
Solution to Corruption

*The Corruption Dilemma: A Game-Theoretic and Psychological Analysis
with Solutions via Generative AI and Blockchain*

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1 Abstract

Corruption continues to be a serious problem across governments, public institutions, and societies. Common anti-corruption methods—such as strict laws, monitoring, and punishment—are costly and often fail to bring lasting results [Rose-Ackerman, 1999a, Klitgaard, 1988]. This paper looks at corruption from the combined view of human psychology and game theory, and introduces a model called the *Corruption Dilemma*.

The model explains how personal incentives, group behavior, and human thinking patterns work together to keep corruption alive, even when strong rules exist to stop it [Tversky and Kahneman, 1974, Ostrom, 1990]. Instead of using data or case studies, this paper focuses on simple theory and human behavior. By comparing current anti-corruption systems with this new model, it shows how corruption can be managed in a more efficient and realistic way. The study argues that corruption is not only a moral issue but a system-wide coordination problem [Basu, 2011, Rothstein, 2011], and solving it requires methods that match how people actually think and act [Kahneman, 2011].

2 Introduction

Corruption is one of the biggest barriers to good governance, economic growth, and public trust. Around the world, governments spend large amounts of money to control it using laws, audits, and technology. Yet corruption continues to exist, showing that the main problem lies not only in weak laws but also in how people behave within these systems [Klitgaard, 1988, Rose-Ackerman, 1999a].

This paper looks at that human side of corruption. Using game theory and psychology, it studies how people make self-interested choices that sometimes harm the larger system. The main idea, called the *Corruption Dilemma*, shows that even when individuals act logically for their own benefit, the result can be bad for everyone—similar to how players in the *Prisoner's Dilemma* both lose by trying to protect themselves [Axelrod, 1984].

Unlike studies based on data or case examples, this paper focuses only on concepts—it explains corruption in terms of incentives, habits, and system design [Tversky and Kahneman, 1974, Kahneman, 2011]. It also reviews why current anti-corruption models, which rely heavily on punishment and monitoring, often fail: they are expensive and do not address the root cause—human motivation [Rothstein, 2011].

The paper then introduces the *Corruption Dilemma* model, which connects human psychology with system-level thinking. The later sections explain:

1. Why current anti-corruption systems are limited,
2. How the Corruption Dilemma works, and
3. How it can improve efficiency and reduce costs compared to existing models.

By treating corruption as a coordination problem instead of a moral failure, this study aims to build a foundation for practical policies that are both human-centered and cost-effective [Ostrom, 1990, Basu, 2011].

3 Literature Context

Corruption has been studied across economics, political science, psychology, and sociology. Most research links it to weak institutions and limited enforcement capacity. Economists describe corruption as a rational choice,

where individuals act based on cost–benefit calculations—participating when rewards outweigh risks [Becker, 1968]. Political science highlights the role of governance, accountability, and law enforcement in shaping corruption levels [Klitgaard, 1988, Rose-Ackerman, 1978].

From a psychological angle, corruption is viewed as a behavioral adaptation. Studies show that moral reasoning, social norms, and habits play a key role [Bandura, 1999, Ashforth and Anand, 2003]. When unethical behavior becomes normalized, individuals perceive it as acceptable. Theories such as moral disengagement and risk perception explain why people justify corrupt acts even when they understand their social harm.

Game theory adds another perspective, describing corruption as a strategic interaction problem. Early models viewed bribery as a game between officials and citizens, with outcomes depending on detection and punishment [Rose-Ackerman, 1978]. Later models framed it as a coordination dilemma, where misaligned incentives cause individuals to act against collective welfare [Basu et al., 1992, Tirole, 1996].

Despite this broad literature, most anti-corruption strategies still focus on institutional control—laws, audits, and enforcement—without addressing the psychological and behavioral drivers. Economic and game-theoretic studies often remain too abstract, missing the human dimension. This paper bridges that gap through the *Corruption Dilemma*, a model combining behavioral psychology and game theory to design cost-efficient, human-aligned solutions.

