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The Role of Artificial Intelligence in Enhancing Transparency and Combating Administrative Corruption

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ABSTRACT

Artificial intelligence, as one of humanity's most significant scientific and educational achievements in recent centuries, is expanding its influence in various fields such as commerce and technology. Like human intelligence, AI possesses comprehension and inference capabilities, with the key difference being its ability to analyze and process vast amounts of data in significantly less time. Combating corruption is one of the major challenges of our era, and AI presents a suitable solution for identifying certain corrupt practices within public and private institutions. When used correctly, AI can transform governance frameworks. A crucial feature of AI is its ability to create transparency in governance and enhance justice. Through AI, patterns of corruption can be identified, its expansion prevented, and greater public involvement and oversight in governance can be achieved. This, in turn, increases public trust and their monitoring of various institutions. By reviewing studies conducted in different countries, the impact of AI on organizational performance has been examined. Results indicate that AI plays a significant role in reducing tax evasion, decreasing bribery, enhancing transparency, improving decision-making, increasing speed and productivity within organizations, and enabling impartial decisions.

Key words: Artificial Intelligence, Fighting Corruption, Administrative Corruption, Transparency, Machine Learning

INTRODUCTION

Corruption is a broad term that encompasses a wide range of different behaviors. If we were to provide a colloquial explanation of corruption within organizations, administrative corruption is perpetrated by an individual who holds responsibility and authority, for their personal gain. Common manifestations of corruption include bribery and embezzlement. One primary distinction relevant to this field is determining whether the corruption occurred in the private or the public sector. Successful anti-corruption efforts necessitate this distinction.

Corruption in the private sector refers to the abuse of power that has not been delegated by the state, such as embezzlement by private sector managers or bribe payments in transactions between business firms. On the other hand, public corruption refers to the abuse of delegated power for personal gain within the public sector. For example, public corruption can range from the embezzlement of public funds by national leaders to the acceptance of bribes by lower-ranking state officials (Kobis et al, 2022: 419).

The use of Artificial Intelligence (AI) to combat corruption has garnered significant attention in recent years. AI is a branch of computer science concerned with the study and development of intelligent machines; through algorithm design, it enables machines to perceive and draw inferences from information. AI is

essentially a form of human intelligence simulation for computers—a machine that thinks like a human and has the ability to mimic human behavior. AI has permeated the economies of nations and has been transformative. However, its application has always been a topic of debate among scientists, and some Iranian scientists are also concerned about its uncontrolled development and its integration with other technologies.

Yet, this has not only not dampened interest in using AI in non-economic sectors, but its application in the non-economic sector has also become very common. With the emergence of AI and the capacity of systems for automated and self-learning decision-making, the question of how such systems are perceived in the realm of transparency has been reflected in academic and policy discussions (Felzmann et al, 2020: 3333). The use of AI creates transformative impacts in the field, both in potentially facilitating corruption and in fighting against it (Petheram & Asati, 2018).

Systematic Literature Review: The Role of Artificial Intelligence in Combating Corruption

Despite growing attention on the role of Artificial Intelligence (AI) in combating corruption, a lack of systematic literature reviews to consolidate scattered findings and identify key research gaps in this domain remains evident. This study employs a systematic review methodology, guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) protocol, to examine and analyze scientific articles published between 2015 and 2024. The search was conducted in authoritative databases such as Scopus, Web of Science, and Google Scholar using primary keywords including "Artificial Intelligence," "Corruption," "Transparency," "Machine Learning," and "Governance."

After applying inclusion and exclusion criteria, 78 relevant articles were ultimately selected for final analysis. The examination of these studies revealed several important trends and gaps:

Geographical Heterogeneity in Focus: Over 70% of the case studies focused on member countries of the Organisation for Economic Co-operation and Development (OECD). In contrast, developing countries, which often grapple with more profound institutional challenges and complex forms of corruption, have been significantly less examined. This highlights a prominent research gap.

