



AI IN TAXATION, GST AND TAX ADMINISTRATION: TRANSFORMING COMPLIANCE, REVENUE COLLECTION AND TAXPAYER SERVICE

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ABSTRACT

Artificial Intelligence (AI) is increasingly transforming the way governments design, administer and enforce tax systems. Tax administration is particularly suitable for AI because it involves large volumes of structured and unstructured data, repetitive compliance processes, risk assessment, fraud detection and continuous interaction with taxpayers. In India, the digital transformation of taxation has progressed through income-tax e-filing, faceless assessment, the Goods and Services Tax Network (GSTN), e-invoicing, e-way bills, automated return processing and data analytics. These systems create an extensive digital information environment in which AI and machine learning can support tax compliance, identify anomalous transactions, improve taxpayer services and assist tax authorities in allocating limited administrative resources.

This paper examines the role of AI in taxation, with particular emphasis on GST and Indian tax administration. It analyses major applications including fraud detection, input tax credit verification, risk-based scrutiny, taxpayer assistance, automated document processing, predictive analytics and compliance management. The paper also evaluates the benefits and limitations of AI, including privacy concerns, algorithmic bias, cybersecurity, explainability, data quality and the danger of excessive automation. International evidence indicates rapid adoption of AI by tax administrations, while India's expanding digital tax infrastructure provides a substantial foundation for further AI-enabled administration. The paper argues that AI should primarily function as a decision-support and risk-management technology, with appropriate human oversight rather than completely replacing statutory decision-making. A governance framework based on transparency, accountability, data protection, human review and continuous auditing is therefore essential for trustworthy AI-enabled taxation.

KEYWORDS: Artificial Intelligence, GST, Tax Administration, Machine Learning, Tax Compliance, Tax Fraud, E-Invoicing, Data Analytics, India, Digital Taxation

1. INTRODUCTION

Taxation is one of the most important functions of government because tax revenues finance public infrastructure, social programmes, public services and economic development. Traditionally, tax administration depended heavily on physical records, manual verification, direct interaction between taxpayers and officials, and retrospective examination of transactions. The rapid digitisation of economic activity has changed this model. Businesses increasingly generate invoices electronically, make digital payments, file online returns and conduct transactions through interconnected platforms. Consequently, tax authorities now have access to significantly larger quantities of data than in the past.

Artificial Intelligence provides tools for analysing such data at a scale that would be difficult to achieve through manual methods. AI can identify unusual transaction patterns, classify taxpayers according to risk, detect relationships between apparently unrelated entities, automate repetitive administrative tasks and provide personalised assistance to taxpayers. The OECD's *Tax Administration 2025* reports that 69% of tax administrations surveyed were already using AI in 2023, while another 24% were implementing AI for future use. This demonstrates that AI has moved from an experimental technology to an increasingly important component of modern tax administration.

India represents an important case for examining this transformation. The introduction of GST in 2017 created a nationwide indirect-tax framework supported by digital registration, return filing, e-way bills and e-invoicing. E-invoice information can be transferred from the Invoice Registration Portal to the GST Portal and used to auto-populate relevant sections of GSTR-1.

At the direct-tax level, the Income Tax Department has developed data-driven systems such as Project Insight, which uses information collection, data warehousing, business intelligence and analytics to strengthen voluntary compliance, improve risk assessment and detect possible fraud and revenue leakage.

2. OBJECTIVES OF THE STUDY

The major objectives of this research are:

- To examine the role of AI in modern tax administration.
- To analyse the application of AI and data analytics in GST administration.



- To identify the benefits of AI for tax compliance, fraud detection and revenue administration.
- To examine the risks associated with AI-based tax decision-making.
- To propose a framework for responsible and effective use of AI in Indian taxation.

