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Supplementary Research Report

Exploring Blockchain Technology for Government Transparency:

Blockchain-Based Public Procurement to Reduce Corruption

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Contents

Introduction

This Supplementary Research Report serves as an addendum providing additional resources to researchers and policy-makers. All authors, contributors and acknowledgements are listed in the primary report, Exploring Blockchain Technology for Government Transparency: Blockchain-Based Public Procurement to Reduce Corruption.

The Supplementary Research Report begins with a framework for evaluating the anti-corruption potential and efficacy of a blockchain-based public procurement system. It provides background information related to the Colombian public-school meal programme (*Programa de Alimentación Escolar*, or PAE) and the current regulatory framework for the use of cryptocurrency in Colombia.

The addendum continues with a high-level overview of existing anti-procurement-corruption laws and regulations advocated by the Organisation for Economic Co-operation and Development (OECD), United Nations and World Trade Organization (WTO), and embraced by the majority of nation states worldwide. It presents the current proliferation, nature and capacities of e-procurement worldwide, and enumerates relevant best practices, as advocated by the Open Contracting Partnership and the Open Data Charter. The ubiquitous dichotomy of robust anti-corruption measures functioning in parallel with high rates of procurement corruption highlights the need for innovative, transparency-enhancing solutions such as is explored in the *Unlocking Government Transparency with Blockchain Technology* project (hereafter, the *Transparency Project*).

This addendum briefly enumerates additional use cases for blockchain in public-sector anti-corruption. Finally, it lists information on leading guides, reports, studies and model procurement practices. These materials address traditional anti-corruption legal frameworks, e-procurement best practices and effective citizen engagement, all of which are essential components of an effective blockchain-based procurement corruption solution.

Measuring success: Evaluating a blockchain-based e-procurement solution

The initial implementation of an emerging technology inevitably involves trial and error. This section proposes a framework of key performance indicators (KPIs) and evaluation strategies for a blockchain-based e-procurement platform and outlines a general approach to data gathering. For the *Transparency Project*, the evaluation will be performed upon completion of the software proof-of-concept (PoC) deployment, potentially later in 2020.

Key performance indicators

The blockchain-based public procurement platform envisioned in the *Transparency Project* has two independently important objectives. It must: 1) reduce instances of corruption in vendor selection in the public procurement process; and 2) serve as an efficacious mechanism for vendor selection.

The intentional secrecy of corruption poses a significant barrier to the assessment of anti-corruption programmes.[1] To meet this challenge, various leading international institutions and initiatives – including USAID,[2] the World Bank,[3] the Organisation for Economic Co-operation and Development (OECD),[4] Support for Improved Government and Management (SIGMA)[5] and the Methodology for Assessing Procurement Systems (MAPS)[6] – have developed a menu of proxy indicators that speak to the presence or absence of corruption in government programmes. The difficulty in pinpointing corruption has also led these institutions to advocate for the triangulation of data from a variety of sources and perspectives, in order to corroborate findings.[7] The KPIs in Table 1 are informed by these leading frameworks as well as metrics used in more specific evaluations of e-procurement programmes in countries such as Bulgaria, Macedonia, Portugal and Turkey.[8]

TABLE 1: **Proposed key performance indicators for a blockchain-based e-procurement platform**

Performance category	Definition	KPI
A. Transparency	The ability for citizens, businesses, public officials and civil society to obtain material information about the vendor selection process within the procurement auction. This includes both substantive and procedural transparency.	– Timeliness of information published – Relevance and quality of information published – Quantity of information published – Ease of search and usability for the public
B. Accountability	The ability for citizens, businesses, civil society and other stakeholders to check, balance and oversee the procurement process. This includes both horizontal (internal/governmental) and vertical (non-governmental) accountability.	– Platform accessibility – Amount of third-party website traffic – Number of end-user comments (e.g. complaints) submitted
C. Prevention and fairness	Prevention: The reduction in opportunities for corruption. This includes factors that minimize monopolized and discretionary decision-making. Fairness: A procurement process based on vendor qualifications, merit and honest competition.	– Value of winning bid – Number of vendors involved – Number of bids submitted – Number of public-private in-person interactions
D. Cost, usability, functionality, security and other measures of performance	The usability, effectiveness and efficiency of the blockchain procurement platform more generally.	– Required time for tender process (from publishing tender offer draft to declaring the winning bidder) – Cost savings – Platform security – Satisfaction with technical infrastructure – Regulatory barriers – Ease of training and usage

The proposed evaluation is designed to measure the results and experience of the vendor selection portion of a single procurement auction. Notably, while valuable on its own, the data is most informative when compared against baseline measures of past procurement auctions in identical or similar industry and country contexts.[9] Such comparisons will allow for both objective and relative assessments of the blockchain solution.

Data gathering

The proposed programme evaluation triangulates data on the inputs and outputs of the procurement process with user experiences conveyed through surveys of key stakeholders, including the tenderers, vendors, government audit or anti-corruption agencies and civil society.

Input indicators tend to be more subjective and less quantifiable than output indicators.[10] Input indicators refer to factors that facilitate the generation of desired procurement and anti-corruption outcomes, such as platform accessibility, the number of technological glitches and the openness of the vendor-selection process. Output indicators refer to procurement and anti-corruption outcomes, such as the number of public-private interactions, the value of the winning bid, and the quantity, quality and timeliness of the procurement information published.

While most of this data will be based on observable processes and outcomes, certain factors that are less externally verifiable, such as platform accessibility and user satisfaction, may involve end-user surveys. Stakeholder perception surveys – a tool commonly used to assess corruption levels – may also capture the efficacy and anti-corruption capacity of a blockchain-based procurement platform. Given the difficulty in measuring corruption itself, corruption perception surveys are by far the most common corruption evaluation method.[11] To allow for greater comparability, the stakeholder surveys can be indexed.[12] Respondents would describe their level of satisfaction on a scale from 1 to 5, where a response of 1 indicates a total lack of satisfaction and a response of 5 indicates extreme satisfaction (see Table 2).

Data limitations

There are a couple of limitations to the data-driven evaluation of procurement corruption solutions. First, the findings may not be easily translatable. Anti-corruption procurement programmes are never a one-size-fits-all solution – jurisdiction size, cultural context, economic environment, industry, legal framework and contractual particularities may alter the efficacy of any given anti-corruption programme.

Second, two broad opportunities for corruption exist in procurement: the procurement award process and the execution of the procurement contract. The *Transparency Project* and the proposed evaluation only pertain to the former. However, given the close connection between effective vendor selection and successful contract execution, a follow-up evaluation could be considered that captures the latter, with indicators such as the fulfilment of contractual obligations.

TABLE 2: **Project evaluation survey tool, sample questions**

Survey question	Performance category
Were you satisfied with the amount of information viewable or released during the procurement process?	Transparency
Were you satisfied with the nature of the information released during the procurement process?	Transparency
Were you satisfied with the timeliness of the information released during the procurement process?	Transparency
Were you satisfied with the accessibility of the procurement process?	Accountability
Were you satisfied with the available complaint mechanisms?	Accountability
Were you satisfied with the expenses associated with the procurement platform (i.e. personnel, resources, time, etc.)?	Cost
Were you able to successfully engage with and use the system?	Usability
Were you satisfied with the reliability of the procurement platform?	Functionality
Were you satisfied with the technical infrastructure of the procurement platform?	Broader Measures of Performance
Were you satisfied with the security and privacy of the procurement platform (i.e. data anonymity, security vulnerability, etc.)?	Security
Were you satisfied with the defined procedures of the procurement process?	Broader Measures of Performance
Were you satisfied with the technical and non-technical support you received?	Broader Measures of Performance

Indexed on a scale of 1 to 5

1	2	3	4	5
Not satisfied	Somewhat satisfied	Satisfied	Very satisfied	Extremely satisfied

Colombian public-school meal programme background information

The *Programa de Alimentación Escolar* (PAE), or public-school meal programme in Colombia, is a government-run initiative that promotes access to nutritious meals among children and youth enrolled in the public-school system. The PAE delivers food to schools daily with the goal of positively impacting students' learning processes, cognitive development and school attendance, in addition to more general nutrition-related goals.[13]

The government agencies directly involved in the PAE include the National Ministry of Education (MEN), which directs the programme; the certified regional entities (ETC)[14] and the non-certified entities, which co-finance and coordinate the programme and contract the vendors who provide the meals; and PAE directors, coordinators, teachers, school administrative personnel and citizen auditors, who are involved in the monitoring, control and evaluation of the programme's execution (Table 3). In general, the MEN allocates federal funding to the territorial and regional entities, which they use to co-finance programme vendors in accordance with ministry guidelines and local needs.

