

Artificial Intelligence (AI) in Tax Auditing and the KURGAN Application in Türkiye

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Abstract

In a developing economy such as Türkiye, pervasive practices like tax evasion, issuance of fraudulent invoices, and the substantial size of the informal economy underscore the critical importance of tax auditing. The shortage of qualified auditors and limitations in institutional capacity have rendered the integration of artificial intelligence (AI) into tax supervision increasingly indispensable. Since not all taxpayers adhere to the principles of tax morality, and given the prevailing perception that substantial income cannot be earned without engaging in tax evasion, AI-based oversight mechanisms have emerged as a necessity rather than a luxury.

Artificial intelligence—already utilized across various sectors ranging from healthcare and finance to education and the automotive industry—has recently been adopted in the field of taxation to enhance compliance and enforcement efficiency. In Türkiye, where the tax gap remains considerable, the share of taxpayers subjected to audits is limited to merely 2–3 percent of the total. To address this structural weakness, the KURGAN (Institutionally Supervised Analysis) system was launched on October 1, 2025, by the Ministry of Treasury and Finance as an AI-driven early warning and risk assessment mechanism. KURGAN continuously monitors taxpayers' financial and commercial transactions in real time, replacing traditional retrospective audit practices with proactive digital analysis. Designed primarily to combat the use of fraudulent documents, the system identifies risky transactions without requiring field visits, relying instead on algorithmic evaluation of vast digital datasets encompassing all purchase and sale activities within the economy.

This study explores the global applications of AI in tax administration, the operational logic of the KURGAN system, its advantages and disadvantages, its potential contribution to fiscal revenues, and the legal foundations and regulatory gaps associated with its implementation. In doing so, it situates Türkiye's experience within the broader discourse on AI-enabled tax governance, assessing how algorithmic oversight can enhance fiscal transparency, reduce compliance costs, and strengthen the integrity of public finance systems.

Keywords

Artificial intelligence; fraudulent documents; tax evasion; KURGAN; Türkiye; AI-driven tax auditing; fiscal transparency.

INTRODUCTION

Artificial intelligence (AI) is a field that integrates computer science with large-scale data analytics to address complex, real-world problems (Singh, 2025: 2). It may be defined as the capacity of a computer, a computer-controlled robot, or a software system to perform cognitive functions—such as reasoning, learning, and problem-solving—in a manner that simulates human intelligence (Tutorials Point, 2014: 1). As an intelligent digital system capable of independent reasoning and learning (Ivic, 2019: 162), AI has emerged as a transformative force across various industries, including the public sector. Its applications range from playing chess and proving mathematical theorems to generating poetry, navigating vehicles in dense traffic, and diagnosing diseases (Russel & Norvig, 2010: 1). Although some AI technologies have existed for more than half a century, recent advances in computing power, access to vast datasets, and improvements in algorithmic design have catalyzed major breakthroughs in the field (McDonald, 2024: 8).

Within the domain of taxation, AI is increasingly utilized to support taxpayer compliance and reduce administrative burdens for both taxpayers and revenue authorities. By streamlining internal procedures, audits, and decision-making processes, AI allows tax administrations to allocate resources more efficiently and improve the overall quality of fiscal governance (Ilieva, 2025: 1).

1. The Role of AI in Fiscal Governance

In contemporary public administration, AI represents a critical enabler of data-driven decision-making. Governments have begun employing AI tools not only for service delivery but also for fiscal oversight, risk-based auditing, and compliance management. The integration of AI into tax administration allows authorities to identify irregularities more effectively (Söylemez & İlhan Söylemez: 2024), detect patterns of evasion, and promote equity among taxpayers.

Particularly in developing economies, where informal activities, underreporting, and fraudulent documentation undermine fiscal capacity, AI systems can perform multidimensional analyses that are impossible through manual auditing. The use of machine learning algorithms, predictive analytics, and anomaly detection models enables authorities to assess behavioral patterns and assign risk scores to taxpayers. As a result, enforcement shifts from reactive to preventive, allowing early detection of suspicious transactions and optimizing resource allocation in audit selection.

2. AI Adoption in the Context of Türkiye

Türkiye presents a distinctive case in this transformation. Structural challenges—such as limited audit personnel, fragmented data infrastructures, and entrenched informal economic behavior—have long constrained the effectiveness of traditional tax control mechanisms. The perception that significant profits cannot be earned without tax evasion has further eroded public trust in fiscal

institutions. Consequently, enhancing tax morale and institutional credibility requires innovative solutions that can simultaneously increase transparency, equity, and efficiency.

