



AI-Powered Fraud Detection in Public Procurement: Transforming Audit and Tax Compliance in the Digital Economy

Introduction

Public procurement contains governments and state-owned enterprises attaining goods, services, and works, revealing substantial public funding that produces prospects of efficiency and ethical procurement practices (Sampaio et al., 2026). Yet, fraud in the buying and sourcing procedure is a major issue, and high amounts of money are lost in the process, and public confidence eroded (Alves Batista, 2024). It is projected that the global economy loses more than 5% of its GDP due to corruption, and the leakage of over one trillion dollars in bribes annually (Sampaio et al., 2026). Procurement fraud is often among the top three most disruptive economic crimes the world over, after cybercrime and corruption (PwC, 2024).

As procurement systems have engraved their path into the virtual world, transactional information has grown in important and substantial volumes, providing opportunities as well as difficulties for fraud detection. Over time, the traditional fraud detection means based on rules are becoming inadequate to deal with the volume and complication of procurement data (OECD, 2024). Artificial Intelligence (AI), including machine learning (ML), offers a transformative mechanism— and methods to deduct, envisage and lessen fraud and corruption threat in a scale not possible before with traditional means (OECD, 2024).

It looks at how technologies powered by AI can be used for Fraud Detection in Public Procurement mainly through Audit and Tax Compliance Applications. The analysis reflects three main areas – (1) Anomaly detection with AI for detecting procurement fraud, (2) AI applications for monitoring tax compliance, and (3) AI changes to the audit process with automation. Furthermore, the ethical and practical insinuations of using AI in this field are observed, with a precise focus on the challenges of depending on AI tools so broadly.

The Landscape of Procurement Fraud and Tax Evasion

The Scale of the Problem

Procurement fraud can be considered as any type of illegal act that is committed with the intention of securing economic or other advantages in the procurement process of goods/services or contracts (Taxmann, 2024). Some general illustrations are invoice fraud, shell company schemes, supplier collusion, conflict of interest and bid rigging. The PwC Global

Economic Crime Survey 2024 found that procurement fraud ranked among the top three (along with revenue fraud and transfer pricing fraud) most disruptive economic frauds in the past two years, impacting 59% of all the respondents. Likewise, only 26% of organizations leverage data analytics to identify unusual bidding behavior, which is significant as there is still plenty of potential to make use of the technology in areas of detecting potential fraud techniques (PwC, 2024).

Limitation of Traditional Approaches

Conventional methods of fraud deterrence and detection are profoundly reliant on manual audits, rules-based systems and random sampling methods. The complicated and extensive nature of the procurement processes makes it challenging for these methods to deduct highly developed fraud designs (Salazar et al., 2024). A high number of false-positives is generated by rules-based systems, which are non-flexible to new types of fraud and human auditors struggle in processing large volumes of data (Sampaio et al., 2026). Furthermore, outdated approaches are reactive and not practical, meaning fraud is deducted after a significant amount of money has been lost, and not in real-time.

AI-Powered Fraud Detection Technologies

Machine Learning for Anomaly Detection

Machine learning algorithms are most superior in analyzing complex information, and provide excellent capability to detect anomalies that might easily be overlooked by human auditors. AI algorithms can examine massive amounts of data in just a few minutes when handling with public procurement data, tax records, or government expenses, which supports deduction anomalies that could show bribery, fraud, or embezzlement (Atta-ur-Rahman, 2025).



Machine learning permits these mechanisms to advance and get better over time, as they are exposed to increasingly more data to flag suspicious activity.

Supervised learning datasets consist of transactions which are labelled as fraudulent and legitimate, and classification models are developed using these datasets. Machine learning (ML) algorithms have proven successfully effective in sleuthing and prioritizing investigations of reported purchases in enterprise data, as this helps advance the effectiveness of an organization's control for the benefit of the organization. Rather, unsupervised learning techniques, like clustering and anomaly detection, detect patterns that deviate from those the training data has seen, and can therefore be utilized in spotting new fraud patterns, without the requirement of labelled training information.

VigIA is a tool developed to monitor public procurement using machine learning models in order to assist detection of inefficiencies as cost overrun and delivery delay, and risk indicators to highlight irregularities in the public procurement process (Salazar et al., 2024). In this data-driven method, the oversight agencies can focus their scarce resources on highest-risk contracting activities. Risk Guard is also one of the leaders in machine learning and transparent decision-support tools that detect unusual procurement patterns and risks, which include supervised and unsupervised machine learning, network science, and statistical/probabilistic modeling (Anonymous, 2024).