TABLE 3: **Roles and responsibilities of key PAE actors**

Actor	Principle
National Ministry of Education (MEN)	Directs the programme by reviewing, updating and defining the technical administrative guidelines, standards and minimum conditions for the provision of the programme as applied by the territorial entities and local operators; co-finances the programme alongside territorial entities; contracts with vendors when appropriate
Certified regional entities (ETC)	Assess the needs of relevant educational institutions; co-finance the programme; apply MEN-established measures; coordinate vendor selection and programme implementation according to MEN guidelines and standards (beginning the first day of the school year)
Non-certified regional entities	Coordinate with the local ETC and the educational institutions on programme implementation and monitoring; support local programme financing; facilitate and promote citizen participation
Vendors	Deliver food to schools; guarantee food quantity, quality, safety and accessibility according to programme requirements
Directors, coordinators, teachers, administrative staff, citizen auditors	Monitor and assess the programme's execution at the school level

Sources: Colombia Ministry of National Education, Decree 1852 (2015); Resolution 29452 (2017)

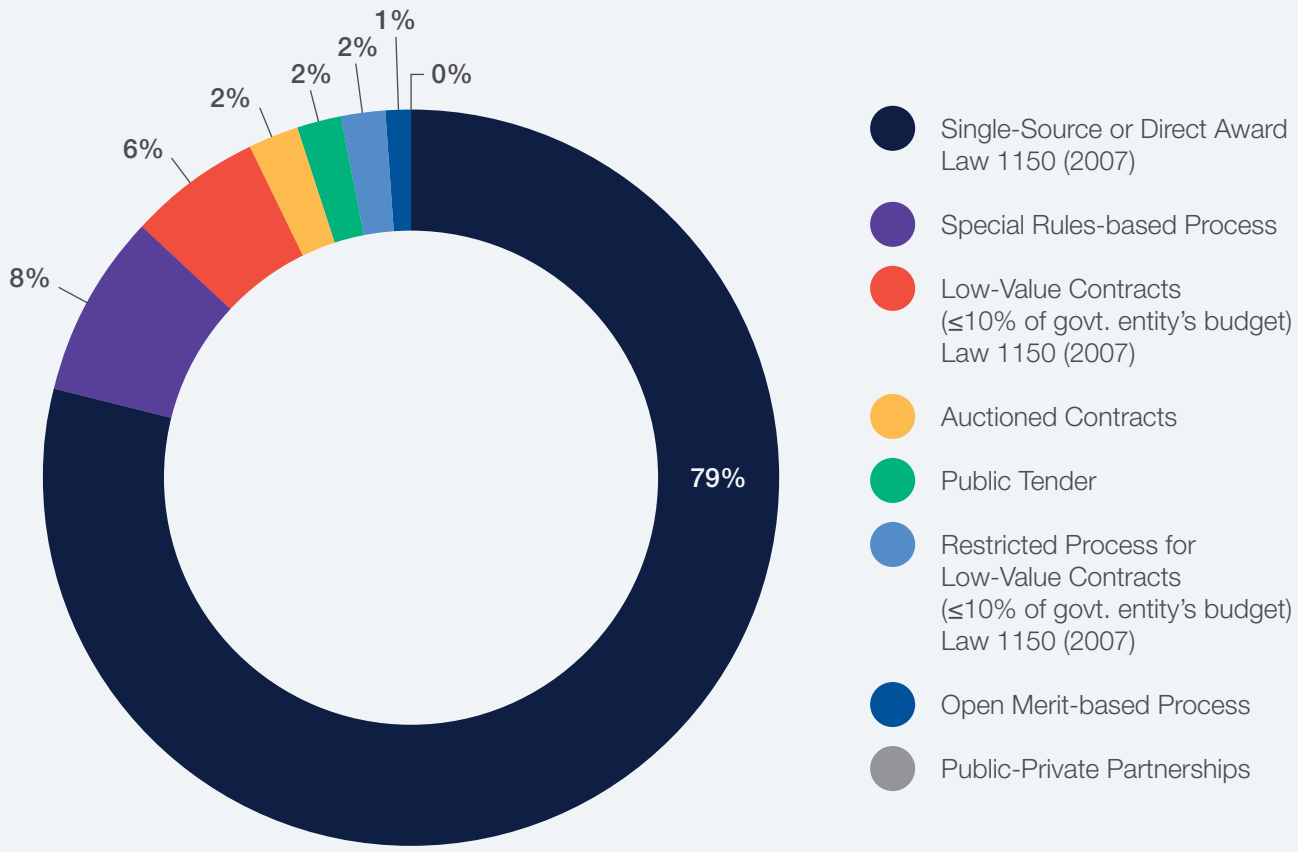
The ETCs enjoy discretion in structuring and implementing their vendor-selection processes within the parameters of Colombian law. Law 1150 of 2007 provides general guidance on the choice of public contractors but, depending on the amount of goods and services at issue, ETCs may resort to less competitive procurement processes, such as limited auctions or direct contracting.

According to the Colombian Inspector General's Office (*Procuraduría General de la Nación* - PGN), the vast majority of PAE vendors are selected via direct contracting (Figure 1), which maximizes opportunities for corrupt practices and minimizes transparency in programme administration.[15] In another report, the PGN office flags the high frequency and amount of PAE contracts in light of the precarious contract award procedure.[16]

The key regulations that guide the implementation and execution of the PAE include the following:

- **CONPES 151 (2012)**: Addresses the criteria and methodology for applying Article 145 of Law 1530 (2012), which dictates the basic public procurement process in the school meals context
- **MEN Resolution 29452 (2017)**:[17] Provides the technical-administrative guidelines, standards and minimum conditions for the PAE and repeals outdated provisions
- **MEN and Ministry of Finance and Public Credit (MinHacienda) Resolution 2248 (2018)**:[18] Regulates the PAE's master accounts
- **MEN Resolution 002428 (2020)**:[19] Guarantees co-financing of the PAE in partnership with territorial entities
- **CONPES 151 (2020)**: Provides MEN's operational budget for the 2020 fiscal year

FIGURE 1: **PAE contracting methods, 2017**



Source: Colombian Inspector General's Office, translated from PAE, https://prezi.com/view/L3V9LC0UimXbAHPOfAAo/.

Regulatory framework for the use of blockchain and cryptocurrency in Colombia

Two bills have come before the Colombian legislature regarding the regulation of cryptocurrencies: 1) "The use of virtual currencies or cryptocurrencies and the forms of transaction using them in the territory of Colombia"[20] (PL-028-18), proposed by Senator Carlos Abraham Jiménez López; and 2) "The regulation of cryptoactive exchange services offered through cryptoactive exchange platforms"[21] (PL-268-19), proposed by Deputy Mauricio Toro. These are the only bills on cryptocurrency filed to date.[22]

Additionally, several Colombian entities have issued statements and analyses on possible methods and guidelines for allowing Colombian nationals or residents to trade cryptoassets, such as cryptocurrencies, within Colombia. They include:

- **Colombian Central Bank**: Published multiple articles on cryptocurrencies[23]
- **Financial Supervision Office of Colombia (*Superintendencia Financiera de Colombia* - SFC)**: Designed a webpage that houses information on cryptocurrencies and crypto assets[24]
- **Ministry of Finance Financial Information and Analysis Unit (UIAF)**: Published an article titled "Blockchain and financial intelligence",[25] which asserts that "in the future, if the blockchain is widely adopted, it may have a seriously transformational effect on Financial Intelligence Units"
- **Colombian Directorate of Taxes and Customs (DIAN)**: Released Concept No. 20436 in 2017,[26] which proposes that cryptoactive mining activities should be recorded within the country's income tax framework
- **Technical Council on Public Accounting in Colombia (CTCP)**: Issued Concept No. 977 in 2017,[27] which claims that cryptocurrencies are not cash or equivalent to traditional currency
- **Association of Banking and Financial Institutions of Colombia (Asobancaria)**: Published a report titled *Cyber Risk Challenges in Colombian and Latin American Financial Sectors*,[28] which flags the link between cryptocurrencies and cyber fraud
- **National Police Department of Cybercrime**: Published a report titled *Colombian Cybercrime Trends 2019-2020*,[29] which coins the criminal act of "crypto-jacking", or theft tied to cryptocurrency mining
- **Colombian Industry and Commerce Supervisory Office (SIC)**: Published a technological bulletin titled "Blockchain: The Revolution of Digital Trust",[30] which discusses opportunities for technological innovation and development
- **Ministry of Information and Communication Technologies (MINTIC)**: Published a report titled *Guide for the Use and Implementation of Distributed Ledger Technology (DLT/Blockchain) in the Public Sector*, and promoted the use of technology in-country through programmes such as Colombia's blockchain hackathon[31]

Existing efforts to curb procurement corruption

Legal and regulatory frameworks

Anti-corruption public procurement laws and regulations are now commonplace, with 180 countries included in the World Bank's 2016 public procurement policy benchmarking report.[32] While such laws vary significantly from country to country, best practices dictate a two-pronged regulatory strategy, addressing both minimum standards for effective procurement procedures and a variety of civil, criminal and administrative sanctions for those who commit acts of corruption.[33]

In the context of minimum standards, best practices are outlined in prominent international frameworks, such as the World Trade Organization's Government Procurement Agreement (WTO GPA), the 2011 Model Procurement Law issued by the United Nations Commission on International Trade Law (UNCITRAL), and Article 9 of the United Nations Convention against Corruption (UNCAC), the latter of which boasts 186 state parties.[34,35] The key provisions in these frameworks require that:

- Procurement laws and regulations be made publicly available
- Potential bidders be given a reasonable amount of time to prepare and submit bids
- Solicitation procedures and bid selection criteria be pre-established, objective, non-discriminatory and published in advance of the procurement auction
- Specifications in solicitations be not unduly restrictive
- Governments ensure that bidders have access to a forum for protests – with countries increasingly requiring a protest-triggered "stay" period to allow for pre-award redress and to provide the opportunity for protestors to compete in an honest process[36]

In addition to these core principles, the model laws acknowledge non-open bidding procurement processes (such as direct purchasing agreements) and allow for their use as needed, based on the urgency of the project, the universe of qualified bidders and the size of the contract, among other considerations.[37] The UNCAC also calls for various measures to regulate personnel responsible for procurement, including declarations of interest, screening procedures and training requirements.[38]

On the sanctions side, best practices are embodied by the UNCAC and the OECD Anti-Bribery Convention.[39,40] The core principles require:

- The codification of criminal, administrative and civil penalties for domestic and international bribery and corruption
- State capacity to investigate and prosecute individuals and agencies found to have bribed a public official
- Administrative sanctions for non-compliance, including disqualification from participation in public procurement, judicial supervision and judicial winding-up orders
- The termination of corrupt contracts
- The confiscation of gains obtained through corrupt practices
- Liability for damages to those financially harmed by the corrupt practices
- Protection for whistle-blowers[41,42]

The OECD Anti-Bribery Convention also contains a variety of additional recommendations, such as adequate accounting and financial reporting, corporate internal compliance mechanisms and mandatory external audits.[43]

While the adoption of such measures is an important step towards curbing procurement corruption, on-the-ground realities frequently limit the impact of such efforts no matter how good they may sound on paper.[44] Weak rule of law or limited political will for enforcement combined with the significant discretion generally enjoyed by procurement officials all too often prevent such laws from reducing procurement corruption in practice.[45]

Additionally, the codification of laws itself can reduce the transparency and efficiency of the procurement process, as countries tend to overregulate (or "micro-regulate") and under-publish the legal framework.[46] On the vendor side, micro-regulation raises the motive and opportunities for corruption by increasing the frequency of public-private interaction throughout the procurement process. On the government side, micro-regulation frequently breaks down the responsibilities of procurement officials into discrete, mundane tasks that reduce the need to hire qualified employees and erode any sense of accountability for the overall outcome.[47]

Finally, anti-corruption investigations and enforcement mechanisms depend substantially on data that does not exist – due to the high cost of data collection or selective disclosure on the part of the government – and on public collaboration that governments frequently cannot inspire.[48]

A study by the OECD found that "The impact of new rules on the challenge of corruption has regularly been overestimated. Judicial tools are insufficient unless the risk for those involved in corruption is increased".[49] Consequently, as a complement to anti-corruption laws and policies, countries around the world have begun to adopt

electronic procurement technologies to better promote transparency and accountability and to more effectively enforce the existing regulatory structure and proactively minimize the opportunities for procurement corruption.

E-procurement programmes

Electronic procurement ("e-procurement") refers to "the use of any internet-based inter-organizational information system that automates and integrates any parts of the procurement process in order to improve efficiency, transparency and accountability in the wider public sector".[50] By transferring the formerly centralized and opaque processes of public procurement to the internet, e-procurement promotes transparent and efficient information flows and increases accessibility for prospective vendors and civil society.[51] Any or all of the procurement process can occur on an electronic platform: advertising, tendering, bidding, awarding, purchasing, ordering, contracting, invoicing and other forms of project management.[52] The WTO GPA and UNCITRAL Model Law both address the utility of online procurement systems, recommending certain parameters and minimum standards including:

- A widely accessible platform – both in terms of interoperability and cost, as well as the universe of stakeholders
- Adequate authentication, encryption and security
- Clear governance – essentially mirroring best practices in non-electronic public procurement[53]

Additionally, initiatives like the Open Contracting Partnership (OCP) and the Open Data Charter (ODC) have developed e-procurement-specific best practices and core principles. These frameworks are endorsed by both the public and private sectors and have been adopted by dozens of national and local governments. Both initiatives aim to leverage the growing prevalence of electronic procurement data towards greater information dissemination, transparency and citizen monitoring.

A vast majority of economies across the world have adopted e-procurement systems as a national policy.[54] The services offered on these platforms range from static informational hubs to interactive portals where vendors and procurement officials can carry out the entire tendering process.[55] Overwhelmingly, studies have found these systems to promote the anti-corruption agenda in numerous ways. E-procurement tends to increase transparency by publicly publishing contracts and criteria, reducing information asymmetries, preserving a history of previous arrangements, minimizing human interaction, and limiting official discretion through automation and publication.[56] These systems are also found to increase accountability by opening access to procurement information, facilitating stakeholder oversight, allowing easier detection of irregularities, reducing instances of repeated public-private sector interaction through automation, and laying the informational foundation for investigative activities.[57] Additionally, e-procurement systems have produced benefits beyond the anti-corruption agenda, with studies showing increased vendor competition[58] and government savings.[59,60]

However, many of these studies focus on the yet-to-be-realized potential of the technologies or best-case scenarios.[61] The attainment of these benefits depends on the nature of the e-procurement services and the surrounding policy infrastructure. Though at least 154 countries use some form of national e-procurement system, most merely publish public procurement laws and regulations, with fewer countries publicizing procurement plans (74 countries), tender documents (97 countries) and award notices (122 countries).[62] Only 24 countries legally mandate such measures.[63]

Additionally, core interactive aspects of the procurement process, such as electronic submission of bids and bid-opening, remain the exception, with OECD high-income countries at the forefront of these initiatives.[64,65] Of the economies that do accommodate electronic bid-opening, only two – Kazakhstan and Malta – systematically produce information on this process to bidders.[66] Furthermore, e-procurement data and documentation are often restricted to government officials and registered vendors, largely perpetuating information asymmetries and opacity vis-à-vis civil society and the public at large.[67]

E-procurement implementation can also be stunted by technological, social and legal barriers. Low levels of internet penetration, inadequate end-user training and deficient data security may limit the participation of vendors and civil society.[68] Existing laws can also hinder the adoption of e-procurement by mandating hard-copy procurement documentation or by inadequately addressing e-procurement concerns, like the force of e-contracts and the role of electronic signatures.[69] However, such barriers to implementation vary greatly based on the country and industry contexts.