Over the past decade, Türkiye has made notable progress in digital governance, implementing e-government initiatives and data integration systems to curb the informal economy. Yet, audit coverage remains exceptionally low: only about 2–3 percent of all taxpayers are audited annually. Against this backdrop, AI-supported audit systems such as KURGAN (Kuruluş Gözetimli Analiz) signify a paradigm shift—from retrospective, document-based inspections toward real-time, algorithmic supervision. This evolution aligns with broader global trends in the modernization of tax administrations, as advocated by the OECD’s Inventory of Tax Technology Initiatives (ITTI) framework.

3. Purpose and Scope of the Study

This paper seeks to analyze both theoretical and practical dimensions of AI integration in tax auditing, with a specific focus on Türkiye’s KURGAN system. It aims to:

Examine global examples of AI adoption in tax administration and identify best practices;

Explain the operational framework, structure, and legal foundations of the KURGAN system;

Evaluate the system’s potential to enhance fiscal transparency, taxpayer compliance, and efficiency in resource allocation;

Discuss the ethical, legal, and administrative challenges that accompany algorithmic oversight in taxation.

By situating Türkiye’s experience within the global discourse on AI governance, the study contributes to understanding how algorithmic fiscal control can reshape state–citizen relations, improve compliance culture, and strengthen fiscal resilience in the digital age.

Numerous countries employ artificial intelligence-supported programs in the domain of taxation. The utilisation of artificial intelligence in the context of taxation is predominantly aimed at facilitating enhanced comprehension of tax-related matters among taxpayers and employees. This objective is pursued through mechanisms such as the provision of frequently asked questions, the monitoring of alterations in tax amounts, the identification of potentially suspicious transactions, and the provision of assistance during tax audits. The present study incorporates illustrative examples drawn from country practices. The subject of AI support for tax audits is addressed. The KURGAN application, implemented in Türkiye to assist with tax audits, is described in detail.

INTERNATIONAL CASE STUDIES: GLOBAL APPLICATIONS OF AI IN TAX ADMINISTRATION

The integration of artificial intelligence (AI) into tax systems has become a global trend, reflecting a paradigm shift toward data-driven fiscal governance and risk-based auditing. Many countries now employ AI technologies to detect tax evasion, enhance compliance, and increase the efficiency of revenue collection. Comparative analysis of international experiences provides

valuable insights into the opportunities and limitations that accompany AI implementation in taxation.

1. Spain

Spain's Tax Agency (Agencia Tributaria) stands among the early adopters of AI-powered virtual assistants (chatbots) to improve taxpayer services. These systems respond to frequently asked questions regarding deadlines for tax filings, value-added tax (VAT) procedures, and e-invoicing. Beyond service delivery, the Spanish authority also deploys AI to send personalized alerts concerning potential errors, compliance risks, and changes in tax liabilities. Importantly, AI models are used to predict voluntary non-compliance and to identify emerging risk patterns in employer payroll taxes and VAT reporting (Ilieva, 2025: 2). Spain's experience demonstrates how automation and predictive analytics can strengthen the link between compliance promotion and enforcement efficiency.

2. Singapore

The Inland Revenue Authority of Singapore (IRAS) has advanced one of the most comprehensive models of AI integration in taxation. By combining data analytics, machine learning, and virtual intelligent assistants, IRAS has transformed taxpayer interaction and internal workflow management. In 2021, IRAS introduced an AI-based chatbot—VICA (Virtual Intelligent Chat Assistant)—to address frequent inquiries related to income, corporate, property, and stamp duties, as well as withholding taxes. By 2023, VICA's conversational algorithms had substantially improved user comprehension, enabling taxpayers to check balances, design payment plans, and complete transactions through mobile or self-service terminals. In fiscal year 2024, the chatbot handled approximately 70,000 transaction queries, saving an estimated 11,666 taxpayer hours (IRAS, 2025; VICA, 2025). Singapore's approach illustrates how AI-driven taxpayer services can promote compliance by reducing administrative friction and transaction time.

3. France

France's Direction Générale des Finances Publiques (DGFIP) employs AI to detect undeclared or unreported real estate properties. Within the Foncier Innovant (Innovative Land) project, the DGFIP collaborates with the National Institute of Geographic and Forest Information (IGN) to analyze aerial imagery and identify physical changes to buildings or swimming pools that may affect property tax bases. AI algorithms process publicly accessible images from the geoportail.gouv.fr platform to locate discrepancies, notify property owners, and recalculate tax liabilities accordingly (OECD, 2022; Ilieva, 2025: 3). This practice demonstrates how AI-assisted geospatial analytics can enhance fiscal equity by ensuring accurate property valuation and reducing tax leakage.

4. The Netherlands

The Dutch Tax and Customs Administration utilizes AI to perform web-scraping and data-matching operations, consolidating tax-relevant data from interconnected online sources. Algorithms identify networks of interrelated entities and ultimate beneficial owners, thereby detecting undeclared business activities. The system assigns each taxpayer a risk score, which is

subsequently used to prioritize audits across sectors and professions (Ilieva, 2025: 2). The Dutch model illustrates the importance of algorithmic risk profiling as a tool for optimizing audit selection and focusing enforcement efforts where they yield the highest fiscal returns.

