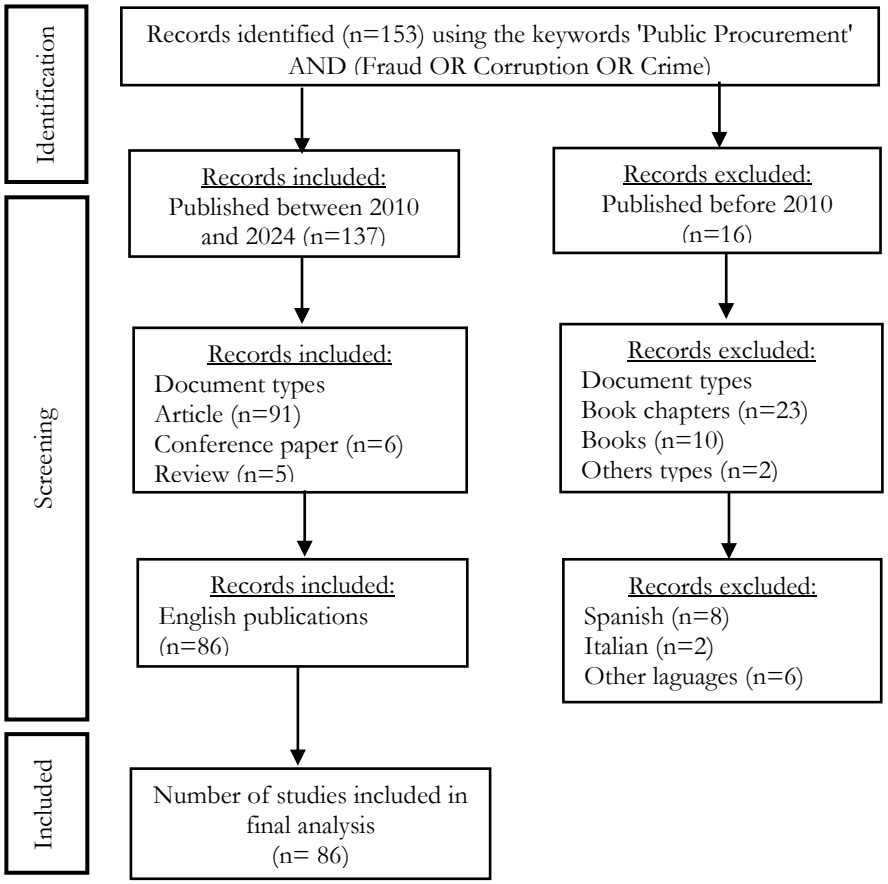

Figure 1. PRISMA flow diagram

In addition to following the PRISMA protocol, this study employed bibliometric methods and co-word cluster analysis using VOSviewer to map keyword relationships, identify research clusters, and highlight emerging trends in public procurement fraud. To complement this, a manual qualitative content analysis was conducted on all 86 included articles. Key findings, author arguments, and contextual insights were thematically coded to extract specific patterns related to determinants and impacts. This process informed the construction of Table 2 and Table 3, where author references were systematically linked to each identified theme.

RESULTS AND DISCUSSION

The PRISMA diagram (Figure 1) presents the final sample of 86 articles selected after screening. These articles were classified according to key themes and objectives. To deepen the analysis, the study further classifies research outputs into dominant themes, as illustrated in Figure 4. These thematic categories not only demonstrate the breadth of scholarly focus but also help identify the most influential contributions in the field.

Influential Works and Citation Trends

An analysis of citations reveals that Hessami's 2014 study is the most influential, followed by others with significant contributions (Table 1). Hessami's study is notable for applying a two-stage rent-seeking model to analyze the correlation between political corruption and public expenditure composition in OECD countries. Although these countries typically exhibit lower levels of corruption, the study reveals that corruption still shapes budget allocations, particularly for high-tech procurements outside competitive frameworks.