Despite these implementation hurdles, e-procurement presents a promising path forward. If informational asymmetries and opaque processes are primary impediments to the effective enforcement of otherwise robust anti-corruption legal and regulatory frameworks,[70] the information proliferation and stakeholder engagement capacities of e-procurement speak directly to these concerns.

Anti-corruption e-procurement norms from leading international frameworks

In addition to the aforementioned corruption reduction measures advocated in both traditional and electronic procurement contexts, Table 4 presents a more complete summary of e-procurement best practices advocated by leading international organizations. The norms and policies describe measures that promote integrity, transparency and accountability in distributed ledger or standard e-procurement processes. The table also connects each principle with one of the anti-corruption-oriented KPIs ("goals") addressed in the *Measuring Success: Evaluating a Blockchain-Based e-Procurement Solution*.[71]

TABLE 4: **Summary of e-procurement best practices**

Norm	Source(s)	Goal	Details
Professional standards for procurement officials or government officers who might otherwise influence procurement decisions – including disclosure of special interests	UNCAC UNCITRAL OECD	Transparency Accountability Prevention	Promotes adequate training of procurement officers and screening procedures to promote professional and objective processes
Publication of procurement laws, regulations, general processes and upcoming auctions	UNCITRAL WTO OECD	Transparency Fairness	Promotes broader participation and evens the playing field between veteran and first-time vendors
Publication and use of predetermined, objective criteria on vendor qualifications, bid-rejection and contract award – ensuring such criteria are not unduly restrictive	UNCAC UNCITRAL WTO OECD	Transparency Accountability Prevention Fairness	Reduces room for discretionary procurement decisions and allows for subsequent verification
Clear delineation of the permissible avenues for procurement and the factors under which each may occur – proscribes open, competitive auctions as the default procedure	UNCITRAL WTO OECD	Transparency Accountability Prevention Fairness	Reduces use of opaque procurement processes and removes discretion from the process of selecting a procurement method
Timely, comprehensive and high-quality data disclosure throughout the procurement process	UNCAC ODC OCP OECD	Transparency Prevention	Promotes meaningful data analysis and user feedback; should also include data gathering methodology
Accessible and usable data, including data literacy and capacity-building opportunities for civil society	ODC OCP OECD	Transparency Accountability	Promotes the use of government data by civil society and the broader public through the elimination of digital, structural and cognitive barriers to access
Use of comparable and interoperable data across government agency, industry, country and temporal contexts	ODC	Transparency Accountability	Promotes standardized data formatting – across agencies, industries and countries – that maximizes human- and machine-readability

Norm	Source(s)	Goal	Details
Systematic documentation and archival records	UNCITRAL WTO	Transparency Accountability	Allows monitors to track repeat contract winners and past award/rejection criteria; facilitates temporal comparisons
Improved procurement governance and proactive citizen engagement	ODC OCP WTO OECD	Transparency Accountability Prevention	Promotes government–citizen engagement, including the production of regular reports, the enforcement of the right to information, respect for freedom of expression and citizen-driven policy proposals
Effective and independent system of domestic review, appeal and dispute resolution when procedural or legal violations are alleged	UNCAC UNCITRAL WTO OECD	Accountability Prevention Fairness	Provides an avenue for stakeholders to flag irregularities and rebut false allegations
Appropriate sanctions for violations of procurement-related processes, agreements or laws	UNCITRAL WTO OECD	Accountability	Raises costs of corrupt behaviour through the threat of disqualification, blacklisting or legal sanctions
Systematic evaluation of procurement processes using predetermined key performance indicators	OECD	Transparency Accountability Prevention Fairness	Ensures all anti-corruption and general procurement goals are effectively pursued

Existing blockchain-based e-procurement projects

At least three government institutions launched blockchain-based public procurement systems in 2019. One at the United States Department of Health and Human Services is focused on project cost analysis; a second, in Seoul, South Korea, is focused on proposal evaluation; and a third, in the autonomous community of Aragon, Spain, is focused on public procurement vendor selection. All are considered to be functioning effectively.[72]

The Aragonese project, developed with the Government of Aragon, Grupo Oesía and Open Canarias, is the most similar to the World Economic Forum T*ransparency Project*.[73] It employs blockchain technology with the goals of increasing transparency, traceability, security and integrity in vendor selection. The Aragonese government has used the platform to tender about 25 contracts since its launch in 2019.

The solution employs a hybrid blockchain architecture, with the Ethereum public blockchain coupled with the Hyperledger Fabric permissioned blockchain framework. It conducts a highly automated tender vendor evaluation process that is reviewed by civil servants, and it includes the use of hash functions for record integrity and smart contracts for automated functionalities. Lessons from this project have been incorporated in the findings and conclusions for the *Transparency Project*.

Anti-corruption and government transparency: Additional use cases for blockchain

The unique qualities that make blockchain technology a high-potential tool for improving transparency and accountability in public procurement also lend themselves to a variety of additional public-sector and anti-corruption contexts. The examples below provide a sample of potential blockchain applications:

– **Land title registries:** Various governments, including Colombia, Brazil, Georgia, Honduras, India, and Sweden, have begun experimenting with blockchain-based land title registries. Some of these initiatives, like that in Sweden, are motivated by a desire to increase efficiency in a transaction-intensive industry, while others, such as those in Honduras and India, are intent on instilling and expanding property rights and enhancing transparency in a process vulnerable to corrupt practices.[74]

  Over 70% of the world's population is without a "legally registered" title to their land, which leaves people vulnerable to unjust seizures, particularly in resource-rich or corruption-prone regions.[75] Blockchain-based land registries can potentially provide a secure, decentralized, publicly verifiable and immutable record system through which individuals could definitively prove their land rights.[76] These qualities reduce the opportunity for the self-interested manipulation of land registries or land rights and increase the resilience of land ownership more generally.

  Several administrative, legal and technological barriers may block or stunt the progress of this use case. First, blockchain technology itself cannot formalize property ownership or solve ineffective governance. Countries with non-existent, incomplete or incorrect land registries need to go through the difficult process of gathering, cleaning and digitizing this information before a blockchain-based land title registry can function.[77] Conversely, these same environments, where land title is less entrenched and regulated, may provide a simpler regulatory context for blockchain deployment, particularly if land reform is actively under way.[78]

  Second, the degree of connectivity and tech savviness within a population may determine the feasibility of a blockchain-based land registry in the short term. A land registry could involve the active participation of a large portion of the population. Where internet proliferation or technological familiarity is low, the costs of tech support may make such an initiative impractical.[79]

  Blockchain-based land title registries can take a variety of forms and perform a variety of functions. To date, several examples exist at the more basic end of the spectrum of possibilities – generally providing complementary services to a pre-existing system or serving as a second, "mirrored" catalogue of ownership.[80] The more sophisticated blockchain-based registries present additional challenges, including the capacity to store documents, disaggregate land rights and trade land on the platform itself.[81] They may also require changes to legislation.

– **Electronic voting:** Growing concern over election security, voter registration integrity, poll accessibility and voter turnout has led governments to consider blockchain-based voting platforms.[82] Proponents argue that the decentralized, transparent, immutable and encrypted qualities of such a system could potentially help minimize election tampering and enhance voter trust in democratic outcomes.[83]

  However, given the high stakes of elections, electronic blockchain-based voting presents substantial risks. Any new technology systems, including those based on blockchain technologies, are vulnerable to cyberattacks and other security vulnerabilities. These could cause vote manipulation, paper trail erasure or electoral chaos.[84] Furthermore, a voter verification system that uses biometric software, such as facial recognition, could lead to false positives or negatives in voter identification, thus facilitating fraud or disenfranchising citizens. Blockchain-based voting systems may also entail privacy risks and concerns. It is thus imperative that any such service be provided by an extremely vetted technology provider and system.