5. Belgium

In addition to approaches similar to France's, the Belgian Tax Authority applies AI to monitor and intercept suspicious VAT transactions. By leveraging data mining and web scraping from public databases, it detects anomalous transaction chains that may indicate VAT carousel fraud (Ilieva, 2025: 3; The Brussels Times, 2025). Belgium's experience highlights the growing relevance of data integration and cross-platform analytics in detecting sophisticated fraud networks within the EU's digital economy.

6. Bulgaria

In Bulgaria, VAT fraud not only diminishes public revenues but also exacerbates tax inequity. To counter this, the Bulgarian Tax Administration developed scalable AI algorithms using existing VAT data to detect fraudulent activities. A key innovation involves the use of the Laplacian matrix, allowing differentiation among firms based on unique operational characteristics. This analytical framework has enabled authorities to identify approximately 50 percent of VAT-related fraud cases, significantly reducing revenue losses (Alexopoulos et al., 2025: 1). Bulgaria's example illustrates how network-based AI modeling can improve detection precision and reinforce taxpayer fairness.

7. Italy

Italy institutionalized the application of AI in tax administration through a Ministerial Decree in 2020, which formally endorsed the use of algorithmic systems for tax risk analysis. The Italian Tax Agency (ITA) employs AI to analyze taxpayer data and focus audits on high-risk entities. When constructing datasets, ITA adheres to the ISO/IAC Standards, ensuring data quality in terms of accuracy, timeliness, completeness, and traceability (Rizzo & Hassan, 2024: 11–12). The AI-based system Ve.R.A. (Verifica Rapida Automatica) was introduced to predict tax evasion and assist auditors (Francioso, 2023: 47). Italy's structured regulatory approach underscores the necessity of legal and ethical frameworks to ensure transparency in algorithmic decision-making.

8. Brazil

In Brazil, approximately USD 140 billion worth of tax-related appeals are pending before administrative courts, with average resolution times of six years. To expedite this process, Brazil launched the AI Litigation Project, which applies supervised machine learning to classify and cluster case files. An initial dataset of 2,000 manually labeled cases allowed algorithms to reach an accuracy rate above 80 percent. The project developed a web-based analytical dashboard to assist officials in improving case management and policy evaluation (OECD, 2022). This example reveals the growing potential of AI-assisted judicial analytics to enhance procedural efficiency in fiscal dispute resolution.

9. Austria

Austria's Federal Ministry of Finance established the Predictive Analytics Competence Centre (PACC) in 2014 to apply machine learning algorithms in tax operations. PACC focuses on four analytical domains—Predictive, Advanced, Tax, and Customs Analytics—to modernize risk management and strengthen fraud detection. In 2023 alone, PACC analyzed approximately 6.5 million cases related to income, corporate, VAT, and customs taxes, uncovering fraudulent activities that generated an additional EUR 185 million in revenue. Moreover, 27.5 million cases were evaluated for compliance, of which 375,000 were flagged as high-risk (FMF, 2024). Austria's centralized analytics model exemplifies how institutionalized AI capacity can enhance both fiscal performance and administrative accountability.

10. Comparative Insights

Across these cases, several patterns emerge.

First, AI adoption enhances fiscal transparency by enabling the near real-time monitoring of taxpayer behavior. Second, risk-based auditing models supported by AI reduce administrative burdens and focus enforcement resources where non-compliance risks are greatest. Third, inter-agency data sharing and legal standardization appear to be critical for success. Finally, these examples demonstrate that AI not only increases revenue efficiency but also reshapes the relationship between tax authorities and citizens—transforming the fiscal state into a more adaptive, evidence-based governance actor.

AI IN TAX AUDITING: CONCEPTUAL AND LEGAL FRAMEWORK

Technological developments have significantly transformed the expectations of taxpayers and the operational paradigms of tax administrations. The growing reliance on digital tools for service delivery, identity verification, and compliance monitoring has compelled governments to rethink how fiscal systems ensure both efficiency and legality in a digital environment (OECD, 2024: 2). Within this context, artificial intelligence (AI) represents not merely a technological tool but a governance mechanism that redefines how states interact with taxpayers.

1. Theoretical Foundations of AI in Fiscal Oversight

AI systems generate value by analyzing large, complex data environments and identifying patterns that would be imperceptible through human judgment alone. In taxation, the term “AI-driven audit” refers to the use of machine learning (ML) and data-mining algorithms to detect irregularities, predict compliance risks, and prioritize cases for inspection. Such systems allow for a shift from random or reactive auditing toward risk-based and predictive supervision, aligning with the principles of fiscal efficiency and accountability.