Natural Language Processing for Fraud Detection

Using Natural Language Processing (NLP) practices, anyone can get automated insight into unstructured procurement documents, such as tender documents, assessments, and contracts. The study directly aimed at evaluating the potential of automated corruption risk indicator detection and identification in procurement texts has been completed by analyzing state-of-the-art technologies for automated corruption risk indicator detection and making a comparative analysis of these technologies, and suggesting the application of the Contextual Transformer Models for scalable, transparent and operational anti-corruption monitoring systems (Salazar et al., 2024).

Social Network Analysis Applied to Collusion Detection

Traditional tools of detection fail to work as well with supplier collusion and conflicts of interest. With the help of Machine Learning and Social Network Analysis, it is feasible to identify fraudulent supplier relationships. Machine Learning together with Social Network Analysis can be a powerful tool to detect suspicious supplier relationships (Anonymous, 2025).

The models can further help detect corrupt activities in public procurement, such as repeated bidder groups, unusual supplier activity, etc., which can aid in doing due diligence including risk assessments. The use of this methodology was applied to information from Chilean public procurement, where it showed its possibilities of improving transparency and risking the reduction of corruption.

AI Use-Cases in Audit and Tax Compliance

AI-Enhanced Audit Processes

AI is substantially changing audit processes in the public sector. Audits of beneficiary schemes using the supremacy of AI/ML have exposed many more cases of frauds, evading the misuse of huge financial resources. AI-driven forensic audits can reveal fraud trends which can only be deducted by fraud machine learning.

In the domain of auditing, intelligent invoice verification systems prove to be a practical use of AI. Enhanced Apriori algorithm has very high verification efficiency, and its application, particularly in financial robots for normal, abnormal taxation, fraud supplier invoice, can be used in practice. These systems enable you to scan the procurement invoices against the procurement contracts, the delivery record, and tax filed documents on real-time basis.

AI for Tax Compliance Monitoring

AI is intensifying tax administrations' capabilities to reduce fraud and corruption by refining risk management processes, accompanying taxpayer compliance, and decreasing taxpayer burdens (OECD, 2024). Tax administrations can evade non-compliance by finding ways to mediate at earlier stages of taxpayer phases. AI-driven network analysis, blockchain verification, and computer vision have already proven operative for customs fraud detection, including under valuations, smuggling, and false goods classification (Anonymous, 2024). Similarly, AI solutions in VAT fraud have effectively drive to the investigation of carousel fraud, fake invoice systems, and handlings of refunds, and therefore allowed tax authorities to recover billions of dollars in loss in tax revenues.

Ethical Challenges and PRO-Trust Framework

Ethics of AI Fraud Prevention

As AI is employed in fraud detection, there are substantial ethical challenges at stake, including respect for human privacy, prevention of harm, equality, and explain ability (Sampaio et al., 2026). System opacity, lack of user transparency, automated explain ability tools confines, lack of operational error and lack of strategic control are recurring ethical problems.

CASE STUDIES: Anti-Fraud System using AI

Consider Brazil's Robo Laura which is an AI-powered platform to investigate public procurement agreements, as an effect to high-profile corruption scandals. With the enactment of Robo Laura, distinctiveness in public infrastructure contracts could be detected early on, averting millions of dollars being lost.

The Government of India's project demonstrated AI and data analytics to reconcile data from tax returns, bank statements, property records, and even social media interactions. The results have seen greater tax revenues, higher numbers of voluntary filers, and condensed tax official prejudice during tax assessment (Atta-ur-Rahman, 2025).

The Clean Portal is the AI-driven digital center of South Korea, which combines and examines large datasets from different ministries. The process includes artificial intelligence systems to analyses financial disclosures, government agreements and the action of civil servants, comparing declared financial assets to procurement decisions or to patterns of contracts awarded and concluding about potential conflicts of interest.

This comprises a detailed concern about algorithmic bias, such as the Dutch tax agency's penalty for tens of thousands of families, mostly from lower-income and ethnic groups, on using a self-learning algorithm to deduct benefits fraud (Anonymous, 2024).

The PRO-Trust Framework

The PRO-Trust pipeline delivers an ethics-focused framework to building reliable AI-based Fraud Detection solutions for the sector of Public Procurement. PRO-Trust covers five recurring ethical questions system opacity, user transparency, explain ability instruments and, role of the operator, and strategic consideration of ethical principles with measures that can be taken during the advancement of the AI-based technology, deduction of the responsible actors, and application of technological strategies to operationalize ethical principles. In conclusion, PRO-Trust puts its efforts into the making of more reliable, transparent and accountable AI-based fraud detection systems in public administration.