3. RESEARCH METHODOLOGY

The paper adopts a **descriptive and analytical research methodology** based primarily on secondary data. Information has been obtained from official Indian government sources, the Income Tax Department, GST-related government portals, the Government of India's Economic Survey and international institutional publications, particularly OECD research on tax administration and AI. The study is conceptual rather than an econometric assessment of the causal impact of AI on tax revenues. Therefore, claims regarding the potential benefits of AI are distinguished from measured outcomes. Where numerical data are presented, they are attributed to the relevant source. The paper also uses a conceptual framework to explain how AI can connect taxpayer data, risk assessment, compliance intervention and human decision-making.

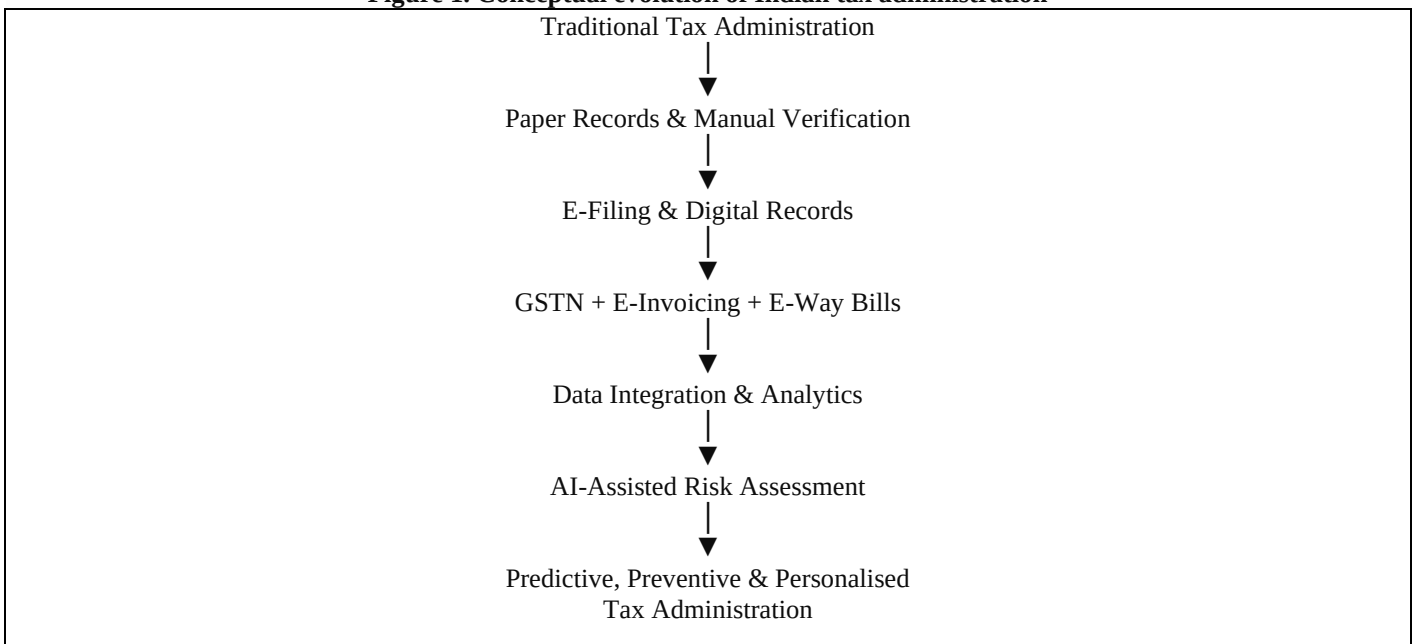
4. EVOLUTION OF DIGITAL TAX ADMINISTRATION IN INDIA

India's tax administration has progressively moved from paper-based processes towards integrated digital systems. The transformation has occurred across both direct and indirect taxation.

In GST, the digital ecosystem includes taxpayer registration, return filing, e-way bills, e-invoices, electronic payment and information matching. E-invoice data can automatically flow into GSTR-1, reducing repetitive data entry and creating opportunities for automated reconciliation.