Europe leads in public procurement fraud research, with Italy contributing significantly to transparency and governance issues (Baldi et al., 2016; Decarolis & Giorgiantonio, 2020; Fazekas & Kocsis, 2020; Lisciandra et al., 2022). Scandinavian nations, recognized for minimal corruption, emphasize efficient and abuse-free procurement practices (Transparency International, 2024). Asia accounts for 17 articles, predominantly focusing on Indonesia, where corruption levels remain high (CPI 37, rank 99) with studies exploring fraud motivations, governance, and blockchain applications (Prakasa et al., 2022, 2023; Rustiarini, T., et al., 2019; Zulaikha et al., 2020). India (CPI 38) underscores corruption challenges across South Asia. Africa contributes 11 studies, focusing on moral-based anti-corruption initiatives (Mubangizi & Sewpersadh, 2017; Ntayi et al., 2013), while the Americas offer 9 studies, with the U.S. and Canada emphasizing technology-driven detection approaches (Murillo et al., 2023; Velasco et al., 2021).

Table 1. Most Cited Articles

Rank	Tittle / Authors / Year	Citations
1	Political Corruption, Public Procurement, and Budget Composition: Theory and evidence from OECD countries (Hessami, 2014)	122
2	An Objective Corruption Risk Index Using Public Procurement Data (Fazekas et al., 2016)	114
3	Uncovering High-Level Corruption: Cross-National Objective Corruption Risk Indicators Using Procurement Data (Fazekas & Kocsis, 2020)	105
4	Careers, Connections, and Corruption Risks: Investigating the Impact of Bureaucratic Meritocracy on Public Procurement Processes (Charron et al., 2017)	95
5	Exploring Corruption Practices in Public Procurement of Infrastructural Projects in Ghana (Osei-Tutu et al., 2010)	89
6	Lights on the Shadows of Public Procurement: Transparency as an Antidote to Corruption (Bauhr et al., 2020)	76
7	Why People Commit Public Procurement Fraud? The Fraud Diamond View (Rustiarini, T., et al., 2019)	61

Rank	Tittle / Authors / Year	Citations
8	Corruption in Public Procurement: Finding the Right Indicators (Ferwerda et al., 2017)	53
9	Grand Corruption and Government Change: An Analysis of Partisan Favoritism in Public Procurement (Dávid-Barrett & Fazekas, 2019)	53
10	A Decision Support System for Fraud Detection in Public Procurement (Velasco et al., 2021)	37

Geographical Distribution of Research

In general, only a limited number of researchers conduct cross-country studies, with most of focusing on European contexts (Bauhr et al., 2020; Ferwerda et al., 2017; Grødeland & Aasland, 2011; Hessami, 2014; Mazza, 2016; Mizoguchi & Van Quyen, 2014; Souissi-Kachouri & Guizani-Jelassi, 2023). Most researchers tend to focus their studies on their home countries. This trend creates a research gap, given the limited number of comparative studies between countries, particularly due to the scarcity of comparative studies involving developing countries that continue to face significant challenges in public procurement.

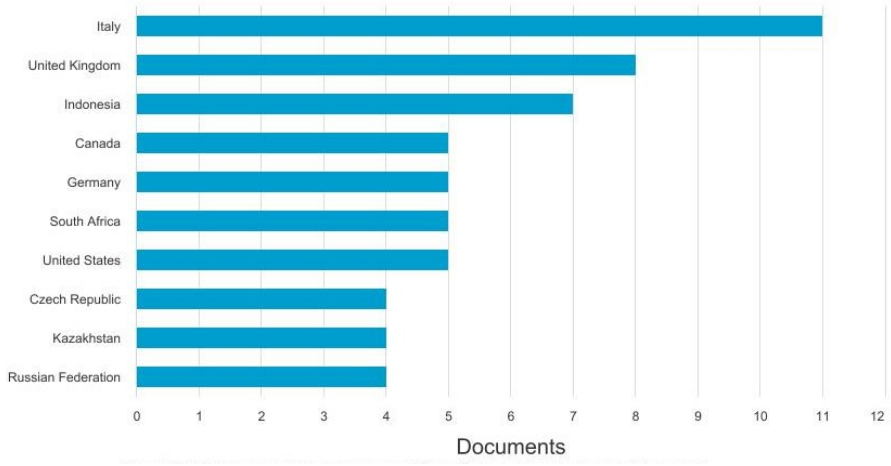

Figure 2. Geographical Concentration

The prominence of Italy in Figure 2 likely reflects a combination of factors rather than a single cause. While corruption is a recognized issue in Italian public procurement, this alone may not explain the high volume of academic output. A more probable explanation lies in the country's strong research culture in public administration and the availability of accessible procurement data, which enables quantitative and policy-oriented studies. In contrast, regions like Asia and Africa remain underrepresented not necessarily due to the absence of procurement challenges, but rather due to limited academic infrastructure, data accessibility issues, and lower international visibility of local journals. This imbalance reinforces the need for more comparative and cross-regional research, especially in developing countries that face systemic procurement vulnerabilities but are less documented in the global literature