– **Beneficial corporate ownership registries:** Recent corruption scandals have raised concerns worldwide over opaque or undisclosed beneficial corporate ownership. Secretly operated companies can easily be used by political officials to launder money, pay bribes or self-interestedly sway governmental investment.[85] Many countries are beginning to develop central registries for beneficial corporate ownership to better track conflicts of interest and criminal activity. However, such registries remain the exception and existing registries overwhelmingly lack adequate verification systems.[86]

  Beneficial corporate ownership registries may benefit from employing blockchain technology to support tamper-proof record-keeping. The system could record the full beneficial corporate ownership history to ensure the authenticity and immutability of relevant documentation.[87] Furthermore, a blockchain-based platform could enable globally-linked registries, an important quality in a transnational context like corporate ownership.[88]

  In addition to security concerns outlined in the two aforementioned blockchain applications, the recent emergence of these registries combined with the novelty of blockchain technology may pose certain challenges. For example, most countries still do not require companies to maintain beneficial ownership information themselves. Furthermore, the adoption of a

comprehensive and verifiable blockchain-based registry would require buy-in from politicians, lawyers, banks and big business, many of whom may feel their interests are not served by public transparency and auditability of such a system.[89]

– **Grant disbursements:** As in the case of public procurement, many governments annually disburse millions of dollars to support education, arts, humanitarian aid and social assistance, among other causes. This process is frequently convoluted, opaque and inefficient, which causes money to be lost to banking fees and middlemen and opens the potential for corrupt financial diversions.[90]

  Blockchain can potentially be used to build public trust in such systems. The ability to disintermediate and reduce the number of actors involved in grant awards, disbursements and management could streamline the process and reduce costs, thus allowing more of the money to support the targeted organizations and initiatives. The decentralization of the database employed in grant disbursements can also potentially reduce opportunities for corruption. Recent blockchain experiments in this context include a pilot programme in the municipality of Bahía Blanca in Buenos Aires, which focused on the city's arts and cultural grants; a yet-to-be launched programme in the United States, which focuses on National Science Foundation grants; and a partnership among over three-dozen leading international aid agencies that aims to use blockchain to deliver humanitarian assistance around the globe.[91]

  However, the ability for recipients to effectively manage blockchain-based grant disbursements may pose a significant challenge at present. Less technologically savvy or well-resourced individuals and organizations may face discrimination or exclusion from grant disbursement processes if they are unable to use the system. Moreover, a blockchain-based disbursement system does not adequately address the challenge of corrupt practices in the use of the grant itself, which is often the case in humanitarian aid.[92]

In addition to the more application-specific concerns highlighted above, some overarching hurdles can stymie effective blockchain deployment. First, public and large-scale blockchain platforms have scarcely been tested to date. Particularly in contexts like blockchain-based land title registries or voting, the platform would potentially have to simultaneously support millions of users while sustaining very high security. No existing public blockchain platform could support this amount of user activity today. However, permissioned or hybrid blockchain networks can potentially address many scalability concerns (although not necessarily security concerns).

Second, the immutability of blockchain presents both a blessing and a curse – it reduces opportunities for self-serving information manipulation, but it also makes errors irreversible. Many of the blockchain applications above would need to establish a system for error correction and input adjustment to remedy incorrect or outdated information from the public eye. Relatedly, the transparency–confidentiality balance in governmental applications of blockchain-based technologies is a sensitive one that requires careful consideration of the regulation and the risks and interests at stake.

Third, political buy-in is essential. The devolution of authority and dissemination of information made possible by these "e-government" or "open government" initiatives will not always be well received by governing bodies and other sources of power. If existing political and administrative institutions are not on board, the necessary regulatory adjustments and systemic integration cannot be achieved. Another challenge relates to the identification and financial support of sponsors for public-sector blockchain projects as the cost to provide this digital infrastructure may be substantial.

Finally, even when political powers are bought in, permitting and then regulating public-sector blockchain applications present challenges. As a base consideration, national laws and regulations may need to fully embrace the legal power of smart contracts if blockchain-stored information is to possess weight under the law. More generally, blockchain-oriented regulation could misunderstand or mischaracterize the technology, which may trigger negative externalities originating from under-informed regulation or unexpected market consequences.[93] Blockchain technology pilot deployments in the public sphere should flag and minimize certain unintended consequences up front; that said, some might not manifest until the technology is deployed at scale.

The novelty and untapped anti-corruption potential of blockchain-based solutions should not distract policy-makers from the downsides and trade-offs associated with employing the technology in the public sphere. Nonetheless, blockchain presents valuable qualities, particularly related to tamper-evidence and publicly available permanent databases and record-keeping, that could enhance transparency, accountability and citizen engagement in areas that materially impact democratic governance and sustainable development around the world.

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Martini, Maira and Maggie Murphy, *G20 Leaders or Laggards? Reviewing G20 promises on ending anonymous companies,* Transparency International, 2018, https://www.transparency.org/whatwedo/publication/g20_leaders_or_laggards.

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Further reading

Guides, reports and studies

Akaba, Temofe Isaac, et al., "A Framework for the Adoption of Blockchain-Based e-Procurement Systems in the Public Sector: A Case Study of Nigeria", *Responsible Design, Implementation and Use of Information and Communication Technology,* 1 April 2020, pp. 3-14, https://link.springer.com/chapter/10.1007/978-3-030-44999-5_1

> Through analysis of the current Nigerian procurement framework and interviews with 12 high-level stakeholders, the authors provide a menu of recommendations towards the implementation of a blockchain-based e-procurement system in Nigeria. These recommendations focus on three key areas: 1) using blockchain-enabled smart contracts to facilitate interoperability; 2) engaging citizen monitors; and 3) using blockchain to track vendor effectiveness. Stakeholder enthusiasm for a blockchain-based system was grounded in a desire to increase transparency and accountability in a system perceived to be lacking in both.

Albano, Gian Luigi, et al., *Preventing Collusion in Procurement: A Primer*, 2006, https://www.researchgate.net/publication/228261555_Preventing_Collusion_in_Procurement_A_Primer

> This primer discusses the nature and extent of collusion in public procurement, from price-fixing to "bidding fees" to market-sharing agreements. The authors also describe the factors that contribute to the prevalence of collusion, including low-competition markets, entry barriers, high-frequency interactions and market transparency. The primer presents various practical conclusions on the relative risk of different market features and procurement methods. Of particular relevance, the authors note the importance of raising the costs of collusive practices so as to outweigh the potential economic benefits.

Basel Institute on Governance, *Learning Review: Transparency International's Integrity Pacts for Public Procurement*, Transparency International, December 2015, https://www.transparency.org/files/content/ouraccountability/2015_IntegrityPacts_LearningReview_EN.pdf

> This review provides a comprehensive account of Integrity Pacts, a public procurement monitoring strategy developed and promoted by Transparency International since the 1990s. These Pacts consist of a pledge, signed by all parties involved in the procurement process, to refrain from corrupt practices. The review outlines their core qualities and potential, and compares them against a menu of anti-procurement corruption tools and technologies. The authors find Integrity Pacts to be among the most effective methods for preventing procurement corruption – a benefit that, they note, can be significantly enhanced with the development of e-procurement platforms.

Center for Global Development, *Publishing Government Contracts: Addressing Concerns and Easing Implementation*, 2014, https://www.cgdev.org/sites/default/files/publishing-government-contracts-report.pdf

> This report highlights the importance of transparency in public procurement. The authors argue that even the small step of proactively publishing contracts can increase competition, lower and stabilize prices, and promote civil society oversight. The report also addresses common concerns with contract publication, including collusion and the protection of commercial and national secrets.

de Michele, Roberto, Joan Prats and Isaias Losada Revol, "Effects of Corruption on Public-Private Partnership Contracts: Consequences of a Zero-tolerance Approach", Discussion Paper no. IDB-DP-625, Inter-American Development Bank, 2018, https://publications.iadb.org/publications/english/document/Effects_of_Corruption_on_Public%E2%80%93Private_Partnership_Contracts_Consequences_of_a_Zero-tolerance_Approach_en_en.pdf

> This paper discusses the economic and social fallout from Latin America's most recent corruption scandal involving Grupo Odebrecht, the region's largest construction conglomerate. Specifically, the authors focus on the public-heavy financing structure of most public-private partnerships and the consequent costs for society when such contracts are annulled due to corruption charges. The authors argue that harm reduction requires solutions that punish corrupt behaviour while ensuring the continuity of the projects, the businesses involved and the economic development of society at large.