The scale of the GST ecosystem has also expanded substantially. According to the Government of India's Economic Survey 2025-26, registered GST taxpayers increased from approximately **60 lakh in 2017 to more than 1.5 crore**, indicating substantial expansion of the formal tax base. The same source reports that cumulative e-way-bill volumes during April–December 2025 increased by 21% year-on-year.

Figure 1. Conceptual evolution of Indian tax administration



The significance of this transformation is that AI does not operate independently. Its effectiveness depends on the quality of the underlying digital infrastructure, data standards, interoperability and governance.

5. AI IN TAXATION

AI refers broadly to computer systems capable of performing tasks that traditionally require human cognitive capabilities, such as pattern recognition, prediction, classification, language processing and decision support. Machine learning, natural language processing, anomaly detection and robotic process automation are particularly relevant to taxation.

The OECD identifies several major areas in which tax administrations use AI, including detection of tax evasion and fraud, risk assessment, virtual assistants, assistance to tax officials and recommendations for administrative action. In the OECD's 2024 inventory, among administrations using AI, detection of tax evasion and fraud was reported by 74.4%, risk assessment by 64.1% and virtual assistants by 59%.



Table 1. Major applications of AI in taxation

Application	Function	Potential tax-administration benefit
Fraud detection	Identifies unusual transaction patterns	Earlier identification of suspicious activity
Risk scoring	Classifies cases according to risk	Better allocation of audit resources
Data matching	Compares information from multiple sources	Identification of inconsistencies
Document processing	Extracts information from digital documents	Reduction of manual work
Chatbots/virtual assistants	Responds to taxpayer queries	Faster taxpayer support
Predictive analytics	Forecasts compliance behaviour	Preventive compliance interventions
Anomaly detection	Detects deviations from expected patterns	Identification of potential evasion
Natural-language processing	Analyses textual information	Faster examination of correspondence
Automated reconciliation	Compares transaction records	Reduction of reconciliation errors

AI is particularly useful when the tax authority must analyse millions of transactions. Instead of treating every taxpayer identically, algorithms can identify patterns requiring greater attention while allowing low-risk taxpayers to experience less intrusive compliance processes.

6. AI AND GST ADMINISTRATION

GST is especially suitable for AI because it generates transaction-level information throughout the supply chain. A typical GST transaction may involve an invoice, supplier, recipient, GSTIN, HSN/SAC classification, tax amount, payment information, e-way bill and subsequent return information.

This interconnected structure creates opportunities for automated analysis.

➤ 6.1 Input Tax Credit Verification

Input Tax Credit (ITC) is a central feature of GST. AI can assist authorities in identifying inconsistencies between suppliers' outward supplies and recipients' claims. For example, an algorithm may identify unusual patterns involving:

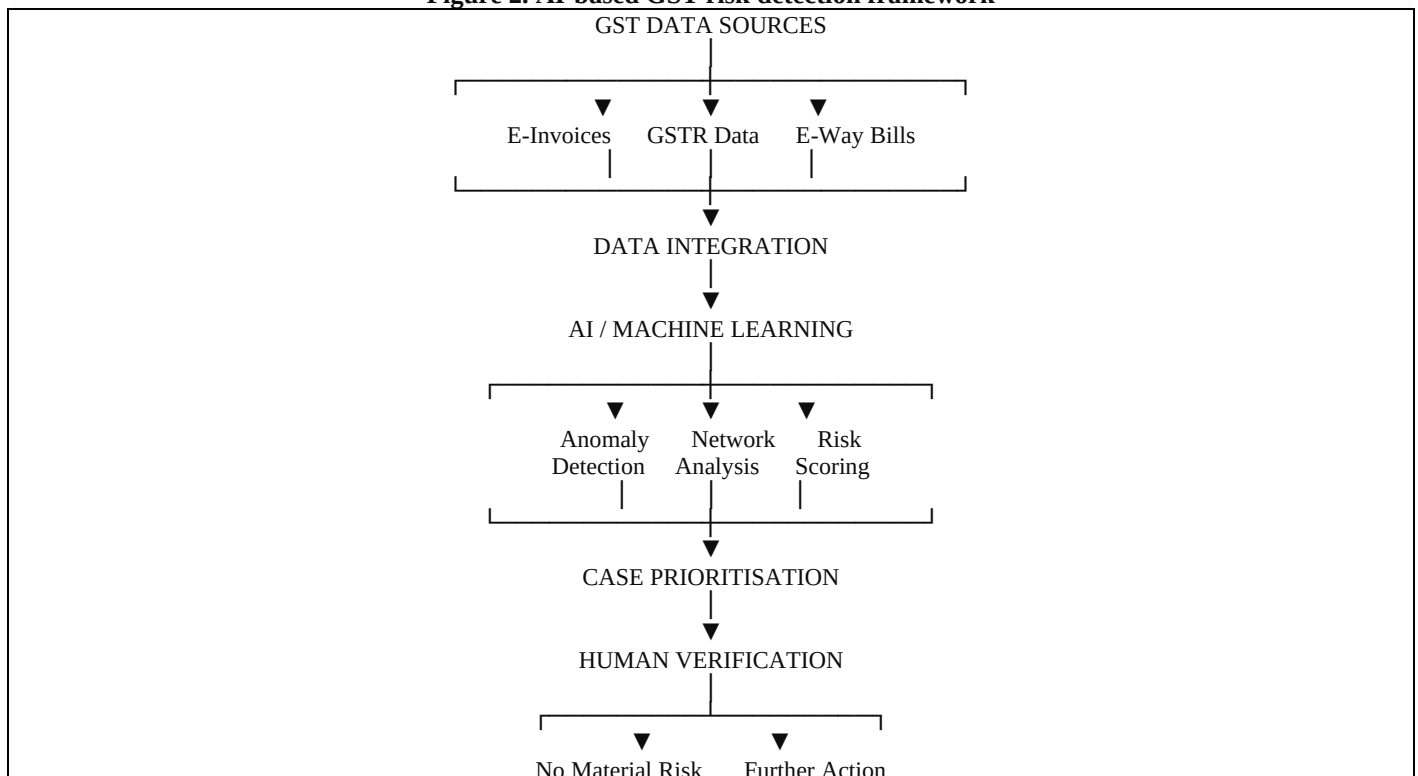
- Large ITC claims compared with business turnover.
- Repeated transactions involving high-risk entities.
- Unusual concentrations of transactions between connected businesses.
- Sudden increases in purchases or sales.
- Repeated cancellation or amendment of invoices.
- Transactions inconsistent with historical business behaviour.

AI does not automatically establish tax fraud. Rather, it can identify cases for further verification.

➤ 6.2 Fake Invoice and Circular Trading Detection

One of the most significant potential applications of AI in GST is identifying networks involved in suspicious invoicing. Traditional examination may focus on individual transactions. AI-based network analysis can instead examine relationships among multiple taxpayers.

Figure 2. AI-based GST risk detection framework





This approach can potentially detect clusters rather than isolated transactions. However, an AI-generated risk score should be treated as an indicator rather than conclusive evidence.

➤ 6.3 E-Invoicing and AI

E-invoicing creates standardised electronic transaction data. GSTN documentation confirms that e-invoice information received from the Invoice Registration Portal can populate relevant GSTR-1 tables.

Standardised data is important for AI because machine-learning models require consistent and sufficiently reliable inputs. As the volume of structured transaction data increases, authorities can develop more sophisticated models for anomaly detection, reconciliation and compliance risk assessment.