Theoretical Clusters and Framework Progression

Based on VOSviewer output (Figure 3), studies on public procurement fraud grouped into three clusters, with the 2016-2018 dark blue cluster focusing on institutional frameworks and governance. Keywords such as public contract, auction, and bidder reflect the influence of Institutional Theory, which explains organizational isomorphism driven by external pressures (DiMaggio & Powell, 1983). This perspective emphasizes transparency in procurement (Fazekas et al., 2016; Jahmurataj & Zejnullahu, 2022; Lisciandra et al., 2022; Nemec et al., 2023; Pedro, 2023), legal rules (Gong & Zhou, 2015; Grødeland & Aasland, 2011; Harpe, 2013; Katayev et al., 2019;

Pashev, 2011; Thomann et al., 2024), and auction process (Davis et al., 2024; Pashev, 2011). When institutions fail to maintain transparency, their inadvertently foster corruption in procurement processes.

Closely related is Good Governance, which underscores accountability, regulatory effectiveness, and public policy as crucial elements of fraud mitigation. Within this framework, research on public procurement highlights responsibility (Junusbekova & Khamitov, 2021; Ochrana & Pavel, 2013; Psota et al., 2020; Yustiarini & Soemardi, 2020), and the role of policies, particulary regulatory measures (Miranzo Díaz et al., 2023; Mungiu-Pippidi & Toth, 2023; Peneda et al., 2024), in strengthening procurement systems in line with good governance principles.

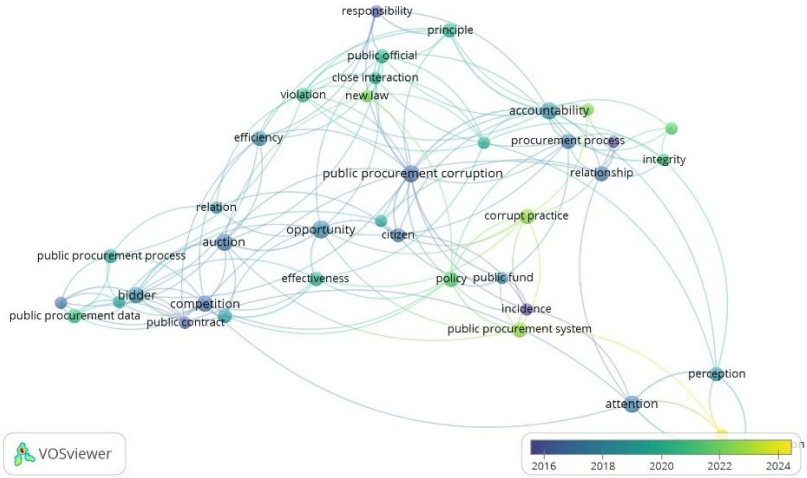

Figure 3. Theoretical Framework

The teal-green cluster (2019–2021), centered on terms such as efficiency, accountability, relationship, citizen, corrupt practice, public official, and close engagement, marks a shift towards examining social dynamics and legal structures in addressing procurement fraud. Civic engagement and whistleblowing also emerge as crucial themes; citizens act as deterrents to fraud (Basheka et al., 2015; Prakasa et al., 2022), while whistleblowers serve as critical informants in opaque environments (Gottschalk & Smith, 2016). Furthermore, Fraud Triangle and Fraud Diamond Theory have been applied to explain fraud mechanisms through pressure, opportunity, rationalization, and personal capability. Zulaikha et al. (2020), Ifejika (2024), and Osei-Tutu et al. (2010) demonstrated how weaknesses in internal control systems and individual justifications for unethical behavior foster fraudulent conduct.