As Cockfield (2016: 497) notes, AI applications that utilize big tax data—including taxpayer records, legal provisions, judicial decisions, and doctrinal analyses—facilitate faster and more accurate tax enforcement. The integration of machine learning and deep learning techniques allows AI systems not only to process vast datasets but also to develop adaptive reasoning models that evolve with new information. In doing so, these systems contribute to minimizing tax loss and evasion, while simultaneously promoting voluntary compliance.

In the global context, tax administrations have long recognized data as the backbone of enforcement activities. The early adoption of rule-based expert systems has now evolved into sophisticated predictive analytics frameworks, capable of integrating structured and unstructured data from multiple sources. Through this evolution, authorities can detect anomalies, infer behavioral risks, and reallocate limited audit resources toward high-impact cases. The OECD's Inventory of Tax Technology Initiatives (ITTI) survey (2022–2025) confirms that AI applications in member states are most effective in three areas: (1) detecting fraud and evasion, (2) supporting decision-making, and (3) improving taxpayer services (OECD, 2025).

2. AI and the Transformation of Tax Compliance Models

AI-driven audit systems signify a transformation from post-event auditing—based on ex post examination of financial statements—to continuous monitoring that evaluates transactions in real time. This transformation enhances the ability of tax administrations to maintain fiscal transparency and to apply proportionate oversight. By integrating data from e-invoices, financial institutions, customs records, and social security systems, AI establishes a comprehensive “fiscal map” of taxpayer behavior.

Milner and Berg (2017: 9) argue that the use of extensive data warehouses improves both the speed and accuracy of administrative decision-making. In this sense, tax auditing becomes not only a compliance mechanism but also an instrument of digital governance—aligning fiscal objectives with technological innovation. The concept of “big data” in taxation, as defined by Schwieger and Ladwig (2016: 48), encompasses all tax-relevant information, including statutory texts, judicial precedents, and doctrinal interpretations. When these datasets are algorithmically integrated, AI enables the dynamic assessment of each taxpayer's fiscal profile.

Empirically, such systems enhance audit precision, reduce manual workloads, and foster trust in the integrity of fiscal institutions. Moreover, they allow administrations to respond proactively to emerging compliance risks rather than reactively addressing violations after they occur. This proactive orientation also improves the equity dimension of taxation by ensuring consistent enforcement across taxpayers.

3. Legal and Ethical Considerations

While the efficiency gains of AI in taxation are substantial, its deployment raises complex questions concerning legality, accountability, and taxpayer rights. The principle of legality in taxation—stipulating that no tax can be imposed, modified, or abolished without a legal basis—requires that AI-generated inferences and audit decisions remain subject to human oversight and legal validation. Algorithmic assessments that trigger enforcement actions must comply with the constitutional standards of transparency, due process, and non-discrimination.

Furthermore, as Raikov (2021a: 172) emphasizes, digital technologies may create opaque value chains that complicate state control and fiscal accountability. AI systems, if not properly regulated, could replicate or even exacerbate existing biases in audit selection and risk scoring, potentially leading to unequal treatment among taxpayers. Raikov (2021b) further suggests that developing expert-analytical systems tailored to specific taxpayer behaviors is essential for maintaining proportionality and fairness in enforcement.

From an ethical standpoint, the adoption of AI necessitates the establishment of robust frameworks for data protection, algorithmic transparency, and institutional accountability. Tax authorities handle vast amounts of sensitive and personal data, making cybersecurity and data integrity central to maintaining public trust. Consequently, AI governance in taxation must be guided by the principles of legitimacy, explainability, and human oversight.

4. Implications for Fiscal Governance

The incorporation of AI into tax administration represents a critical step toward smart fiscal governance—an approach characterized by evidence-based policymaking, digital accountability, and adaptive regulation. However, the effectiveness of such systems depends on the legal infrastructure that governs their operation. Countries that have established explicit legislative frameworks for algorithmic auditing—such as Italy and Austria—demonstrate greater success in ensuring both efficiency and legality.

For Türkiye, where constitutional and statutory frameworks regarding AI remain under development, the challenge lies in integrating algorithmic systems like KURGAN within a clear and transparent legal structure. Only then can AI serve as a legitimate instrument of fiscal oversight, balancing technological innovation with the fundamental rights of taxpayers.