4 Real-World Anti-Corruption Budgets

4.1 Overview

Across countries, direct spending on anti-corruption agencies is relatively small compared to the estimated losses caused by corruption. Budget transparency also varies widely, with many agencies’ expenditures embedded within larger administrative budgets.

4.2 Examples

- **Singapore & Hong Kong:** Both operate high-integrity agencies (CPIB and ICAC) with strong autonomy. While ICAC’s budget (“Head 72”) is publicly listed, CPIB’s exact spending is less transparent. Both are recognized for effectiveness, not scale of spending.
- **Thailand:** The National Anti-Corruption Commission (NACC) had a FY2019 budget of 2.239 billion baht, a modest share of total government expenditure.
- **Malaysia:** The Malaysian Anti-Corruption Commission (MACC) received MYR 294.3 million (2015) and MYR 251.8 million (2016). These figures exclude other anti-corruption-related spending in audit, judiciary, or compliance systems.
- **Denmark (Nordic Model):** Denmark ranks among the least corrupt nations but has no central anti-corruption agency. Integrity systems are distributed across open governance, transparency laws, and internal audits. Thus, explicit “anti-corruption budget” figures are not available.

4.3 OECD Perspective

OECD's *Government at a Glance* classifies “anti-corruption and integrity” as a sub-function within governance spending. However, actual numbers are small and fragmented, spread across various ministries and oversight bodies. Comparable global data on “% of GDP spent on anti-corruption” remains limited [OECD, 2021].

4.4 Global Spending vs. Corruption Loss (Illustrative Range)

Table 1: Illustrative comparison of anti-corruption spending and corruption losses as a percentage of GDP

Category	Anti-Corruption Spend (% GDP)	Estimated Corruption Loss (% GDP)	Spend : Loss Ratio
Low Corruption Countries	0.03% – 0.2%	0.5% – 1.0%	1 : 8 to 1 : 100
Medium Corruption Countries	0.02% – 0.1%	1.5% – 4.0%	1 : 20 to 1 : 80
High Corruption Countries	0.005% – 0.05%	5% – 15%	1 : 100 to 1 : 1000
Global Estimate (OECD Range)	0.01% – 0.15%	~1% – 5%	1 : 20 to 1 : 200

4.5 Synthesis: Key Patterns

1. **Small Budgets:** Anti-corruption agencies typically receive a tiny fraction of national GDP.
2. **Limited Transparency:** Many countries do not publish distinct budget lines for these agencies.
3. **Fragmented Spending:** Major anti-corruption work happens outside agency budgets (courts, audits, transparency programs).
4. **Data Gaps:** There is no consistent cross-country dataset on anti-corruption spending.
5. **Scale Mismatch:** Corruption costs economies 10–1000 times more than what is spent to fight it.

5 Conceptual Model

Corruption is not only a matter of rules or institutions—it is deeply rooted in human behavior and psychological tendencies. Traditional explanations often reduce corruption to financial incentives or weak enforcement. However, the reality is more complex: corruption emerges when personal motives, systemic pressures, and collective expectations interact in a way that makes unethical choices seem rational.

People often engage in corruption due to short-term thinking, low tolerance for obstacles, and fear of exposure. Immediate personal gain frequently outweighs distant consequences, while bureaucratic hurdles or rigid systems encourage shortcuts. Once corruption becomes common, it creates a self-reinforcing cycle: honest individuals face disadvantages, and those who adapt to corrupt norms find it easier to survive.

Thus, corruption is not simply caused by “bad actors,” but by a system of incentives and habits that rewards corrupt actions and punishes integrity. To understand and potentially reverse this trap, the paper applies game theory and psychological insights—particularly Nash equilibrium and loss aversion—to explain how corruption stabilizes and persists within societies.

5.1 Game Theory and Strategic Interaction

Game theory provides a structured way to understand how individuals make decisions when their outcomes depend on others' actions. In corruption settings, every participant—whether a citizen, official, or institution—evaluates personal gain against the risk of detection and punishment.

When the perceived benefit of cooperation in corrupt acts outweighs the expected cost of honesty, corrupt equilibria emerge. This means corruption can become a rational strategy, sustained by shared expectations and self-interest, rather than just moral weakness.