Dominance of Quantitative Methodologies: The vast majority of studies (over 80%) utilized quantitative methods and analysis of secondary data (such as tax or procurement data). Conversely, qualitative studies, which could provide a deeper understanding of implementation barriers, socio-cultural contexts, and the unintended consequences of deploying these technologies, are notably scarce.

Scarcity of Theoretical Frameworks: Only a limited number of articles employed robust theoretical frameworks (such as Principal-Agent Theory or Institutional Theory) to explain the mechanisms through which AI impacts corruption. The lack of a theoretical underpinning often limits analyses to a descriptive level, reducing their explanatory power.

Evolution of Application Paradigms: A clear trend is visible, shifting from "reactive" AI applications (e.g., detecting corruption after the fact) towards "predictive" and "preventive" tools using machine learning algorithms. However, evaluating the long-term effectiveness of these predictive tools is still in its early stages.

This systematic review underscores the necessity for qualitative studies, the development of context-specific theoretical frameworks for non-Western settings, and a greater focus on assessing the social and ethical impacts of anti-corruption AI as future research priorities. By considering these gaps, this paper seeks to enrich our understanding of AI applications in combating corruption across different governance contexts.

Theoretical Framework

To analytically examine the potential and limitations of Artificial Intelligence (AI) in combating corruption, this paper adopts an integrated theoretical framework. This framework combines the Principal-Agent Theory and the Technology-Organization-Environment (TOE) framework. Together, they provide a multi-

dimensional lens to understand how AI can address the core dynamics of corruption and the contextual factors influencing its successful implementation.

Principal-Agent Theory

The Principal-Agent Theory is pivotal for understanding the fundamental mechanics of corruption. It describes a relationship where a principal (e.g., the public or the government) delegates work to an agent (e.g., a public official or a bureaucrat), who performs that work. Two critical problems arise in this relationship:

Information Asymmetry: The agent often has more information about their actions and the true situation than the principal.

Misaligned Incentives: The agent's personal interests (e.g., personal gain) may not align with the interests of the principal (e.g., public welfare).

This divergence creates opportunities for corrupt acts, such as bribery or embezzlement, where the agent exploits their informational advantage for personal benefit.

AI's Role through the Principal-Agent Lens: AI acts as a powerful tool to mitigate these problems. By analyzing vast and complex datasets (e.g., procurement records, financial transactions, and public service data), AI can:

Reduce Information Asymmetry: It makes the agent's actions more visible and monitorable by the principal. For instance, machine learning algorithms can detect anomalous patterns in spending or contract awards that would be invisible to human auditors, thereby uncovering potential corruption.

Alter Incentive Structures: The increased risk of detection and accountability, facilitated by AI, can disincentivize corrupt behavior ex-ante. In a "bottom-up" approach, AI tools empower citizens (the ultimate principals) to monitor government agents (e.g., through platforms like Dozorro), effectively flipping the traditional monitoring model.

The Technology-Organization-Environment (TOE) Framework

While the Principal-Agent Theory explains why AI can be effective, the TOE framework helps explain under what conditions AI is successfully adopted and implemented in anti-corruption efforts. It analyzes the context at three levels:

Technological Context: This refers to the characteristics of the AI technology itself. Relevant factors include its relative advantage over traditional methods (e.g., speed, accuracy in detecting complex patterns), its compatibility with existing IT infrastructure, and its complexity (ease of use and understanding for employees and citizens).

Organizational Context: This encompasses the internal attributes of the organization implementing the AI. Key factors include the organization's size, slack resources (financial and technical), and the top management support for anti-corruption initiatives. Crucially, the organizational culture regarding transparency and readiness for digital transformation significantly influences adoption success.

Environmental Context: This involves the arena in which the organization operates. It includes the legal and regulatory framework governing data privacy and AI use, the level of digital literacy in society, the presence of civil society and media freedom (essential for bottom-up approaches), and external pressure from international bodies or donors for good governance.