THE KURGAN SYSTEM: STRUCTURE, MECHANISMS, AND FISCAL IMPLICATIONS

The Turkish Revenue Administration (Gelir İdaresi Başkanlığı – GİB) has long pursued efforts to enhance tax revenues and reduce the scale of the informal economy. In addressing persistent revenue losses, the Ministry of Treasury and Finance (Hazine ve Maliye Bakanlığı – HMB) has adopted a dual strategy: implementing periodic tax amnesties for uncollected liabilities, while simultaneously introducing digital governance instruments to improve enforcement. Among these, e-government applications and the Tax Office Automation Projects (Vergi Dairesi Otomasyonu Projeleri – VEDOP) have played a pivotal role in modernizing fiscal operations by enabling electronic declaration, payment tracking, and taxpayer registration systems (Ay, 2006: 74). Research indicates that such digitalization efforts have contributed to a measurable decline in tax evasion (Uyar et al., 2021).

In this context, the KURGAN (Kuruluş Gözetimli Analiz – Institutionally Supervised Analysis) system represents a landmark development in Türkiye’s digital fiscal governance landscape. Officially launched on October 1, 2025, by the Tax Inspection Board (Vergi Denetim Kurulu – VDK), KURGAN was introduced through the Strategy for Combating Fraudulent Documents manual, developed under the Ministry of Treasury and Finance. The system constitutes not merely a risk analysis tool but an AI-driven early warning mechanism, designed to detect and prevent tax fraud—particularly the issuance and circulation of fraudulent invoices—that collectively result in billions of lira in public losses each year.

1. Purpose and Strategic Rationale

The use of fraudulent documents in Türkiye has long undermined both fiscal justice and market competition. Such practices distort economic data, facilitate money laundering, and conceal criminal activities. KURGAN aims to preempt these risks through real-time digital surveillance of economic transactions. Unlike traditional audits, which occur years after the event, KURGAN enables instantaneous verification of the authenticity and consistency of financial activities.

The system’s strategic framework draws on both institutional memory and international best practices, including the OECD’s Ten Global Principles for Fighting Tax Crime. It integrates lessons from advanced economies to develop a proactive and adaptive model of fiscal oversight. In doing so, it redefines the relationship between taxpayers and authorities—transforming compliance monitoring from a punitive mechanism into a preventive, cooperative process.

2. Data Architecture and Operational Flow

KURGAN’s architecture is structured around an AI-enabled data fusion model, integrating multiple public and private data sources. The process follows four analytical stages:

Data Collection and Integration: The system aggregates data from diverse sources, including e-invoices, tax declarations, social security records, banking transactions, point-of-sale (POS) data, notary archives, customs operations, property registries, and vehicle databases.

Modeling: Through machine learning and statistical analysis, KURGAN learns “normal” transaction patterns within each industry, identifying deviations that may indicate fraudulent or high-risk activities.

Risk Scoring and Prioritization: Taxpayers are assigned risk scores based on sectoral deviations, networked party relationships, VAT refund behaviors, and mismatches between staffing levels and reported turnover.

Action and Audit Guidance: High-risk profiles are prioritized for administrative actions such as guidance notices, clarification requests (izaha davet), or field audits. In severe cases, the administration may request collateral or guarantee deposits proportional to the risk magnitude.

This structured workflow transforms KURGAN into a dynamic fiscal intelligence platform, capable of continuous learning and adaptive monitoring.

3. Integration with National Fiscal Systems

KURGAN's operational backbone is built upon two preexisting digital infrastructures:

The Tax Intelligence System (Vergi İstihbarat Sistemi – VİS), which consolidates taxpayer data and risk indicators.

The Report Automation System (Rapor Otomasyon Sistemi – ROS), which receives AI-generated risk alerts and initiates corresponding administrative actions.

Beginning in 2024, taxpayers identified as high-risk by AI algorithms have been automatically notified through the *izaha davet* mechanism. This notification allows taxpayers to clarify or contest the flagged transactions, thereby ensuring a dialogue-based compliance model rather than an exclusively punitive one. The system's design thus balances automation and accountability, preserving the human element of oversight within an algorithmic framework.

4. Empirical Outcomes

According to the Ministry of Treasury and Finance, during 2024 and the first three quarters of 2025, KURGAN identified approximately 578 billion Turkish lira in high-risk transactions involving 17,373 sellers and 77,834 buyers (Palabıyık & Uylaş, 2025). These results highlight both the analytical power and the preventive function of AI in tax enforcement. Importantly, the system facilitates targeted audits, enabling tax inspectors to focus on the most critical cases rather than performing broad, resource-intensive examinations.

5. Fiscal and Administrative Implications

KURGAN's deployment carries profound implications for Türkiye's fiscal governance architecture:

Enhancement of Fiscal Transparency: By enabling near real-time monitoring, KURGAN improves the traceability of financial flows and reduces opportunities for evasion.

Transformation of Audit Strategy: The shift from *ex post* inspections to algorithmic, real-time supervision increases administrative responsiveness and reduces the time lag between offense and enforcement.