7. AI IN DIRECT-TAX ADMINISTRATION

AI also has substantial applications in income-tax administration. India's Project Insight is an important example of data-driven tax administration. The Income Tax Department describes Project Insight as a data warehousing and business intelligence project intended to improve voluntary compliance, strengthen risk assessment, detect fraud and revenue leakage, support taxpayer outreach and provide information for policy and research. Income Tax Department

AI can support direct-tax administration through:

- ❖ **Return-risk analysis:** identifying returns requiring additional scrutiny.
- ❖ **Information matching:** comparing declared income with information available from third parties.
- ❖ **Transaction analysis:** identifying unusual financial patterns.
- ❖ **Taxpayer segmentation:** distinguishing different compliance profiles.
- ❖ **Document analysis:** processing large volumes of correspondence and supporting documents.
- ❖ **Predictive compliance:** identifying situations in which taxpayers may require reminders or clarification.
- ❖ **Case prioritisation:** helping officials focus on complex or high-risk cases.

India has also developed faceless assessment and appeal mechanisms. The Income Tax Department states that faceless assessment and faceless appellate frameworks continue under the Income Tax Act, 2025, which took effect for relevant tax years from 1 April 2026. [1]Income Tax Department

AI can complement such digital systems, but it should not be confused with the legal authority exercised by a tax officer. The distinction between **algorithmic assistance** and **statutory decision-making** is essential.

8. AI AND TAXPAYER SERVICES

AI can also change taxation from a primarily enforcement-oriented activity into a more service-oriented system.

Virtual assistants can answer frequently asked questions, guide taxpayers through filing processes and provide personalised information. International evidence shows that virtual assistants are already a significant area of AI use by tax administrations.

For taxpayers, potential benefits include:

- ❖ 24-hour access to basic tax information.
- ❖ Faster answers to routine queries.
- ❖ Assistance in identifying missing information.
- ❖ Automated reminders for deadlines.
- ❖ Personalised compliance guidance.
- ❖ Reduced need for physical visits.
- ❖ Faster identification of filing errors.

AI can therefore support the principle of **voluntary compliance**. If taxpayers receive timely and understandable information before making an error, the administration may prevent non-compliance rather than merely penalising it afterwards.

9. MAJOR BENEFITS OF AI IN TAX ADMINISTRATION

Table 2. Benefits and expected outcomes

Benefit	Explanation	Expected outcome
Efficiency	Automates repetitive processes	Lower administrative workload
Accuracy	Detects inconsistencies systematically	Better data quality
Risk management	Identifies higher-risk cases	Better use of audit resources
Fraud detection	Finds complex transaction patterns	Stronger enforcement capability
Taxpayer service	Provides automated assistance	Faster responses
Revenue protection	Identifies possible leakage	Improved compliance
Personalisation	Tailors communication to taxpayers	Better taxpayer experience
Predictive capability	Anticipates compliance risks	Preventive administration



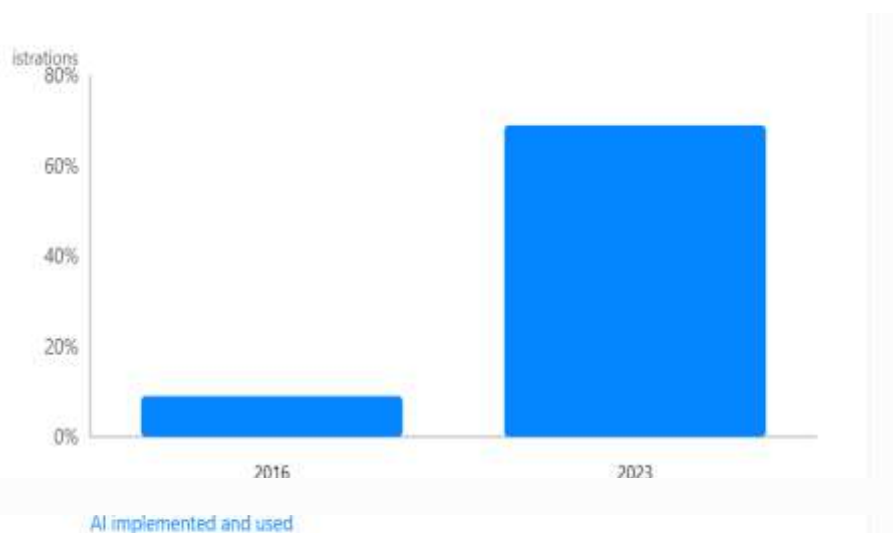
The OECD reports that AI adoption is increasingly associated with compliance management, taxpayer services and resource allocation. It also notes that AI and robotic process automation can free staff from repetitive tasks so that human resources can be directed towards more complex work.