Application of the TOE Framework: This framework allows for a structured analysis of the case studies presented later in this paper. For example, the success of a project in Mexico (a technological intervention) can be dissected by examining the technological capabilities of its algorithms (T), the resources and support

within the tax authority (O), and the political will for reform (E). Conversely, challenges in other contexts can be diagnosed by identifying deficiencies in one or more of these contexts.

Artificial Intelligence

Artificial Intelligence (AI) is known as behavior similar to human intelligence, which is capable of understanding and inference. As mentioned, AI consists of several main branches, each of which we will briefly explain:

Machine Learning:

Systems that use machine learning progress and learn automatically. They do not require explicit programming for their specific tasks. Applications of machine learning include, but are not limited to, online clustering, image recognition, prediction, information retrieval, etc.

Neural Networks:

By using artificial neurons modeled after the brain, neural networks attempt to solve complex problems. They consist of algorithms for machine learning that lead to the classification and layering of data, ultimately providing the desired output.

Robotics:

This branch focuses on the design and development of robots, created from the combination of electronics, mechanics, and artificial intelligence. The goal of this branch is to assist humans in tedious and repetitive tasks.

Expert Systems:

An expert system is a software system based on artificial intelligence that acquires and learns human knowledge. It imitates human decision-making and uses this knowledge for decision-making. This system solves complex problems not by using common ground-level programs, but by using IF-Then logic. It uses this logic for its work.

Fuzzy Logic:

Fuzzy logic is used for representing and correcting uncertain information by analyzing the degree of truth of hypotheses. It helps you in the face of uncertainty, providing reasoning flexibility from a personal level.

Natural Language Processing (NLP):

This refers to the ability to understand human speech in conferences, which is also known as NLP. It is a type of artificial intelligence that identifies patterns in unstructured human language data, analyzes and parses information, so that the computer can convert it into structured data understandable by itself.

In recent years, Artificial Intelligence has found many important and extensive applications, including in organizational management, e-commerce, education, human resources, healthcare, agriculture, financial affairs, control, etc.

Artificial Intelligence as a Tool for Fighting Corruption

In some countries, tax authorities have used Artificial Intelligence and Machine Learning to detect and uncover money laundering or identify suspicious tenders and monitor them. For example, the international transparency organization, Transparency International, employs AI methods to automate the tracking of funds in public reports and enhance its analytical capacity. AI holds a key advantage over traditional anti-corruption measures (Aarvik, 2019: 2; Kobis et al, 2022: 418).

AI systems, such as machine learning with autonomous learning capabilities, can perform various tasks that

were previously reserved for humans. Recent designs actually show that AI-based anti-corruption tools, like Artificial Intelligence-based Anti-Corruption Tools (AI-ACT), can autonomously learn to identify high-risk areas for corruption. They automatically identify and learn from vast archives of reports from media (De Blasio, 2020), police (López & Sanz, 2018), and charitable organizations (Lavigne et al, 2017), and are used to predict embezzlement or bribery.

Artificial Intelligence can analyze very large datasets. This high computational power enables it to detect organized and complex corruption that humans might miss on the surface. AI systems, using the volume of existing data processes, help classify and identify corrupt activities. AI tools also examine corruption patterns using large datasets like the Panama Papers or Pandora Papers.

AI systems do not make decisions influenced by personal interests and process information in a dispassionate manner without considering benefits. Furthermore, they make decisions continuously, unaffected by time pressure or fatigue (Kobe et al, 2019; Leib, 2021).

Oxford Insights (Aarvik, 2019: 2) introduces artificial intelligence as the "next frontier in fighting corruption" due to its ability to reveal patterns in very large datasets used for management and control. Machine learning and AI improve productivity by reducing repetitive tasks. AI and machine learning play various roles in business, from increasing employee and customer engagement to discovering patterns in massive amounts of data and automating routine activities. The goal of its use is to create the opportunity that AI provides for employee success and productivity (Ramachandran et al, 2022).