Gutman, Jeffery and Vinay Bhargava, *A Decade of Helping Civil Society Fight Corruption in the Philippines: Results and Lessons*, Partnership for Transparency Fund (PTF) Asia, 2015, https://ptfund.org/wp-content/uploads/2018/07/A-Decade-of-Helping-Civil-Society-Fight-Corruption-in-the-Philippines.pdf

This report describes a decade (2003-2013) of civil society anti-corruption monitoring programmes facilitated through the Partnership for Transparency Fund (PTF) in the Philippines. It highlights over two-dozen distinct monitoring projects addressing a variety of sectors throughout the country, 12 of which specifically focused on government procurement. Over the course of the decade, PTF found that when done effectively, civil society monitoring can improve government services, increase the responsiveness of public officials, reduce corruption and waste, and empower local communities, among other positive impacts.

Hardwick, Freya Sheer, Raja Naeem Akram and Konstantinos Markantonakis, "Fair and Transparent Blockchain Based Tendering Framework – A Step Towards Open Governance", Conference Paper, 2018, https://www.researchgate.net/publication/327479167_Fair_and_Transparent_Blockchain_Based_Tendering_Framework_-_A_Step_Towards_Open_Governance

This paper provides a detailed outline of an Ethereum blockchain-based e-procurement programme and served as a valuable early inspiration for the *Transparency Project*. It develops a step-by-step scheme employing smart contracts for a fair and transparent government contracting process. It further evaluates the potential security and auditability challenges that can arise from such a programme. The paper concludes that the use of smart-contract-enabled blockchain technology, such as the Ethereum blockchain platform, can enable an intuitive and low-cost open-governance framework that facilitates citizen oversight in public procurement.

International Monetary Fund (IMF), *Fiscal Monitor: Curbing Corruption*, 2019, https://www.imf.org/en/Publications/FM/Issues/2019/03/18/fiscal-monitor-april-2019

Chapter 2 of the IMF's 2019 *Fiscal Monitor* report addresses curbing corruption, with a strong emphasis on public procurement. In addition to a discussion on the status of procurement corruption worldwide, the authors provide numerous "country cases" of promising practices that states are implementing to reduce procurement corruption. The methods include open auctions, e-procurement and transparency-oriented legislation, among others. The authors note that a country's particular history of corruption may influence the nature of corruption reduction measures, but found that fiscal transparency and digitalization stood out as "key institutional features associated with better control of corruption". Finally, the report outlines a model fiscal governance framework for corruption reduction, which encompasses digitalization, legal reform, enforcement mechanisms and a professional civil service.

Kahn, Theodore, Alejandro Baron and Juan Cruz Vieyra, *Digital Technologies for Transparency in Public Investment: New Tools to Empower Citizens and Governments*, Inter-American Development Bank, 2018, https://publications.iadb.org/en/digital-technologies-transparency-public-investment-new-tools-empower-citizens-and-governments

This paper addresses the potential for digital technologies to dramatically reduce procurement corruption in Latin America and the Caribbean. It focuses on the efficiency- and transparency-enhancing capacities of computerized processes. The authors discuss the prerequisites for maximizing e-governance and highlight certain policies and legal reforms that have helped realize the potential of technological solutions. Finally, the authors assess the MapaInversiones programme, an interactive online platform that allows users to monitor the physical and financial progress of public investment projects through data visualizations and geo-referenced maps.

Lagunes, Paul, "Guardians of accountability: A field experiment on corruption and inefficiency in local public works", International Growth Centre, no. C-89335-PER-1, 2017, https://www.theigc.org/wp-content/uploads/2017/11/Lagunes-2017-Working-paper.pdf

This study tested whether the threat of officially-backed civil society oversight can curb procurement corruption and simultaneously increase overall efficiency – two phenomena that, the author contends, are strongly correlated. The author conducted a field experiment on 200 municipalities in Peru. One group was informed that its infrastructure projects were being monitored by a civil society organization with the support of the country's anti-corruption agency, and a control group of municipalities received no such communication. The experiment group was found to have completed its infrastructure projects at approximately 15% lower cost than the control group, while experiencing no time delays or other inefficiencies.

Landell-Mills, Pierre, *Citizens Against Corruption: Report from the Front Line,* Partnership for Transparency Fund (PTF), 2013, https://www.ptfund.org/publication_page/citizens-against-corruption-report-from-the-frontline/

This book details the anti-corruption efforts of the Partnership for Transparency Fund (PTF), which was created in 2000 with the goal of mobilizing civil society organizations against official corruption. The book highlights projects around the world – from Azerbaijan to Uganda – where civil society organizations effectively stifled corrupt behaviour. The author explains the failures of government-centric anti-corruption solutions and the need to more systematically harness people power towards enhanced government accountability. The book also addresses the limitations and risks of this type of civic involvement and provides suggestions on how these hurdles may be overcome.

OECD, *Preventing Corruption in Public Procurement,* 2016, http://www.oecd.org/gov/ethics/Corruption-Public-Procurement-Brochure.pdf

This report focuses on procurement corruption in OECD countries. The author enumerates the various direct and indirect harms caused by procurement corruption and outlines a holistic reform agenda. The report focuses on mutually supportive principles which, if integrated into governance structures, may reduce corruption, including integrity, transparency, stakeholder participation, accessibility, e-procurement and oversight. Of note are the case studies provided throughout the report, highlighting various countries that have successfully implemented one or more of the seven recommended principles.

OECD, *Reforming Public Procurement: Progress in Implementing the 2015 OECD Recommendation*, 2019, https://www.oecd-ilibrary.org/sites/1de41738-en/index.html?itemId=/content/publication/1de41738-en

This report discusses the national implementation of the 2015 OECD Recommendation of the Council on Public Procurement based on 2018 survey data collected by the OECD. In general, survey respondents reported implementation progress, with an increasing per cent of governments using predetermined criteria in procurement bid evaluations and a growing proliferation of data-driven procurement platforms. However, the report notes that significant room for improvement remains in such areas as procurement evaluation, officer training and risk management.

Open Government Partnership, *Open Up Guide: Using Open Data to Combat Corruption*, Version 2.0, 2018, https://open-data-charter.gitbook.io/open-up-guide-using-open-data-to-combat-corruption/

Open Government Partnership promotes the government use and production of publicly available data. This guide builds upon the Partnership's core principles, enumerated in the Open Data Charter, through priority datasets, data collection and distribution standards, and potential open data use-cases to combat corruption. Through case studies, the guide explains how open data can support corruption prevention, detection, investigation and enforcement.

Open Government Partnership, *Anti-Corruption Initiatives: Open Contracting*, Open Government Partnership Global Report, 2019, https://www.opengovpartnership.org/wp-content/uploads/2019/05/Global-Report_Open-Contract.pdf

This report builds the case for "open contracting", described as: "1) the affirmative disclosure of information; and 2) participation, monitoring and oversight". The authors outline the benefits of open contracting, including cost-savings, greater procurement participation, fairer processes, improved deliverable quality and corruption prevention, among others. The report also provides examples of countries that have already implemented aspects of open contracting within their procurement processes. The authors note that, to date, open contracting-related country commitments overwhelmingly focus on disclosure rather than citizen engagement, viewing the latter as a key next step towards greater procurement transparency and accountability.

Søreide, Tina, *Corruption in public procurement: Causes, consequences and cures*, Chr. Michelsen Institute, 2002, https://www.cmi.no/publications/file/843-corruption-in-public-procurement-causes.pdf

This study explains the close relationship between corruption and public procurement, and the various resulting harms. Beyond explicitly illegal acts, the author describes various avenues for corrupt behaviour that may fall through the cracks of express legal prohibitions and existing sanctions. To reduce the opportunities for procurement corruption, the document offers a menu of principles and reforms. At the core of the policy proposals lies the opinion that the procurement process must be more transparent, competitive and accountable. The author concludes the study with an extensive list of concrete practices that would help realize various policy recommendations.

Transparency International, *Curbing corruption in public procurement: A practical guide*, 2014, https://www.transparency.org/whatwedo/publication/curbing_corruption_in_public_procurement_a_practical_guide

This guide outlines the prevalence and resulting harms of procurement corruption, such as financial, environmental, social, political and health impacts. The author summarizes key principles for procurement reform, the minimum standards for upholding these principles, and their connection to the leading international anti-corruption conventions, the UNCAC and the OECD Anti-Bribery Convention. The author also highlights special risk factors that can arise in the procurement context and how to best mitigate them. The publication includes a list of tools for improving the procurement process, including Integrity Pacts, e-procurement and social witness programmes.