10. CHART: GROWTH IN AI ADOPTION BY TAX ADMINISTRATIONS

The following chart uses OECD-reported data for the share of surveyed tax administrations reporting AI implementation and use. The figures are not Indian GST figures; they provide international context.

AI adoption among tax administrations

Share of tax administrations reporting implementation and use of AI.



Source: OECD Tax Administration 2025; 2016 and 2023 figures.

The increase from 9% in 2016 to 69% in 2023 illustrates the rapid international movement towards AI-enabled tax administration. The growth should not, however, be interpreted as evidence that AI automatically improves tax administration. Implementation quality, data availability, governance, staff capability and legal safeguards determine whether technological investment produces useful results.

11. RISKS AND CHALLENGES OF AI IN TAXATION

Despite its potential, AI introduces important risks.

Data Privacy

Tax authorities process highly sensitive information concerning income, assets, businesses, transactions and financial relationships. AI systems require access to data, creating risks if information is improperly accessed, combined or disclosed. Therefore, tax authorities should apply principles of data minimisation, access control, encryption, audit trails and purpose limitation.

Algorithmic Bias

Machine-learning models learn from historical data. If historical enforcement patterns contain biases or incomplete information, algorithms may reproduce those patterns. A taxpayer could therefore receive a higher risk score for reasons unrelated to actual non-compliance.

Risk models should consequently be tested for accuracy and unintended discriminatory effects.

Lack of Explainability

A complex AI model may generate a risk score without providing an easily understandable explanation. Tax administration involves legal rights and obligations, so taxpayers should not be subjected to adverse consequences solely because an opaque algorithm has classified them as high risk.

The OECD emphasises the need for trustworthy, transparent and accountable AI and notes the importance of privacy, security and appropriate governance.

Cybersecurity

The greater the amount of data integrated into tax systems, the greater the potential consequences of a cyberattack. AI systems themselves may also become targets for manipulation, including attempts to corrupt training data or exploit system vulnerabilities.



Data Quality

AI cannot compensate completely for inaccurate or incomplete data. Incorrect GSTIN information, duplicate records, delayed reporting or inconsistent classifications can reduce model reliability.

Excessive Automation

Tax law contains concepts requiring interpretation, context and judgment. Therefore, complete automation can create risks when unusual circumstances are not adequately represented in historical data.