In this framework, Nash equilibrium represents the point where no participant can improve their outcome by acting differently, given others' behavior. In corruption networks, this often translates into mutual complicity—everyone remains silent or participates because any unilateral deviation (e.g., reporting corruption) leads to personal loss or isolation.

Thus, game theory shows that corruption is not always an act of defiance but often the logical outcome of interacting incentives in a system where honesty is penalized and conformity is rewarded.

5.2 Understanding the Nash Equilibrium

The concept of Nash Equilibrium [Nash, 1950] helps explain why corruption persists even when it harms collective welfare. It describes a stable state where individuals have no incentive to change their strategies because others' choices make deviation unprofitable.

A classic example is the Prisoner's Dilemma [Flood, 1950]. Two players must decide whether to cooperate or betray each other. Although mutual cooperation produces the best collective outcome, each player's fear of betrayal drives them to defect, resulting in a stable but inefficient equilibrium.

Corruption mirrors this logic. When individuals believe that “everyone else is corrupt,” being honest seems irrational. Paying bribes or granting favors becomes a survival mechanism within a system where refusal could lead to personal or professional loss. As a result, corruption becomes self-sustaining—an equilibrium where everyone participates, even though all would benefit more in a clean system.

This interaction forms the basis of what this paper terms the *Corruption Dilemma*: a state where psychological biases, loss aversion, and systemic incentives combine to make corruption a stable yet inefficient equilibrium in society.

5.3 Human Behavior and Loss Aversion

Human psychology plays a crucial role in maintaining corrupt systems. One key principle is *loss aversion*, which refers to people's tendency to fear losses more than they value equivalent gains [Kahneman and Tversky, 1979].

In practice, individuals prefer to avoid certain losses rather than take risks for uncertain gains, even when the potential reward is greater. This bias explains why many people remain silent about corruption—exposing wrongdoing may threaten their job, safety, or reputation, while the benefits of speaking up are uncertain or abstract.

Loss aversion can be expressed mathematically by a value function:

$$v(x) = \begin{cases} x^\alpha, & \text{if } x \geq 0, \\ -\lambda(-x)^\beta, & \text{if } x < 0 \end{cases}$$

where $\lambda > 1$, meaning losses are weighted more heavily than gains.

Applied to corruption, this function shows why individuals often tolerate or conceal wrongdoing: the immediate personal loss from challenging corruption (risk of retaliation, job insecurity, social isolation) is felt more strongly than the potential social gain from honesty.

Therefore, loss aversion acts as a psychological anchor that keeps corruption in equilibrium, reinforcing inaction and preserving systemic inefficiency.

5.4 Summary of the Conceptual Model

The *Corruption Dilemma* integrates insights from game theory and psychology to explain why corruption persists:

- Game theory shows how rational self-interest leads to stable corrupt equilibria.
- Nash equilibrium explains why individuals do not deviate even when everyone would be better off collectively.
- Loss aversion explains the emotional weight of risk and fear that sustains complicity.

Together, these concepts reveal that corruption is not only a legal or economic issue but a behavioral coordination failure—one that requires re-engineering incentive structures to shift the equilibrium from corruption toward integrity.

6 The Game of Corruption

6.1 Overview of Players

Society can be modeled as two principal groups of players — *citizens* and *government officials* — operating under a common governance system [Rose-Ackerman, 1999b, Klitgaard, 1988]. Citizens work, earn income, and pay taxes in return for public services such as infrastructure, security, and welfare. Government officials manage these services, ensuring fair and efficient governance.

Ideally, this interaction is mutually beneficial: citizens receive services for their contributions, while officials gain compensation and public trust. However, in practice, corruption often distorts this relationship, creating a strategic game of self-interest between these two groups [Myerson, 1991].

6.2 Current Architecture: The Corruption Game

Corruption manifests in multiple forms, but this model simplifies it into two major types — denoted as T_1 and T_2 — representing real-world corruption structures [Shleifer and Vishny, 1993]. In T_1 , corrupt exchanges occur between:

- **Citizens:** represented as one or more corrupt citizens ($k_c + 1_c$) among total N_c .