The transition from Institutional Theory to Neo-Institutional Theory (2019-2021) reflects a response to criticisms of the former's rigidity. Neo-Institutional Theory integrates variables such as excessive officer discretion (Gnoffo, 2021) and political instability (Khamitov et al., 2023), offering a more comprehensive lens on systemic weaknesses. From 2022 to 2024, research increasingly emphasizes technological solutions for transparency, including blockchain, artificial intelligence (AI), and machine learning. Blockchain technology (Haber & Stornetta,1991) enables tamper-proof documentation and smart contracts for fraud prevention (Weingärtner et al., 2021). Machine learning has been shown to outperform traditional statistical models in fraud detection (Modrušan et al., 2021; Nai et al., 2022). Despite their promise, however, these technologies remain underexplored in academic research.

Several scholars combine multiple theories to achieve a multidimensional understanding of procurement corruption. Hessami (2014) integrates Rent-Seeking and Grabbing Hand Theories to illustrate how political lobbying enables illicit gains. Similarly, Hudon & Garzón (2016) combine Procurement Corruption, Network and Coalition, and Entrepreneurship Theories to depict how "criminal entrepreneurs" exploit procurement systems.

Although institutional frameworks such as Good Governance and Institutional Theory have been persistently co-utilized from 2010 to 2024 studies employing the individual unit of analysis remain limited. Notable exceptions include Basheka et al. (2013) and Gottschalk & Smith (2016), along with more recent contribution (Ifejika, 2024; Kang et al., 2023; Osei-Tutu et al., 2010; Rustiarini, Sutrisno, et al., 2019; Rustiarini, T., et al., 2019; Zulaikha et al., 2020). This gap provides an opportunity for future research to concentrate on individual-level theories for identifying fraud in public procurement.

Moreover, technologies such as machine learning and blockchain (Alves Batista, 2024; Modrušan et al., 2021; Nai et al., 2022; Rabuzin & Modrušan, 2019; Weingärtner et al., 2021) remain under researched despite their substantial potential to enhance fraud detection and mitigate corruption in procurement. The growing significance of these technologies indicates a promising direction for future studies to investigate their capacity improving governance and reducing corruption.

Research Themes and Keyword Clusters

Figure 4 highlights measurement and risk assessment as the dominant theme in the literature, with studies focusing on corruption risk indices, data analysis, and fraud detection methods like machine learning and data mining to mitigate procurement fraud (Brianzoni et al., 2011; Fazekas & Kocsis, 2020; Grødeland & Aasland, 2011; Khamitov et al., 2023; Modrušan et al., 2021; Thomann et al., 2024). The second key theme involves technology and innovation, with 11 studies exploring blockchain, AI, and machine learning to enhance transparency in procurement (Modrušan et al., 2021; Nai et al., 2022; Prakasa et al., 2023; Rabuzin & Modrušan, 2019).

The dominance of this theme reflects a wider shift in research methodology since 2010, as scholars increasingly adopt computational and data-driven approaches to address procurement fraud. The growing availability of open procurement data and advances in digital infrastructure have enabled the application of tools such as anomaly detection, algorithmic red-flag indicators, and predictive modeling. These approaches allow for more objective, real-time identification of risk patterns—moving beyond traditional qualitative assessments. As a result, measurement-focused studies have become central in efforts to quantify fraud risk and support evidence-based policymaking in public procurement systems.

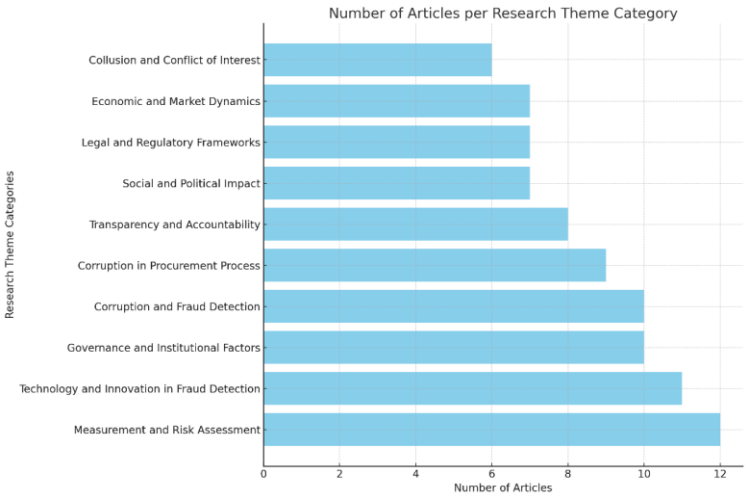

Figure 4. Research Themes

The category of governance and institutional factors (Basheka et al., 2015; Brianzoni et al., 2011; Charron et al., 2017; Grødeland & Aasland, 2011; Harpe, 2013; Psota et al., 2020) underscores the critical role of institutional and governance mechanisms in combating corruption, as well as the importance of independent entities in supervising procurement. Additional categories, including