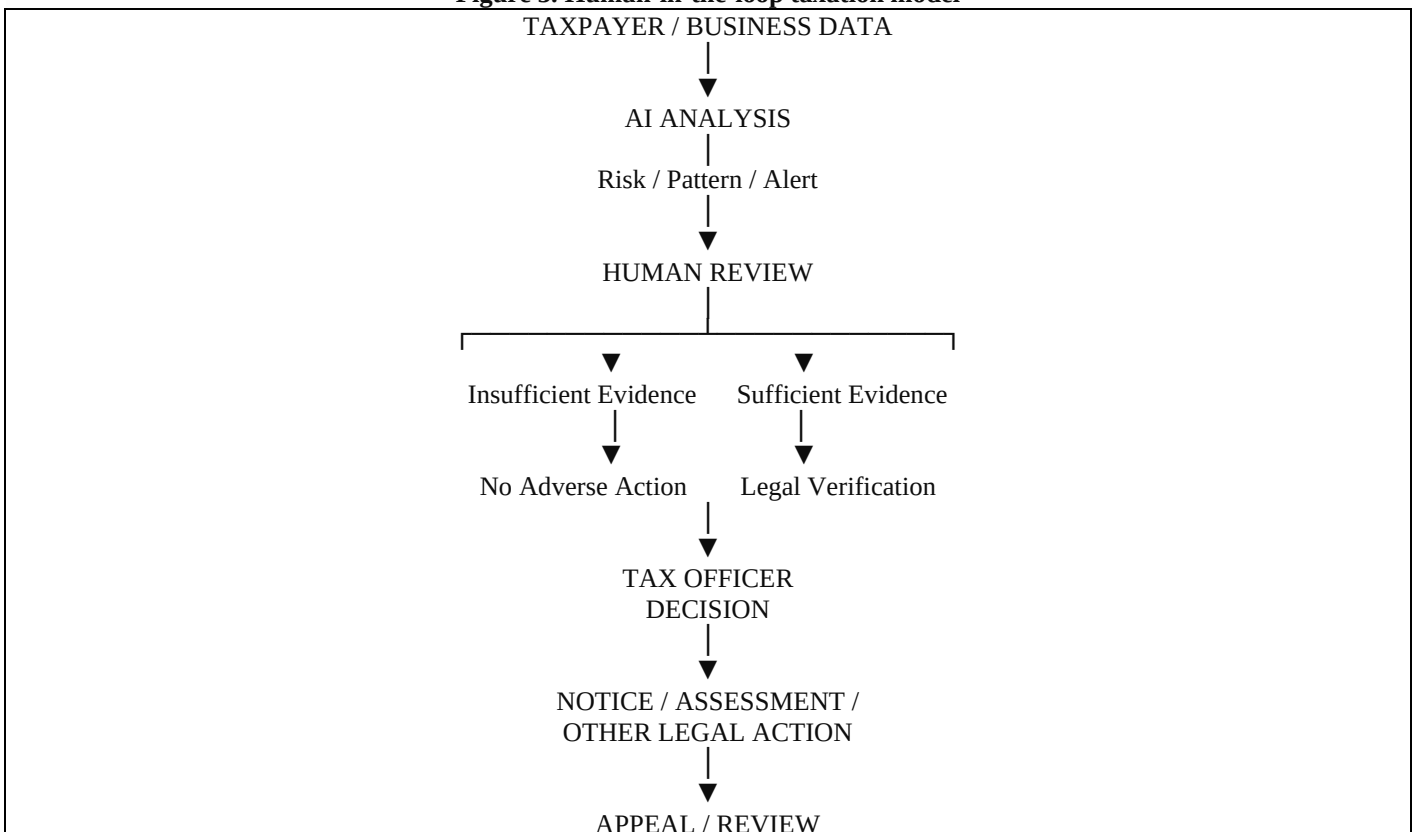
A sensible principle is:

AI may recommend; accountable officials should decide where law and taxpayer rights require human judgment.

12. HUMAN OVERSIGHT AND RESPONSIBLE AI

A responsible AI-based tax administration should establish a clear division of responsibilities.

Figure 3. Human-in-the-loop taxation model



This model ensures that AI assists administration without becoming an unaccountable substitute for statutory authority.

The OECD's recent work indicates that tax administrations are already considering safeguards around AI. Its research reports that a large majority of administrations using AI have placed limitations on its use, while a significant proportion have ethical frameworks governing AI.

13. PROPOSED FRAMEWORK FOR AI-ENABLED INDIAN TAX ADMINISTRATION

India could strengthen AI-enabled taxation through a six-layer framework.