- **Officials:** represented as one or more corrupt officials $(k_g + 1_g)$ among total N_g .

The remaining citizens and officials are honest:

$$n_c = N_c - (k_c + 1_c), \quad n_g = N_g - (k_g + 1_g)$$

Corruption may originate from either side:

- A citizen offers a bribe to gain quicker access to services.
- An official demands a bribe to release those services.

Honest citizens are excluded from such benefits, while corrupt participants form closed transactional loops, reinforcing inequality [Lambsdorff, 2007].

6.3 The Corruption Dilemma

This interaction mirrors a two-player Prisoner's Dilemma [Riker, 1962]. Each player — the citizen and the official — can either:

- Be Honest (H)
- Be Corrupt (C)

Table 2: Key Variables

Symbol	Meaning	Applies To
M_+	Direct monetary gain (bribe received)	Both
M_-	Monetary loss (bribe paid, fine)	Both
S_+	Service gain (faster or exclusive access)	Citizen
S_-	Service loss or delay	Citizen
R_+	Reputation gain	Both
R_-	Reputation loss	Both
P	Penalty if caught	Both
p	Probability of detection	Both

Here R and S represent rewards and services respectively, p the probability of detection, and P the penalty if caught.

6.4 Reward Structure under Pure Self-Interest (Real-World Model)

Under real-world conditions, players act purely to maximize self-interest [Olson, 2000], ignoring social welfare or moral cost.

$$U = (M_+ - M_-) + (S_+ - S_-) + (R_+ - R_-) - (p \times P)$$

Table 3: Payoff Structure in the Corruption Dilemma

Citizen Choice	Official Choice	Description	Citizen Payoff U_c	Official Payoff U_o
H	H	Lawful transaction — taxes paid, service delivered.	$+S_+ + R_+$	$+R_+$
H	C	Official demands bribe or delays service.	$-S_- - M_- - R_-$	$+M_+ + R_- - (pP)$
C	H	Citizen offers bribe, official refuses.	$-M_- - R_- - (pP)$	$+R_+ - M_+$
C	C	Bribe given and accepted.	$+M_+ + S_+ - (pP) - R_-$	$+M_+ - (pP) - R_-$

6.5 Example with Realistic Values

Under these conditions:

$$\text{Corruption is rational when } (M_+ + S_+) > (p \times P)$$

Hence, corruption persists when expected rewards outweigh risks [Becker, 1968].

Table 4: Sample Parameters (in Utility Points)

Variable	Description	Value
M_+	Bribe or extra gain	10,000
M_-	Money paid or lost	2,000
S_+	Value of faster service	3,000
S_-	Loss from delay	4,000
R_+	Reputation gain	2,000
R_-	Reputation loss	5,000
P	Penalty if caught	20,000
p	Probability of detection	0.05

6.6 Simplified Insights

- **Both Honest:** Stable, socially beneficial outcome.
- **One Honest, One Corrupt:** Honest player loses heavily.
- **Both Corrupt:** Short-term gain, long-term instability.

Under weak enforcement, corruption remains the dominant strategy not due to immorality, but due to flawed incentives [Ostrom, 1990].

6.7 Summary

The Game of Corruption demonstrates that persistence of corruption is a function of systemic incentives rather than individual ethics. To break this equilibrium, the incentive structure must shift — by increasing p or P , or

by rewarding honesty.

6.8 Type 2 Corruption — Private Access to Capital (Single Collective Player Model)

Type 2 corruption occurs when a single insider controls continuous access to public funds K , leading to large-scale, low-visibility corruption [Tanzi, 1998].

6.8.1 Conceptual Framework

The official maximizes utility under two choices:

- Honest (H): Uses funds properly, gains stability and trust.
- Corrupt (C): Diverts capital for personal gain.

$$U_H = B, \quad U_C = (M_+ - M_-) + (S_+ - S_-) + (R_+ - R_-) - (p \times P)$$

Corruption occurs when:

$$U_C > U_H \quad \text{or} \quad p < \frac{(M_+ - M_-) + (S_+ - S_-) + (R_+ - R_-) - B}{P}$$

6.8.2 Quantitative Example

$$U_C = (300,000 - 5,000) + (20,000 - 0) + (5,000 - 100,000) - (0.01 \times 500,000) = 215,000$$

$$U_H = 50,000$$

Thus, corruption remains rational until detection probability p significantly increases.