social and political impact (Gong & Zhou, 2015; Sewpersadh & Mubangizi, 2017) and collusion and conflict of interest (Dastidar & Mukherjee, 2014; Kang et al., 2023), highlight how social and political dynamics significantly shape the extent of corruption in public procurement.

Determinant Factors Of Fraud Public Procurement

Table 2 identifies the main determinants—anti-corruption laws, technological advances, political influence, and red-flag indicators—addressing RQ1 on the factors affecting corruptiom in public procurement. Legal frameworks, including public procurement regulations and anti-corruption legislation (Grødeland & Aasland, 2011; Jones, 2021; Junusbekova & Khamitov, 2021; Kostić & Matić Bošković, 2021; Pedro, 2023; Sewpersadh & Mubangizi, 2017; Toeba, 2018; Yustiarini & Soemardi, 2020) are central to preventing fraud, underscoring the persistent need for robbust policies and laws.

Political influence considerably heightens corruption risks in procurement processes. Davis et al. (2024) argue that a meritocratic bureaucracy can reduce corruption by weakening political ties in procurement. High political power concentration, as measured by the Herfindahl-Hirschman Index (HHI), correlates with to greater corruption potential, as evidenced in the Philippines, where dynastic politics undermine oversight. Similarly, in Guatemala, local governments frequently favor politically connected firms, perpetuating clientelism (Waxenecker & Prell, 2024). Charron et al. (2017) also emphasize the link beetwen meritocracy and corruption mitigation.

Fraud in procurement encompasses elements such as pressure, opportunity, rationalization, capability, attitude, and moral frameworks. Pressure often originates from superiors or colleagues (Rustiarini, Sutrisno, et al., 2019; Rustiarini, T., et al., 2019), while individual power and rank enable the exploitation of control weaknesses (Ifejika, 2024; Rustiarini, Sutrisno, et al., 2019). Cultural and social experiences shape moral schemas, allowing individuals to justify corrupt acts (Ntayi et al., 2013). The effectiveness of whistleblowers depends on their trust in the system and assurance of protection against retaliation (Gottschalk & Smith, 2016).

Technological innovations also play a crucial role in combating procurement fraud. Artificial intelligence and machine learning support detection by automating processes (Nai et al., 2022; Rabuzin & Modrušan, 2019). Blockchain enhances transparency and trust (Agustin F, & Susilowati, 2019; Alves Batista, 2024), while tools such as e-procurement, e-auctions, smart contracts, and decision support systems further strengthen efficiency and accountability (Belokrylov, 2017; Prakasa et al., 2023; Velasco et al., 2021; Weingärtner et al., 2021).

Red-flag indicators highlight corruption risks, including limited competition, unusual procurement methods, short bidding periods, and inflated prices (Decarolis & Giorgiantonio, 2020; Fazekas et al., 2016; Ferwerda et al., 2017; Gnaldi & Del Sarto, 2024). Additional warning signs include contract modifications and inadequate documentation raise red flags. Machine learning methods such as random forests can improve detection though their interpretation, requires caution particularly during crise (Gnaldi & Del Sarto, 2024).

Table 2. Determinants In Public Procurement Corruption

Determinants	Findings	Authors
Anti-corruption law	Positive	Jones, 2021; Junusbekova & Khamitov, 2021; Kostić & Matić Bošković, 2021; Mubangizi & Sewpersadh, 2017; Pedro, 2023; Harpe, 2013
Artificial intelligence	Positive	Nai et al., 2022
Attitudes	Positive	Zulaikha et al., 2020
Attitudes towards law	Neutral	Grødeland & Aasland, 2011
Blockchain technology	Negative	Agustin F, & Susilowati, 2019
Bribery	Negative	Mizoguchi & Van Quyen, 2014
Capability	Positive	Rustiarini, Sutrisno, et al., 2019; Rustiarini, T., et al., 2019
Citizen-driven approaches	Negative	Basheka et al., 2015
Codes of ethics	Negative	Miranzo Díaz et al., 2023