Reduction of Informality: Continuous monitoring discourages the use of off-the-record transactions, strengthening the formal economy and improving the quality of macroeconomic indicators.

Institutional Efficiency and Resource Optimization: By prioritizing high-risk cases, KURGAN enhances the productivity of audit personnel and allows the reallocation of limited fiscal oversight resources to areas of greater risk.

At a broader level, KURGAN exemplifies a new paradigm of algorithmic fiscal governance, in which AI operates as a policy instrument that not only detects tax irregularities but also reinforces the legitimacy of the state's fiscal authority. However, this transformation also introduces new administrative, ethical, and legal challenges, which will be explored in the following section.

ADVANTAGES AND DISADVANTAGES OF KURGAN: ADMINISTRATIVE AND TAXPAYER PERSPECTIVES

Artificial intelligence-based audit systems such as KURGAN mark a turning point in the evolution of fiscal supervision. By replacing manual data sampling with algorithmic analysis, tax authorities can achieve broader coverage, faster risk detection, and greater consistency in enforcement. However, as the system redefines state–citizen relations within taxation, it also raises critical issues concerning legitimacy, fairness, and accountability.

The discussion below evaluates KURGAN from both administrative and taxpayer perspectives, emphasizing the trade-offs between efficiency and equity that accompany algorithmic oversight.

1. Administrative Advantages

Enhanced Registration and Transparency: The digitalization of audit procedures under KURGAN enables tax supervision to become data-driven, rapid, and risk-based. As the system expands, unregistered operations are expected to diminish, promoting a culture of fiscal transparency and formalization. Compliant taxpayers will consequently enjoy a more predictable regulatory environment.

Verification of Transaction Authenticity: Through real-time analysis, AI models assess whether goods or services transactions correspond to genuine economic activity. By comparing anomalies in invoice data and cash flow, KURGAN helps prevent the artificial inflation or concealment of revenues.

Precision Auditing: Rather than deploying audit teams randomly, the administration can now target only high-risk taxpayers identified by AI. This focused inspection model improves accuracy and reduces the administrative burden of traditional audits. Physical verification—such as checking warehouse inventories or production inputs—can then be guided by AI-generated alerts.

Instantaneous Monitoring and Reporting: KURGAN enables continuous monitoring of all commercial activities. Suspicious documents, inconsistent records, or off-the-book transactions can be identified almost immediately. The perception that all economic actors are under continuous observation serves as a deterrence mechanism against tax fraud and document falsification.

Early Warning and Dialogue Mechanism (İzaha Davet): Taxpayers flagged for suspicious transactions are promptly informed and invited to provide explanations. This function transforms KURGAN from a punitive enforcement system into an early warning platform that promotes compliance before sanctions are applied.

Dynamic Data Updating:

The integration of information flows from multiple institutions ensures that the system's audit pool remains continuously updated and reflective of real-time economic activity.

2. Taxpayer Advantages

Predictability and Preventive Insight: By monitoring indicators such as abnormal profit margins, rapid sales growth, or inconsistent staffing ratios, KURGAN allows taxpayers to anticipate potential audit triggers. This helps mitigate the risk of unintentional non-compliance and fosters more responsible financial behavior.

Administrative Efficiency and Simplified Processes: When e-invoice, POS, and banking records are consistent, refund and inspection procedures are expedited. The reduction of bureaucratic friction benefits both taxpayers and the administration.

Reputation and Business Credibility: Transparent and consistent financial data enhance the taxpayer's reputation in the eyes of suppliers, distributors, and financial institutions. Lower perceived risk improves access to credit and partnerships.

Internal Control and Fraud Prevention: By aligning internal accounting controls with the indicators monitored by KURGAN, firms can reduce fraud and operational errors, thereby improving corporate governance.

Resource Efficiency: Centralized reporting and the elimination of redundant documentation streamline compliance costs and reduce the administrative time associated with audits.

3. Administrative Disadvantages and Governance Risks

Despite its strengths, KURGAN presents significant technical, legal, and ethical challenges that require ongoing institutional vigilance.

Algorithmic Hallucinations and Data Accuracy: AI-generated outputs are only as reliable as their underlying data and training models. As seen in various generative AI tools such as ChatGPT, algorithmic “hallucinations”—the production of inaccurate or fabricated information—pose serious credibility risks (Cantens & Tourpe, 2025). The KURGAN system must therefore incorporate human verification layers and bias-mitigation protocols to prevent erroneous enforcement actions.

Legal Ambiguities: Turkish constitutional and tax legislation currently lack explicit provisions governing AI-based administrative actions. The principle of tax legality—that taxes must be imposed and executed according to law—necessitates statutory recognition of algorithmic tools to ensure fairness and prevent litigation.