Transparency International Georgia, *Simplified procurement – Corruption Risks in Non-Competitive Government Contracts*, 2013, https://www.transparency.ge/sites/default/files/post_attachments/Simplified%20procurement%20-%20Eng%20–%20Dec%209.pdf

This report finds that direct contracting may result in high instances of procurement corruption. Transparency International Georgia studied 430,000 non-competitive government contracts between December 2010 and September 2013, uncovering significant evidence that this type of directly awarded government contract is commonly misused for indirect party financing, personal favours and nepotism.

Transparencia Mexicana, *A New Role for Citizens in Public Procurement*, Citizens&Markets, 2012, https://www.scribd.com/document/110224943/Citizens-and-Markets-A-New-Role-for-Citizens-in-Public-Procurement

This book examines the evolving roles, interests and relationships of governments, corporations and individuals with a focus on the power of citizens to root out corruption in public procurement. It presents six case studies of citizen-driven efforts in countries around the globe. These movements amplified citizen voices, held government actors to account, and promoted transparency and fair competition throughout the procurement process. The authors advocate that citizen participation and the resulting cultural shifts are essential components of the anti-corruption agenda, which can be cultivated through a variety of strategies in the procurement context.

United Nations Office on Drugs and Crime (UNODC), *Good practices in ensuring compliance with article 9 of the United Nations Convention against Corruption: Guidebook on anti-corruption in public procurement and the management of public finances*, 2013, https://www.unodc.org/documents/corruption/Publications/2013/Guidebook_on_anti-corruption_in_public_procurement_and_the_management_of_public_finances.pdf

This publication, produced as part of the Public-Private Partnership for Probity in Public Procurement project, provides guidance on how countries can implement a procurement process that upholds the standards enumerated in Article 9 of the UNCAC. Specifically, the Guidebook recommends predictable and transparent procurement processes, effective mechanisms for exposing and challenging corrupt practices, appropriate sanctioning mechanisms and the increased professionalization of procurement officials. The Guidebook thoroughly outlines the various procedures, phases and related vulnerabilities of the procurement process before recommending exemplar reforms, including e-procurement. It concludes with a checklist for meeting the minimum requirements set out by Article 9 of the UNCAC.

Wells, Jill, "Corruption and collusion in construction: A view from the industry", in T. Søreide and A. Williams (Eds), *Corruption, grabbing and development,* Edward Elgar Publishing, 2014, pp. 23-34, https://pdfs.semanticscholar.org/79e9/1919263a91d3eb4fba3e82b996c93007b991.pdf

The author asserts that much of the developing world's dissatisfaction with construction projects can be attributed to corrupt procurement practices. Certain characteristics of construction projects make them particularly vulnerable to corruption, including size, uniqueness, complexity and the involvement of multiple procurement officials. The author explains the opportunities and motivations for corruption and collusion in the procurement process, such as the informality of construction contracts: parties know that it is often impossible to accurately predict the time and costs necessary to complete a project, which leads to closed-door post-contract renegotiation. Finally, the author addresses relevant policy solutions, calling for tighter regulation, more transparency and greater civil society oversight.

World Bank, *Corruption and Technology in Public Procurement*, 2007, http://documents.worldbank.org/curated/en/946171468151791174/pdf/481060WP0Corru10Box338882B01PUBLIC1.pdf

Prepared for the Procurement Harmonization Project of the Asian Development Bank, the Inter-American Development Bank and the World Bank, this report offers insights on the historic inability of procurement procedures and reforms to curb corruption, and offers e-procurement as a promising path forward. The author provides insight on the key qualities of effective procurement reform, including public support, transparency and accountability. The author offers e-procurement as a tool that may be able to bridge both regulatory and efficiency goals in public procurement – two priorities that have historically clashed. The article concludes with a detailed explanation of e-procurement and the ways in which it can most effectively be mobilized to increase transparency and accountability in the procurement process.

International agreements, draft legislation and recommendations

OECD, *OECD Recommendation of the Council on Public Procurement*, Directorate for Public Governance and Territorial Development, 2015, https://www.oecd.org/gov/public-procurement/OECD-Recommendation-on-Public-Procurement.pdf

This set of recommendations, produced by the OECD Council on Public Procurement, focuses on procurement corruption and procurement efficacy more generally. It builds on the 2008 OECD Recommendation on Enhancing Integrity in Public Procurement. It advocates transparency, integrity, fairness, accountability and citizen participation through the use of competitive procurement auctions, comprehensive and timely information disclosure, professional codes of conduct, strategic procurement monitoring, and other measures.

Open Contracting Partnership (OCP), "Open contracting global principles", n.d., https://www.open-contracting.org/what-is-open-contracting/global-principles/

> The Open Contracting Partnership worked with almost 200 member organizations from the public and private sectors to develop its Open Contracting Global Principles. The principles consolidate international best practices on disclosure and public participation, with a focus on transparency, monitoring and oversight.

Open Data Charter (ODC), "Principles", 2015, https://opendatacharter.net/principles/

> The Open Data Charter consists of six principles developed by governments, civil society and subject-matter experts. Its goal is to establish a universally agreed-upon, though aspirational, set of norms for data publication. The six principles promote data that is transparent, accessible, comparable, interoperable and used towards socially productive ends – in the procurement context and beyond.

United Nations Commission on International Trade Law (UNCITRAL), *UNCITRAL Model Law on Public Procurement*, United Nations Publication, 2014, https://uncitral.un.org/sites/uncitral.un.org/files/media-documents/uncitral/en/2011-model-law-on-public-procurement-e.pdf

> The Model Law on Public Procurement contains procedures and principles to maximize the efficiency of, and reduce corruption in, the public procurement process. The key provisions of the Model Law contain recommendations for all types and contexts of public procurement, including standard, urgent, low-value and complex procurement. In each scenario, the Model Law promotes modern commercial techniques, including e-procurement, that can help governments effectively marry economic and development goals with a corruption-reduction agenda. These principles are also intentionally harmonized with other leading international standards, including the UNCAC, the Procurement Guidelines of the World Bank, and the WTO GPA.

United Nations Office on Drugs and Crime (UNODC), "United Nations Convention against Corruption" (UNCAC), General Assembly resolution 58/4 of 31 October 2003, U. N. T. S. Doc. A/58/422, https://www.unodc.org/documents/treaties/UNCAC/Publications/Convention/08-50026_E.pdf

> Article 9 of the UNCAC specifically addresses procurement corruption, promoting a system based on transparency, competition and objectivity in decision-making. Though very general in its terms, the Convention requires parties to disseminate relevant information in a timely manner, pre-establish and apply objective selection and award criteria, provide an effective system of domestic review and appeal, and implement effective training requirements for procurement officials.

World Trade Organization (WTO), "Revised Agreement on Government Procurement", 2014, https://www.wto.org/english/docs_e/legal_e/rev-gpr-94_01_e.htm

> The Revised Agreement on Government Procurement (WTO GPA) provides a multilateral framework on government procurement with the goal of promoting non-discrimination, transparency and procedural fairness, without sacrificing governmental efficiency and economic development. For example, the agreement covers e-procurement, supplier-related challenges and clear parameters for information publication and accessibility.

Endnotes

1 Transparency International, 2019.

2 USAID's evaluation method focuses on transparency, accountability, prevention, enforcement and education (USAID, 2005).

3 The World Bank measures performance in government procurement by assessing cost-efficiency, timeliness, transparency, quality and fairness (World Bank, 2015).

4 The OECD public procurement performance indicators include efficiency of the procurement process; openness and transparency of the procurement process; professionalism of the procurement workforce; and contract management and supplier performance (OECD, 2017).

5 SIGMA is a joint initiative of the OECD and the European Union, which aims to support socio-economic development by improving public governance. SIGMA's evaluation focuses on the nature of the data as opposed to the substance, categorizing them into input indicators, output indicators, process indicators, outcome indicators and quantitative indicators (SIGMA, 2016).