Challenges and Future Directions

Though there is great promise, there are also important issues to reduce when it comes to AI and its enactment in the world of procurement fraud detection. Data quality and availability remain to be vigorous issues and AI practices demand large, high-quality datasets for training and validation purposes. Capacity limitations in the organization are a hurdle to implementation, including lack of technical knowledge and/or resistance to change (OECD, 2024). Though there is a massive investment in AI solutions for procurement fraud detection, the market is still in its infancy, having reached USD 1.98 billion with a CAGR of 23.6% in 2024 (Anonymous, 2025).

Conclusion

AI technologies transform fraud detection, audit procedures and tax compliance in public procurement. The use of machine learning algorithms and natural language processing (NLP), along with social network analysis, can support in assessing fraudulent patterns on a large scale, and AI-driven audit tools and tax

compliance systems restructure and increase efficiency and effectiveness. But ethical challenges regarding transparency, fairness and accountability need to be improved, which can be done by developing systems like PRO-Trust. Therefore, to appreciate the advantages and reduce the dangers of AI, procurement professionals and auditors will need to invest in developing their technical expertise and the framework of ethical governance.

References

- Alves Batista, D. (2024). Enhancing transparency and accountability in public procurement: Exploring blockchain technology to mitigate records fraud. *Records Management Journal*, 34(2-3), 151–170. <https://doi.org/10.1108/RMJ-10-2023-0054>
- Anonymous. (2024). Applied Machine Learning to Anomaly Detection in Enterprise Purchase Processes. Harvard ADS. <https://ui.adsabs.harvard.edu/abs/2024arXiv240106234A>
- Anonymous. (2024). Artificial intelligence for detecting and preventing procurement fraud. OUCI. <https://ouci.dntb.gov.ua/en/works/7Xxg0G9Q/>
- Anonymous. (2024). Challenges in Addressing the Ethical Aspects of Artificial Intelligence to Detect Fraud in Public Procurement Processes. OUCI. <https://ouci.dntb.gov.ua/en/works/7Xxg0G9Q/>
- Anonymous. (2024). Detection of Structured Fraud Supported by Shell Companies on Goods and Services Trading Operations. Mendeley. <https://www.mendeley.com/>
- Anonymous. (2025). Data-Driven Transparency: Machine Learning and Social Network Analysis for Corruption Detection in Public Procurement. *ScienceDirect*. <https://www.sciencedirect.com/science/article/pii/S1877050925029722>
- Anonymous. (2025). Intelligent Invoice Dynamic Verification for Accounting-Type Financial Robots Based on an Improved Apriori Algorithm. *Semantic Scholar*. <https://www.semanticscholar.org/>
- Atta-ur-Rahman. (2025). AI against corruption. *The News*. <https://www.thenews.com.pk/print/1315923-ai-against-corruption>
- European Commission. (2024). Member States' measures to combat tax fraud and protect EU financial interests. *EUR-Lex*. <https://eur-lex.europa.eu/>
- OECD. (2024). Artificial Intelligence: Anti-Corruption and Integrity Outlook 2024. OECD Publishing. <https://www.oecd.org/>
- PwC. (2024). Global Economic Crime Survey 2024. PwC. <https://www.pwc.com/>
- Salazar, A., Pérez, J. F., & Gallego, J. (2024). VigIA: Prioritizing public procurement oversight with machine learning models and risk indices. *Data & Policy*, 6. <https://www.semanticscholar.org/paper/VigIA%3A-prioritizing-public-procurement-oversight-Salazar-P%3A9rez/de20e997a6d549da1655e838bd1f795a25fcb526>
- Sampaio, I. G. B., de Oliveira Andrade, E., de Souza Barbosa Fontes, S., Bernardini, F. C., & Viterbo, J. (2026). Trustworthy AI in public administration: The PRO-Trust pipeline for ethical fraud detection in public procurement. *Government Information Quarterly*. <https://www.sciencedirect.com/science/article/pii/S0740624X26000547>
- Taxmann. (2024). Combatting 'Procurement Fraud' – Classification | Key Risks | Mitigation Strategies. Taxmann. <https://www.taxmann.com/>

About the Author: Mahwish Mehmood is an Inspector at the Inland Revenue Department of the Federal Board of Revenue (FBR), Pakistan. She holds a Bachelor's degree (2015) and a Master's degree (2018) from Islamia University Bahawalpur, and is currently pursuing a PhD-DBA at INTI International University, Malaysia.