Misclassification of Transactions: Non-commercial cash transfers, such as internal fund movements within a firm, may be incorrectly flagged as suspicious. Without context-aware modeling, such false positives could trigger unnecessary audits or compliance costs.

Bias and Perception Among Honest Taxpayers: As Ilieva (2025: 3) observes, algorithmic systems risk categorizing compliant taxpayers as high-risk due to statistical biases or incomplete data. Such mislabeling may erode trust, discourage compliance, and inadvertently drive taxpayers toward informality.

Administrative Overload and Manual Verification Needs: While AI expands audit coverage, final determinations still require human review. If verification capacities do not scale proportionally, the number of flagged cases may exceed administrative processing limits.

Entity vs. Transaction-Level Focus: The KURGAN framework is designed to assess transactions, not entire taxpayers. Misinterpreting its findings as taxpayer-level risk could distort investment behavior, trigger capital flight, and negatively affect employment levels.

Disproportionate Sanctions for Minor Errors: Small-scale or accidental errors may attract severe scrutiny, creating anxiety and discouraging voluntary compliance. A proportionality principle must therefore guide administrative responses to minimize over-penalization.

Systemic Costs and Capacity Requirements: Although automation promises long-term savings, the initial setup, continuous model training, and technological updates entail significant financial and human resource investments (Ilieva, 2025: 3).

Continuous Training Demands: Personnel responsible for interpreting AI outputs must receive ongoing training to maintain analytical accuracy. As Cantens and Tourpe (2025) emphasize, human oversight remains essential for contextual interpretation and correction.

Data Privacy and Cybersecurity Risks: Given the massive volume of sensitive personal and corporate data processed, KURGAN is vulnerable to data breaches through insider leaks or external cyberattacks. The tax administration must therefore invest in cyber defense mechanisms and ensure data governance compliance with privacy standards (Ilieva, 2025: 3).

4. Taxpayer Disadvantages

Data Security and Confidentiality: Protecting client and company information is critical. Firms using AI tools must adopt continuous security measures to prevent data misuse, leakage, or unauthorized access throughout the system's operational lifecycle (Wolters Kluwer, 2025).

Financial Exposure: Incorrect risk identification may lead to the imposition of heavy tax penalties or procedural fines, increasing financial uncertainty.

Reputational Damage: Taxpayers flagged as high-risk face potential reputational harm in both market and banking relationships, which may prove difficult to reverse even after exoneration.

Erroneous Alerts from Inconsistent Data: Mismatched datasets across e-invoice, POS, or ERP systems can generate false risk signals that are difficult to contest.

Dependence on Manual Processes: Delays in data reconciliation or offline operations can weaken the chain of evidence during audits, complicating the defense of legitimate transactions.

Limited Supply Chain Visibility: Inadequate access to supplier or client risk data may prevent taxpayers from identifying vulnerabilities within their commercial networks.

Rising Compliance Costs: Adapting to KURGAN's data requirements may increase consultancy and operational expenses, particularly for small and medium-sized enterprises (SMEs) lacking digital infrastructure.

5. Governance Implications

The KURGAN experience underscores a fundamental tension between technological efficiency and procedural justice. While AI enhances fiscal capacity and operational control, it also introduces new risks of overreach, bias, and opacity. Effective governance therefore depends on developing a hybrid audit model that combines automated detection with human judgment and legal oversight.

By institutionalizing this balance, Türkiye can position KURGAN not merely as a surveillance apparatus but as a trust-based governance tool—one that aligns algorithmic efficiency with the constitutional principles of fairness, legality, and accountability in public finance.

EVALUATION AND CONCLUSION

The introduction of artificial intelligence (AI) into tax administration represents a profound transformation in the structure and legitimacy of fiscal governance. While AI technologies promise efficiency, transparency, and predictive precision, they simultaneously challenge long-standing legal doctrines and administrative traditions that safeguard taxpayer rights. The central debate therefore revolves around the legality, accountability, and legitimacy of algorithmic decision-making in the field of taxation.

1. Legality and Institutional Legitimacy

The principle of legality—that taxation must be imposed, altered, and collected exclusively under statutory authority—remains the cornerstone of fiscal law. As Rizzo and Hassan (2024) observe, the application of AI in tax auditing has begun to alter the operational logic of tax enforcement, raising potential tensions with the foundational principles of European Union law and, by extension, comparable constitutional frameworks elsewhere.

In Türkiye, as in many jurisdictions, the legal foundation for AI-based audit mechanisms such as KURGAN remains incomplete. Neither the Constitution nor the Tax Procedure Law explicitly addresses the status of algorithmic administrative actions. Consequently, audit notifications or enforcement measures derived from AI models may risk violating constitutional safeguards if not accompanied by human verification and legal due process.