6.8.3 Societal Consequences

Type 2 corruption leads to systemic decay — infrastructure failure, inflated projects, underfunded public services, and widening inequality [Treisman, 2000]. It operates as a *Game of Information*, where insiders exploit asymmetries until external audits and transparency increase p beyond rational thresholds.

In essence, Type 2 corruption is institutional self-destruction disguised as governance.

7 Solution to Corruption

7.1 Shifting the Nash Equilibrium toward Honesty

The persistence of corruption represents a Nash equilibrium where engaging in corruption remains the most rational choice for many participants [Fudenberg and Tirole, 1991]. To shift this equilibrium, the system's incentives — not merely moral appeals or enforcement — must change so that honesty becomes each player's dominant strategy [Ostrom, 1990].

Let:

G = gross gain from corruption

p = probability of detection

F = penalty if caught (fine, dismissal, imprisonment)

S = baseline legal income

R = reputational or moral utility from honest behavior

V = present value of future legitimate benefits (career stability, pension, repeat opportunities)

Then the expected utilities are defined as:

$$U_{\text{corrupt}} = (1 - p)G - pF$$

$$U_{\text{honest}} = S + R + V$$

A rational actor chooses corruption when:

$$U_{\text{corrupt}} > U_{\text{honest}}$$

To shift equilibrium toward honesty:

$$(1 - p)G - pF < S + R + V$$

Corruption becomes unattractive when expected penalty ($p \times F$) or the non-monetary benefits of honesty ($R + V$) exceed short-term corrupt gains G [Becker, 1968]. Thus, increasing detection probability p is the most direct and cost-efficient lever to reduce corruption across both transactional (Type-I) and systemic (Type-II) models.

7.2 Scale and Player Dynamics

The severity of corruption depends on the number of participating actors N . When fewer individuals control a corrupt process, the potential gain rises, and detection probability decreases [Tanzi, 1998]. If each participant has an independent chance q of exposure, collective detection probability is:

$$p_{\text{detect}}(N) = 1 - (1 - q)^N$$

Severity of corruption S is inversely proportional to N :

$$S \propto \frac{1}{N}$$

Hence:

- Small $N \rightarrow$ low visibility, high severity (Type-II corruption).
- Large $N \rightarrow$ higher detection probability, lower severity (Type-I corruption).

This framework explains why centralized corruption with fewer actors (e.g., budget embezzlement) causes deeper systemic damage than dispersed, petty corruption.

7.3 Silent Players and the Information Gap

Silent players are observers who know of corruption but choose not to act — clerks, auditors, or intermediaries [Bowen and Blackmon, 2010]. Their inaction reduces detection probability and sustains the corrupt equilibrium.

Reasons for silence:

- **Loss aversion:** Fear of retaliation or job loss.
- **Risk–reward imbalance:** Expected cost of whistleblowing exceeds benefit.
- **Bystander effect:** Responsibility diffuses across observers.
- **Reputational risk:** Reporting may harm one’s institutional standing.
- **Normalization:** Silence feels safer than honesty in corrupt environments.

Let:

N = number of active corrupt actors
 M = number of silent observers
 q = per-actor chance of exposure
 s = per-observer chance of disclosure (small)

Then:

$$p_{\text{detect}} = 1 - (1 - q)^N (1 - s)^M$$

If $s \rightarrow 0$, observers stay silent, and detection probability drops sharply — especially in Type-II systems where a few insiders can conceal massive corruption.

7.4 Policy Innovation — Public Corruption Complaint Portal

To increase p and protect whistleblowers, this paper proposes a *Public, Anonymous, Tamper-Evident Corruption Complaint Portal* combining blockchain and generative AI (GenAI) technologies [Crosby et al., 2016, Jobin et al., 2019]. It enables citizens and insiders to report corruption anonymously while ensuring verification, immutability, and transparency.