Table 3. Proposed governance framework

Layer	Key requirement
1. Data	Accurate, standardised and secure tax data
2. Technology	Reliable AI, analytics and computing infrastructure
3. Governance	Clear accountability and audit mechanisms
4. Human oversight	Review of significant automated recommendations
5. Transparency	Explainable risk indicators and taxpayer communication
6. Evaluation	Continuous testing for accuracy, bias and effectiveness

First, data standards should be strengthened across GST, income tax and other government information systems while maintaining legal safeguards. Second, AI models should undergo periodic validation rather than being assumed to remain accurate indefinitely.



Third, tax officials should receive training in data science, AI interpretation, cybersecurity and model governance. The OECD has highlighted changing skill requirements within tax administrations and the increasing need for digital, data-management and technology capabilities.

Fourth, significant automated recommendations should remain subject to human review. Finally, taxpayers should have mechanisms to question adverse outcomes and obtain appropriate explanations.

14. FUTURE PROSPECTS

The next stage of taxation is likely to move beyond digitising existing processes towards **predictive and preventive tax administration**.

Instead of waiting for an incorrect return to be filed, AI could identify potential compliance problems before submission. Instead of manually checking every invoice, authorities could continuously monitor patterns and identify unusual behaviour. Instead of providing identical taxpayer communications, systems could provide context-sensitive guidance.

This development is consistent with the broader international movement towards digital tax administration. The OECD describes a shift towards more intelligent use of data and increasingly pre-filled returns supported by data science and AI.

India's expanding GST taxpayer base and electronic transaction infrastructure provide substantial opportunities for such systems. Nevertheless, technological development should proceed alongside legal and institutional safeguards.

15. FINDINGS

The study produces five principal findings.

First, AI has become an increasingly important technology in global tax administration. International evidence demonstrates rapid adoption of AI for fraud detection, risk assessment, taxpayer services and administrative assistance.

Second, India's digital tax infrastructure provides a strong foundation for AI. GST e-invoicing, e-way bills, online returns and income-tax data systems create large volumes of structured information.

Third, AI can potentially improve tax compliance by shifting administration from broad, manual scrutiny towards risk-based and data-driven intervention.

Fourth, the benefits of AI depend strongly on data quality, model accuracy, institutional capacity and governance. AI should therefore be regarded as an administrative capability rather than a standalone solution.

Fifth, taxpayer rights must remain central. Privacy, transparency, explainability, cybersecurity, human review and appeal mechanisms are necessary to ensure that technology strengthens rather than weakens trust in taxation.

16. CONCLUSION

Artificial Intelligence is changing taxation from a largely reactive administrative process into a more data-driven, predictive and potentially personalised system. In India, the transformation is particularly significant because the GST framework and income-tax administration have already developed extensive digital infrastructure.

AI can assist GST authorities in identifying unusual transaction patterns, analysing potential ITC irregularities, detecting suspicious networks, prioritising compliance risks and improving taxpayer services. In direct taxation, data analytics and AI can support information matching, risk assessment, taxpayer outreach and administrative case selection. International evidence demonstrates that these applications are no longer theoretical; tax administrations are already using AI at significant scale.

However, AI should not be treated as an infallible decision-maker. Taxation involves legal rights, financial consequences and questions of fairness that cannot always be reduced to statistical predictions. A high-risk algorithmic classification does not itself establish tax evasion, just as a low-risk score cannot guarantee compliance.

The future of AI in Indian taxation should therefore be based on a **human-in-the-loop model**. AI should process large datasets, identify patterns, generate risk indicators and assist taxpayers and officials. Human authorities should retain responsibility for significant legal decisions, particularly where those decisions can adversely affect taxpayer rights.

Ultimately, the objective should not simply be to create a more technologically sophisticated tax administration. The objective should be to create an administration that is **efficient, accurate, transparent, secure, taxpayer-oriented and legally accountable**. If implemented with appropriate safeguards, AI can become an important instrument for improving voluntary compliance, protecting public revenue and reducing unnecessary administrative burdens while preserving confidence in the tax system.

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