6 MAPS is the product of a multistakeholder initiative, consisting of international lending institutions, national development agencies and nation states. It is the only tool that comprehensively assesses public procurement systems. However, for the purposes of this evaluation, the most relevant aspect of the MAPS model is Pillar IV: Accountability, Integrity and Transparency of the Public Procurement System, which assesses transparency and civil society engagement, audit systems, procurement appeal mechanisms, and ethics and anti-corruption measures (MAPS, 2018).

7 Manandhar, 2014; Transparency International, 2019; USAID, 2005.

8 World Bank, 2015.

9 SIGMA, 2016.

10 Ibid.

11 Manandhar, 2014; Transparency International, 2019; USAID, 2005.

12 Manandhar, 2014; USAID, 2005.

13 Article 2.3.10.2.1. of Decree 1852 (2015).

14 This includes the departments, districts, municipalities and indigenous territories that administer the educational system in their respective territories (Law 715, 2001).

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16 Colombian Inspector General's Office, "Inspector General encourages the Government to design a new PAE contracting model", Bulletin 990, 20 December 2017 [in Spanish], https://www.procuraduria.gov.co/portal/exhorto-al_gobierno_a_disenar_nuevo_modelo_de_contratacion_PAE.news.

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18 Additional information can be found in Government of Colombia, "Resolución 2248", 30 July 2018 [in Spanish], https://www.mineducacion.gov.co/1759/articles-385700_recurso_1.pdf.

19 Additional information can be found in Republic of Colombia, “Ministerio de educación nacional resolución no. 002428”, 18 February 2020 [in Spanish], https://www.mineducacion.gov.co/1759/articles-393329_recurso_1.pdf.

20 This bill states that “The purpose of this Project is to regulate the civil and commercial transactions and operations of cryptocurrencies or virtual currencies, between private and public actors, for the acquisition of goods and services, throughout the Colombian territory; as well as the protection, surveillance, inspection and control of said operations, seeking to establish a regulatory framework that provides standard practices for the exchange, inspection, control, surveillance, punishment and financial effects of cryptocurrencies or virtual currencies”, http://leyes.senado.gov.co/proyectos/index.php/proyectos-ley/cuatrenio-2018-2022/2018-2019/article/28-por-el-cual-se-regula-el-uso-de-las-monedas-virtuales-o-criptomonedas-y-las-formas-de-transaccion-con-estas-en-el-territorio-de-colombia-y-se-dictan-otras-disposiciones.

21 Additional information can be found in Congress of the Republic of Colombia, House of Representatives [in Spanish], https://drive.google.com/file/d/1VStohmVWfk506Qd-nV4J7Cd1KSSqdU44/view.

22 Additional information can be found in Congress of the Republic of Colombia, Senate of the Republic, 268/19 [in Spanish], http://leyes.senado.gov.co/proyectos/index.php/proyectos-ley/cuatrenio-2018-2022/2018-2019/article/269-por-la-cual-se-regulan-los-servicios-de-intercambio-de-criptoactivos-ofrecidos-a-traves-de-las-plataformas-de-intercambio-de-criptoactivos.

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27 Colombian Ministry of Trade, Industry and Tourism, Technical Council on Public Accounting, Concept 977, “Cryptocurrencies”, 14 November 2017 [in Spanish], http://www.ctcp.gov.co/CMSPages/GetFile.aspx?guid=aa56b447-5c39-4b33-8fb1-5e8a90689b0d.

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29 Colombian National Police Department of Cybercrime, Colombian Cybercrime Trends 2019-2020, 2019 [in Spanish], https://caivirtual.policia.gov.co/sites/default/files/tendencias_cibercrimen_colombia_2019_-_2020_0.pdf.

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31 Colombia Fintech, “Colombia’s first blockchain hackathon seeks e-commerce solutions”, 25 October, https://www.colombiafintech.co/novedades/primer-hackathon-blockchain-de-colombia-busca-soluciones-en-e-commerce.

32 World Bank, 2016.

33 Gordon, 2013.

34 Gordon, 2013; UNODC, 2003.

35 Additionally, for the past 20 years, every free trade agreement the United States has signed includes government procurement provisions that contain the same core requirements as these international frameworks (see Gordon, 2013).

36 Gordon, 2013; UNODC, 2003; UNCITRAL, 2014; WTO, 2014.

37 UNCITRAL, 2014; WTO, 2014.

38 UNODC, 2003.

39 Notably, while the OECD Anti-Bribery Convention only dictates the laws of its 44 state parties, its impact is far-reaching due to the financial and political reach of OECD countries and the extraterritorial application of some of its core principles – namely, those that criminalize the bribery of foreign public officials in international business transactions. These provisions, based on the Foreign Corrupt Practices Act, first enacted in the United States in 1977, make it a criminal violation for a company (for example, one based in the United States) to bribe a foreign official (for example, a political official in Nigeria) in furtherance of business interests (for example, to obtain a procurement contract) (see United States Department of Justice, Criminal Division and U.S. Securities and Exchange Commission, Enforcement Division, 2012).

40 Martini, 2015; OECD, 1998; UNODC, 2013.

41 Ibid.

42 Similar regulatory frameworks have also been adopted by regional and industry-specific bodies, such as the Extractive Industries Transparency Initiative, the Inter-American Convention Against Corruption, the European Convention against Corruption Involving Officials, and others.

43 OECD, 1998.

44 Sandgren, 2005.

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52 Ibid.

53 UNCITRAL, 2014; WTO, 2014.

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57 EBRD, 2015; OECD, 2016; Transparency International, 2014; World Bank, 2007.

58 For example, within a year of launching its e-procurement platform, tenders in Georgia rose from 1,923 to 33,000 (see World Bank, 2016).

59 Outside of corruption prevention-related savings, e-procurement can substantially reduce transaction costs for bidders throughout the procurement process by eliminating document preparation, printing and transportation costs. Countries report efficiency gains of 10-20% of the total volume procured via electronic means (see World Bank, 2016). For example, through the implementation of an e-procurement system, the Chilean government increased savings from $180 billion to $280 billion from 2010 to 2012. Similarly, in Portugal, the use of e-procurement achieved savings of $206 million within the first two years of operation (see World Bank, 2016).

60 EBRD, 2015; OECD, 2016; Transparency International, 2014; World Bank, 2007; World Bank, 2016.

61 Some of the best e-procurement programmes, in terms of comprehensiveness and impact, include KONEPS in Korea (see Public Procurement Service, n.d.) and Prozorro in Ukraine (see Granickas, 2018).

62 World Bank, 2016.

63 Ibid.

64 Ibid.

65 “Bid-opening” refers to the phase of the procurement process in which bids are unsealed and reviewed by government officials. Each bid is read aloud and reviewed for completion and project qualifications. Vendors often can attend a bid-opening if they so choose, though it is not required (see Calamaras, n.d.).

66 World Bank, 2016.

67 Transparencia Mexicana, 2012.

68 Azanlerigu and Akay, 2015; Nawi et al., 2017; Ujakpa et al., 2016.

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70 Sandgren, 2005.

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72 World Economic Forum personal communication on 26 March 2020; Ledger Insights, 2019.

73 Gobierno de Aragón, n.d.

74 Graglia and Mellon, 2018.

75 Shang and Price, 2018.

76 Kriticos, 2019; Shang and Price, 2018.

77 Graglia and Mellon, 2018; Kriticos, 2019; Vos, Lemmen and Beentjes, 2017.

78 Graglia and Mellon, 2018; Shang and Price, 2018.

79 Graglia and Mellon, 2018.

80 Vos, Lemmen and Beentjes, 2017.

81 Graglia and Mellon, 2018; Vos, Lemmen and Beentjes, 2017.

82 Kshetri and Voas, 2018.

83 Bulut et al., 2019.

84 Greenhalgh et al., 2018; Rosenberg, 2020; Specter, Koppel and Weitzner, 2020.

85 de Jong, Meyer and Owens, 2017; Martini, 2019.

86 de Jong, Meyer and Owens, 2017; Martini and Murphy, 2018.

87 Knobel, 2019.

88 de Jong, Meyer and Owens, 2017.

89 Martini and Murphy, 2018.

90 Kanowitz, 2019; Suliman, 2017.

91 Altec, 2019; Kanowitz, 2019; Suliman, 2017.

92 Harvey, 2015.

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