Objective: Create a self-enforcing transparency system that raises p through automation and public accountability.

7.5 Rationale

The following points summarize the main challenges in existing anti-corruption reporting systems and how the proposed portal addresses them:

- **Identity-based portals:** Traditional systems require user identification, discouraging whistleblowers due to fear of retaliation. *Portal Advantage* — Provides full anonymity through AI-based redaction and identity masking.

- **Ignored anonymous reports:** Anonymous submissions are often disregarded because they lack verification or traceability. *Portal Advantage* — Automated scoring, clustering, and blockchain hashing ensure both credibility and accountability.
- **Manual verification:** Human-led verification processes are slow, inconsistent, and expensive. *Portal Advantage* — AI-driven triage and automated validation accelerate case handling.
- **Institutional censorship:** Existing platforms allow deletion or suppression of politically sensitive reports. *Portal Advantage* — Tamper-proof blockchain ledger guarantees immutability and transparency.
- **Limited scalability:** Centralized reporting systems struggle to scale with high submission volumes. *Portal Advantage* — Decentralized architecture and automated moderation enable high throughput at low cost.

7.6 Core Features

Public Frontend: Redacted complaint listings searchable by citizens and journalists.

AI Processing: Automated text redaction, clustering, and credibility scoring through GenAI ensemble models.

Blockchain Integration: Only SHA-256 hashes and timestamps are stored on-chain; encrypted evidence remains off-chain for privacy.

Secure Access: Investigators access verified complaints through auditable, encrypted channels.

7.7 Operational Flow

1. Reporter submits complaint and evidence.
2. Personally identifiable information (PII) is stripped automatically for both honest and corrupt actors.
3. AI models redact, score, and cluster related complaints.
4. Verification model authenticates evidence.
5. Valid complaints are published and hashed on-chain.
6. Unverified entries are quarantined but hashed for proof of existence.

7.8 Privacy, Safety, and Cost

Safety: No plain-text identities, time bucketing, and Tor/HTTPS access ensure anonymity.

Cost and Scalability:

Table 5: Implementation Cost Estimates

Phase	Cost (USD)	Description
MVP	75k–200k	Frontend, backend, AI, blockchain prototype
Annual Ops	50k–200k	Hosting, inference, moderation
Sustainability	—	Private-access dashboards or data APIs

7.9 Expected Impact

- Increased reporting volume → higher detection probability p .
- Public visibility → institutional accountability.
- AI verification → filters false reports.
- Blockchain immutability → eliminates censorship.

By raising p through automation and transparency:

$$(1 - p)G - pF < S + R + V$$

Honesty becomes a rational equilibrium strategy rather than a moral exception.

7.10 Limitations and Safeguards

Table 6: Risks and Mitigations

Risk	Mitigation
Spam / false reports	Mandatory evidence and AI scoring
AI hallucination	RAG grounding and model consensus
Deanonymization	Metadata reduction and bucketing
Legal immutability	On-chain hashes only; content policy governed
Institutional neglect	Public dashboards of unresolved cases

7.11 Summary

The proposed model integrates game theory, behavioral economics, and technology to make honesty the dominant equilibrium. It achieves this through:

- **Anonymity** — protecting individuals,
- **Tamper-evidence** — via blockchain,
- **Automation** — through GenAI moderation,
- **Public accountability** — visible and auditable outcomes.

By raising both real and perceived detection probability p , the system shifts equilibrium from corruption to honesty.

8 Conclusion

Corruption is not merely a moral issue but a systemic equilibrium sustained by incentives, biases, and power concentration. This study showed that as the number of actors N decreases, detection probability p falls, increasing corruption severity. Silent observers further reduce p , creating a self-sustaining corrupt equilibrium [Tanzi, 1998].

The proposed *Public Corruption Complaint Portal* uses blockchain for immutable records and GenAI for intelligent, automated moderation. By enhancing detection probability, reducing extractable gain G , and raising the future value V of honest conduct, it rebalances the system toward an honest Nash equilibrium — turning integrity from a virtue into a rational choice.

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Thank you, Sun God : Nika. Eager to hear the drums of liberation.