Determinants	Findings	Authors
Collusion	Positive	Waxenecker & Prell, 2024
Competition among bidders	Negative	Psota et al., 2020
Control mechanisms	Positive	Kostić & Matić Bošković, 2021
Individual behavior	Positive	Zulaikha et al., 2020
Corruption	Negative	Clark et al., 2018; Detkova et al., 2018; Langr, 2018; Osei-Tutu et al., 2010; Ateljevic & Budak, 2010; Brianzoni et al., 2011, 2015; Gnoffo, 2021; Mohsen et al., 2020
Corrupt contracting officer	Negative	Mizoguchi & Van Quyen, 2014
Corrupt coalitions	Positive	Hudon & Garzón, 2016
Corruption levels	Positive	Junusbekova & Khamitov, 2021
Corruption Perceptions Index	Positive	Hessami, 2014
Decentralization	Negative	Souissi-Kachouri & Guizani-Jelassi, 2023
Decision Support System	Positive	Velasco et al., 2021
Entertainment expenses	Negative	Kang et al., 2023
E-procurement	Positive	Anguelov, 2019; Prakasa et al., 2023
EU legislation	Positive	Ateljevic & Budak, 2010; Pashev, 2011
EU's Directives	Neutral	Oosthoek, 2022; Mungiu-Pippidi & Toth, 2023
Extra-legal governance organizations	Positive	Fazekas et al., 2021
Fiscal and economic	Positive	Davis et al., 2024
Fraudulent practices	Positive	Ifejika, 2024
Mayor's gender	Neutral	Peneda et al., 2024
Good governance	Positive	Basheka et al., 2013; Katayev et al., 2019
Government transition	Neutral	Falcón-Cortés et al., 2022
Human rights-based	Positive	Mubangizi & Sewpersadh, 2017
Information technologies	Positive	Murillo et al., 2023
Institutional strength	Negative	Rendon & Rendon, 2015; Williams-Elegbe, 2018; Baldi et al., 2016; Nemec et al., 2023
Level of education	Positive	Peneda et al., 2024
Machine-learning	Positive	Rabuzin & Modrušan, 2019
Marketization	Positive	Gong & Zhou, 2015
Moral schemas	Negative	Ntayi et al., 2013
Mutual Debarment Enforcement	Positive	Nesti, 2014
Norms	Positive	Zulaikha et al., 2020
Organised criminal	Positive	Mazza, 2016
Opportunity	Positive	Rustiarini, Sutrisno, et al., 2019; Rustiarini, T., et al., 2019
Partisan favoritism	Positive	Dávid-Barrett & Fazekas, 2019
Pressure	Positive	Rustiarini, Sutrisno, et al., 2019; Rustiarini, T., et al., 2019
Political dynasties	Positive	Davis et al., 2024
Political influence	Positive	Ateljevic & Budak, 2010; Charron et al., 2017, 2017; Dávid-Barrett & Fazekas, 2019; Khamitov et al., 2023; Waxenecker & Prell, 2024; Williams-Elegbe, 2018
Populist governments	Positive	Bernatt & Jones, 2023
Principal-agent contract	Negative	Huirong, 2018
Principal-agent dynamics	Positive	Mohd Yusof et al., 2024
Project complexity	Positive	Baldi et al., 2016
Procurement law	Negative	Grødeland & Aasland, 2011; Toeba, 2018; Yustiarini & Soemardi, 2020
Procurement law	Positive	Anguelov, 2019; Kuatova, 2013; Paschal, 2012; Thomann et al., 2024; Yaacoub, 2024
Procurement law	Neutral	Prakasa et al., 2022

Determinants	Findings	Authors
Rationalization	Positive	Rustiarini, Sutrisno, et al., 2019; Rustiarini, T., et al., 2019
Red-flags	Positive	Decarolis & Giorgiantonio, 2020; Fazekas et al., 2016; Fazekas & Kocsis, 2020; Ferwerda et al., 2017; Gnaldi & Del Sarto, 2024
Single bidding	Positive	Fazekas & Kocsis, 2020
Smart contract	Negative	Weingärtner et al., 2021
Tender transparency	Positive	Ochrana & Pavel, 2013; Bauhr et al., 2020
Transparency	Negative	Yustiarini & Soemardi, 2020
Whistleblowers	Negative	Miranzo Díaz et al., 2023