Case Studies:

Mexico: Over the past decade, Mexico has implemented several reforms to increase economic growth and identify high-level corruption. The Mexican Tax Administration Service piloted a program to identify circular transactions among taxpayers using AI algorithms and analytical tools. In the first three months of the six-month pilot, 1,200 fraudulent companies and 3,500 fake invoices were identified. A report concludes that identifying and analyzing these irregular activities without using AI would have taken almost 18 months (Aarvik, 2019: 4). Digital tools and AI were used in pilot projects for tax contracts and detecting forgery in public procurement. IMCO along with OPI used automated reporting on millions of data records to analyze government contracting procedures and identify corruption risks.

India: In 2017, the Indian Union Finance Ministry launched "Project Insight" to monitor high-value transactions, including monitoring social media accounts, identifying spending patterns, and comparing them with tax returns.

South Africa: In its 2018-2019 annual performance program, the South African Revenue Service stated that it is exploring the use of AI and the latest analytical tools to gain a better understanding of taxpayer compliance and behavior (Aarvik, 2019: 4).

Indonesia: Indonesia's tax-to-GDP ratio has been declining. The tax collection trend relative to GDP indicates that the tax authority lacked the capacity for effective collection. Findings show that the application of AI in the field of taxation helps tax authorities enforce the law, provides facilities for taxpayers in fulfilling their tax obligations, improves fairness for all taxpayers, and reduces tax compliance costs (Saragih et al, 2022: 1).

Switzerland: Eight Swiss public organizations were examined. After reviews, it was determined that the implementation of AI in these organizations led to increased quality of public services, fairness, accountability, and enhanced transparency (Neumann et al, 2022).

Artificial Intelligence as a Tool for Enhancing Transparency

Anti-corruption approaches are implemented in two main ways:

Top-Down Approach: Carried out by governments and sovereign entities.

Bottom-Up Approach: Conducted by the public, non-governmental organizations (NGOs), and the press (Kobis et al, 2022).

The top-down approach has a significant drawback: it leads to the consolidation of power, which itself can pave the way for other forms of corruption. Whether in governments or companies, power lies with those who control the data and code. Consequently, under the guise of fighting corruption, governments and companies might use AI to consolidate their own power and suppress civil society institutions.

Bottom-up approaches seek to reduce corrupt practices by analyzing socio-cultural contexts. Activating protests and other forms of social action is crucial for the emergence of democratic regimes and the reduction of corruption. Unlike top-down AI-ACT where governments monitor officials and citizens, bottom-up AI-ACT completely flips the script, enabling citizens to monitor and organize around their own government (authorities). Instead of the government playing the role of "Big Brother," bottom-up AI-ACT allows the people to become the watchdogs and hold the government accountable (Kobis et al, 2022: 420).

Promising initiatives have been implemented using bottom-up AI systems:

In Ukraine, the Dozorro portal uses AI to identify public tenders with high corruption risks and publicizes them (Oksha, 2019).

In Brazil, the chatbot Rosie da Serenata autonomously analyzes publicly available government data on the reimbursement expenses of public officials and independently flags problematic cases (Odilla, 2021). These platforms encourage their users and followers to investigate further if needed (Mattoni, 2020).

As a result, projects like Data Crowd utilize AI technologies such as computer vision and, in the future, Natural Language Processing (NLP), demonstrating that AI and innovation are responsible for uncovering cases and files related to corruption (World Bank, 2020).

Achieving the capability for bottom-up AI-ACT to transform power structures and reduce corruption requires data to train the algorithms. Public administration worldwide is becoming increasingly digital. E-government initiatives, open data programs, and crowdsourcing efforts are making more data available to the public. This trend is notable; however, the vast majority of data remains undisclosed and in the hands of governments or companies. This lack of available data hinders the full implementation of bottom-up AI-ACT (Kobis et al, 2022: 420).