For instance, when the KURGAN system flags internal financial transfers within a company as suspicious—mistaking them for third-party transactions—the resulting administrative action (*izaha davet*) imposes an undue evidentiary burden on the taxpayer. Such practices potentially contravene Article 73 of the Turkish Constitution, which enshrines the legality of taxation, and Article 3/b of the Tax Procedure Law, which stipulates that taxation must reflect the true nature of the taxable event and may be substantiated by all forms of evidence except oath. Therefore, algorithmic assessments must always be subjected to legal scrutiny and human judgment to preserve the integrity of fiscal administration.

2. Accountability, Oversight, and Ethical Governance

AI-driven taxation introduces new forms of algorithmic authority, where automated decisions influence citizens' economic rights and reputations. To prevent misuse, AI governance in taxation must be grounded in three interrelated principles:

Transparency and Explainability: Taxpayers must have access to the logic underlying algorithmic decisions affecting them. Without transparency, automated systems risk producing “black-box” outcomes that undermine trust and the right to defense.

Proportionality and Fairness: Enforcement actions must remain proportionate to the severity of detected anomalies. Overly punitive measures based on probabilistic models can distort taxpayer behavior, eroding voluntary compliance.

Human Oversight and Institutional Accountability: AI models must operate under continuous human supervision. As Cantens and Tourpe (2025) note, AI can enhance both taxpayer and administrative performance only when complemented by trained human judgment capable of interpreting, correcting, and contextualizing automated findings.

These principles require not only technical safeguards but also institutional ethics frameworks, formal data protection policies, and an adaptive legal regime that recognizes AI as both an opportunity and a risk to fiscal justice.

3. Economic and Professional Implications

From an economic perspective, AI-supported tax systems such as KURGAN enhance fiscal efficiency by improving revenue mobilization and reducing tax gaps. Yet their implementation also reshapes labor dynamics within tax administrations. While automation reduces routine workloads, it increases the demand for specialized personnel capable of managing, auditing, and interpreting AI outputs. Consequently, the public sector must invest in capacity-building and digital literacy among auditors and policymakers.

Moreover, the digitalization of tax enforcement creates new responsibilities for accountants and tax professionals. Those involved in the preparation and verification of taxpayers' financial records become de facto intermediaries in algorithmic compliance processes. Accountants thus evolve into "agents of fiscal transparency," facilitating communication between taxpayers and the administration while ensuring data integrity. Over time, professionals who align with regulatory expectations and promote compliance will gain reputational advantages, whereas those complicit in fraudulent activities will face greater scrutiny.

4. Policy and Governance Lessons

Türkiye's experience with KURGAN demonstrates that technological innovation in fiscal administration can substantially improve detection accuracy, deter tax fraud, and promote transparency in public finance. However, the absence of a clear legal framework governing AI systems creates uncertainty that may undermine public trust and expose authorities to litigation risks.

To fully institutionalize KURGAN's potential, several policy directions emerge:

- The development of explicit statutory provisions defining the legal status, scope, and procedural boundaries of AI-based audits;
- The establishment of algorithmic oversight boards tasked with evaluating data quality, bias mitigation, and proportionality in enforcement;
- The promotion of cybersecurity and privacy standards to safeguard sensitive fiscal data;
- Continuous interagency data integration protocols that maintain accuracy and prevent duplication or inconsistencies;
- Regular public transparency reports to demonstrate accountability and reinforce taxpayer trust.
- By embedding these mechanisms, Türkiye can transition from a reactive enforcement model to a legally grounded, trust-based digital tax governance system.

5. Concluding Remarks

Artificial intelligence has become an indispensable component of contemporary fiscal governance. Systems like KURGAN embody the potential of algorithmic tools to enhance efficiency, transparency, and compliance in taxation. Yet, the legitimacy of such systems depends on maintaining equilibrium between technological precision and legal proportionality.

The application of AI in tax audits should not negatively impact tax fairness and tax compliance. There is a close relationship between tax fairness and tax compliance. For tax compliance to be positively impacted, taxes must also be ethical and conscientious (Ay, Söylemez & Ay, 2022: 1). Human oversight of KURGAN applications will contribute to tax compliance during audits. KURGAN, which takes taxpayers' tax records into account, will negatively impact the psychology and perception of honest taxpayers towards the government.

AI should not replace human auditors but rather augment their analytical capacity, enabling more informed, equitable, and evidence-based decision-making. As of now, no judicial precedent in Türkiye has overturned administrative actions derived from AI-based findings—suggesting that the system remains in its experimental phase. Nevertheless, its expansion must proceed under constitutional safeguards and ethical oversight to ensure that efficiency does not come at the expense of justice.

Ultimately, the future of fiscal administration lies not merely in automation but in the integration of human judgment, legal rationality, and algorithmic intelligence—a triad that, when harmonized, can redefine the foundations of tax governance in the digital age.

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