While Table 2 summarizes the key determinants of procurement fraud, some findings show inconsistencies. For example, procurement law appears as a positive, negative, and neutral factor across different studies. These conflicting results are likely influenced by contextual variations such as the stage of legal reform, the strength of enforcement institutions, and the broader governance environment. In countries where procurement laws are newly introduced or poorly implemented, their impact may be minimal or even counterproductive. In contrast, jurisdictions with established regulatory systems and stronger oversight mechanisms tend to experience more positive outcomes. Additionally, the sector under analysis—such as construction versus healthcare—as well as the presence of political interference, can influence how legal frameworks function in practice. These discrepancies highlight the importance of interpreting determinants within their specific contexts rather than applying them universally.

Impact Factors Of Fraud Public Procurement

To address RQ2 on the impact of fraud in public procurement, Table 3 presents key research categories, with corruption being the dominant focus. Studies highlight the effectiveness of AI and machine learning in detecting risks through indicators such as urgency, negotiation procedures, and deadline compliance (Decarolis & Giorgiantonio, 2020). Random forest algorithms enhance prediction accuracy, while text mining and machine learning uncover anomalies—such as single-bidder bids by utilizing unstructured data (Rabuzin & Modrušan, 2019). Decision Support Systems (DSS) employ theory and regression analysis to identify patterns like collusion and conflicts of interest. Thereby helping law enforcement focus on the most cririca situations (Velasco et al., 2021). Neural networks and natural language processing (NLP) further improve anomaly detection, though they require high-quality, well-labeled data (Modrušan et al., 2021).

Research also emphasizes behavioral and institutional drivers of corruption, showing that weak oversight and accountability foster misconduct (Rustiarini, Sutrisno, et al., 2019; Zulaikha et al., 2020). The economic impacts are significant, particularly in terms of bid quality and pricing. Dastidar & Mukherjee (2014); Kang et al. (2023) illustrate that corruption inflates procurement costs and reduces the quality of goods and services, ultimately harming national economies. Furthermore, Brianzoni et al. (2015) highlight the long-term consequences of corruption on economic efficiency and public sector investment, underscoring its adverse effects on economic growth and stability.

Table 3. Impacts In Public Procurement Corruption

Impact variables	Authors
Corruption	Agustin F, & Susilowati, 2019; Anguelov, 2019; Ateljevic & Budak, 2010; Basheka et al., 2015; Bernatt & Jones, 2023; Dávid-Barrett & Fazekas, 2019; Falcón-Cortés et al., 2022; Fazekas et al., 2021; Ferwerda et al., 2017; Gong & Zhou, 2015; Grødeland & Aasland, 2011; Harpe, 2013; Huirong, 2018; Jahmurataj & Zejnullahu, 2022; Jones, 2021; Kang et al., 2023; Khamitov et al., 2023; Kuatova, 2013; Langr, 2018; Miroslav et al., 2014; Mohd Yusof et al., 2024; Mungiu-Pippidi & Toth, 2023; Nesti, 2014; Ntayi et al., 2013; Oosthoek, 2022; Pashev, 2011; Pedro, 2023; Prakasa et al., 2022, 2023; Psota et al., 2020;