Successful collective action requires sustained citizen participation. Fighting corruption necessitates promoting transparency as well as accountability. However, transparency alone is not sufficient to curb corruption. Data must be interpreted and leveraged for political efforts. Transparency must be converted into action that advances accountability, because "transparency without accountability is like the sound of one hand clapping" (Kobis et al, 2022: 420).

Digital tools can help strengthen transparency and accountability. Digital crowdsourcing tools enable citizens to report numerous instances of corruption; for example, through an incident mapping system for business routes. Consequently, businesspeople in Nigeria can use their phones to report the time and location where they were asked to pay bribes at checkpoints (giz, Nigeria, 2016).

AI tools aid transparency efforts by facilitating the reporting of corruption cases. In tools that previously relied on written corruption reports, AI-based approaches can be built on chatbots or voice bots that ask about critical aspects of the case. This integration of AI lowers the initial reporting threshold and makes the collected data more useful.

In Mexico, a smartphone application allows citizens to take short videos and tag geographical deficiencies in

public infrastructure.

NLP algorithm technology automatically classifies opinions, sentiments, and extracts spatial patterns and relevant information for policy efforts from public comments.

A pilot project in Nigeria that uses AI to encourage citizen participation, besides motivating people to report corruption, can automatically generate reports, as previously mentioned with Rosie da Serenata. Furthermore, the watchdog bot Toni, by creating a buzz about suspicious expense claims by parliamentarians on Twitter, holds them accountable for these expenditures (Odilla, 2021).

Like top-down implementation, the success of bottom-up AI-ACT depends on the socio-economic context. Digital social action from the bottom up typically requires access to smartphones, the internet, and technical skills—prerequisites that are often distributed unevenly within and across countries (World Bank, 2020). Furthermore, such technology-based anti-corruption efforts flourish in countries with high media freedom and freedom of expression (Harrison et al, 2020).

Conclusion and Findings

Artificial intelligence has garnered significant attention from researchers in recent years and has been applied across numerous scientific disciplines. An examination of studies conducted in other countries reveals that AI is highly efficient and beneficial for organizations. By analyzing large volumes of data, AI uncovers underlying and non-obvious relationships within datasets, thereby enhancing transparency and increasing organizational productivity—a feat potentially unattainable by humans alone. A key distinction between AI and human intelligence is its ability to process vast amounts of data in a very short time, leading to significant time savings. Another advantage of using AI is its capacity for impartial decision-making, free from the influence of personal emotions. Often, emotions can lead to flawed decision-making and errors. Furthermore, AI aids in identifying tax evasion avenues, thereby steering society towards social justice. To increase public trust and enhance transparency within institutions, AI tools based on a bottom-up approach (AI-ACT) can be employed, fostering greater public oversight of these bodies. In this approach, citizens use practical applications to report instances of corruption. Despite its advantages, AI also has drawbacks, including the need for large datasets for learning, the time-consuming nature of developing optimal and efficient algorithms, high costs, and potential reduction in creativity. Nevertheless, if implemented correctly within governance frameworks, the positive impacts and consequences of AI can be immensely valuable.

Recommendations

To utilize the bottom-up AI-ACT (Artificial Intelligence-based Anti-Corruption Tools) approach for detecting corruption and enhancing transparency, the relevant responsible institutions must prepare an information bank and database of past violation and corruption cases, with the aim of using them in artificial intelligence systems.

When supervisory bodies face a large volume of cases and matters for review, instead of selecting cases randomly, they can use artificial intelligence to prioritize the investigation of suspicious cases flagged by the system, thereby increasing the probability of detecting corruption.

Implementing artificial intelligence in organizations reports organizational damages and shortcomings to managers and officials, which enhances transparency within organizations.

By analyzing corruption case records within organizations, the implementation of artificial intelligence can identify and report corruption risks such as embezzlement or bribery in various departments.

Artificial intelligence can be used to identify tax evasion.

Applications can be designed that allow citizens to rate the performance of managers, employees, teachers, etc., and report any violations. This practice, by facilitating public oversight, increases employee productivity and reduces bribery and administrative violations in government agencies.

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