Impact variables	Authors
	Sewpersadh & Mubangizi, 2017; Souissi-Kachouri & Guizani-Jelassi, 2023; Toeba, 2018; Weingärtner et al., 2021; Williams-Elegbe, 2018; Yaacoub, 2024; Yustiarini & Soemardi, 2020; Bauhr et al., 2020; Charron et al., 2017; Gnaldi & Del Sarto, 2024; Miranzo Díaz et al., 2023; Peneda et al., 2024; Sharma et al., 2019; Thomann et al., 2024; Decarolis & Giorgiantonio, 2020; Murillo et al., 2023; Rabuzin & Modrušan, 2019; Fazekas & Kocsis, 2020; Paschal, 2012; Zulaikha et al., 2020
Fraud detection	Lyra et al., 2022; Modrušan et al., 2021; Nai et al., 2022; Velasco et al., 2021; Alves Batista, 2024
Corruption risk indicators	Davis et al., 2024; Fazekas et al., 2016; Lisciandra et al., 2022
Corruption reduction	Katayev et al., 2019; Mubangizi & Sewpersadh, 2017
Effectivenes	Mohsen et al., 2020; Junusbekova & Khamitov, 2021; Nemec et al., 2023; Kostić & Matić Bošković, 2021
Bid quality	Kang et al., 2023; Mizoguchi & Van Quyen, 2014
Collusion	Bernatt & Jones, 2023; Jones, 2021
Economic	Ifejika, 2024; Osei-Tutu et al., 2010; Brianzoni et al., 2011, 2015
Auctions	Clark et al., 2018; Detkova et al., 2018
Contract allocations	Waxenecker & Prell, 2024
Local government performance	Basheka et al., 2015; Gnoffo, 2021
Overpricing contracts	Tkachenko et al., 2017
Procurement mechanism	Baldi et al., 2016; Hudon & Garzón, 2016; Ochrana & Pavel, 2013
Procurement quality	Dastidar & Mukherjee, 2014
Public spending	Hessami, 2014
Transparency	Belokrylov, 2017
White-Collar Corruption	Gottschalk & Smith, 2016

DISCUSSION

This study has several limitations. One is that the database is restricted to Scopus, which, while comprehensive, may exclude relevant articles from journals not indexed. Another limitation is the time frame of 2010 – 2024, which narrows the scope and may omit important research published before 2010 or after 2024 that could contribute to a broader understanding of public procurement fraud.

Several research gaps remain, a key gap is the predominant emphasis on institutional-level analyses, while individual-level analysis in fraud detection remains underexplored (Figure 3). Institutional approaches (Fazekas et al., 2016; Jahmurataj & Zejnullahu, 2022; Lisciandra et al., 2022; Nemec et al., 2023; Pedro, 2023) effectively highlight external factors such as weak regulations and oversight as drivers of fraud. However, they often overloook the role of individuals who exploit these weakness even within systems designed to prevent fraud. Individual-level analysis, examining psychological and social factors influencing fraudulent behavior (Ifejika, 2024; Rustiarini, T., et al., 2019), would complement institutional perspectives and strengthen fraud detection strategies.

This gap is further emphasized by the findings presented in Table 2, where several individual-level factors such as pressure, opportunity, rationalization, and capability frequently emerge as determinants of fraud. These factors align closely with behavioral theories like the Fraud Diamond, indicating that fraud often stems not only from systemic weaknesses but also from personal motivations and internal justifications. Despite this, most studies continue to prioritize institutional explanations. Addressing this gap through deeper individual-level analysis could provide more targeted insights for fraud prevention strategies, especially those aimed at behavioral interventions within procurement actors.

Cross-country comparisons, particularly in developing countries in Asia and Africa, are also lacking (Figure 2). These regions, which report higher corruption levels according to Transparency International, would benefit from studies that compare fraud practices and assess the effectiveness of universal and country-specific solutions in public procurement. For example, analyzing the success of e-procurement and blockchain adoption could highlight models transferable across contexts.

Finally, a significant gap in the limited exploration of hybrid machine learning approaches for fraud detection. While individual techniques such as decision trees, support vector machines, and regression models have been employed, each has inherent limitations. Hybrid models that combine these techniques could leverage their respective strengths to improve detection accuracy and resilience (Nai et al., 2022; Rabuzin & Modrušan, 2019). Moreover, integrating AI with blockchain could further reinforce fraud detection systems by ensuring data integrity through blockchain and enabling real-time fraud analysis with AI (Agustin F, & Susilowati, 2019; Weingärtner et al., 2021).

CONCLUSION

This study highlights factors influencing procurement fraud, such as insufficient control and lack of transparency, and discusses their impacts on governance. Fraud in public procurement generates substantial economic consequences through higher costs and reduced quality of goods and services, alongside social repercussions such as eroding public trust in the government.

Although their implementation remains limited, emerging technologies including artificial intelligence, machine learning, and blockchain demonstrate significant potential to enhance transparency and accountability in public procurement. This study underscores opportunities for future research that integrates modern technologies with cross-country comparative approaches to better identify, mitigate, and ultimately prevent procurement fraud.

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