



GST Compliance in the Digital Era: The Role of Artificial Intelligence and Automation (A Study on the Transformation of Indirect Tax Administration through Intelligent Systems)

 **Dr. Adesh Kumar**^{1*}  **Dr. Somprabh Dubey**²

¹Assistant Professor, School of Business Studies & Entrepreneurship, Shobhit University, Gangoh, Uttar Pradesh, India.

²Associate Professor & Head, School of Business Studies and Entrepreneurship, Shobhit University, Gangoh, Uttar Pradesh, India.

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*Corresponding Author: adeshkumarshobhit@gmail.com

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The Goods and Services Tax (GST), introduced in India in July 2017, unified a fragmented indirect tax structure into a single, technology-driven regime built on the Goods and Services Tax Network (GSTN). Nearly a decade into implementation, the compliance ecosystem is undergoing a second transformation, one driven not merely by digitisation but by intelligent automation. Artificial Intelligence (AI), machine learning, robotic process automation (RPA), and data-analytics platforms are increasingly embedded in return filing, invoice matching, fraud detection, and enforcement. This paper examines the evolving role of AI and automation in GST compliance, tracing the shift from manual, document-based compliance to real-time, data-integrated, and predictive systems. It reviews governmental initiatives such as the e-invoicing mandate, the Invoice Matching System (IMS), and analytics frameworks including BIFA and ADVAIT, alongside private-sector compliance automation tools used by businesses and tax professionals. The paper also examines the benefits of AI-enabled compliance, including reduced reconciliation time, proactive error detection, and improved audit readiness, while critically assessing challenges such as data privacy, algorithmic opacity, over-reliance on automated outputs, and the continuing need for human professional judgement. The paper concludes that AI and automation are best understood as complements to, rather than substitutes for, professional tax expertise, and offers recommendations for a balanced, human-in-the-loop model of GST compliance going forward.

Keywords: *Goods and Services Tax, GST compliance, Artificial Intelligence, Automation, e-invoicing, GSTN, Tax Technology, Digital Governance.*



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1. Introduction

The introduction of the Goods and Services Tax in India on 1 July 2017 marked one of the most significant reforms in the country's fiscal history, replacing a web of central and state indirect taxes with a unified, destination-based consumption tax. From its inception, GST was conceived as a technology-first tax regime: registration, return filing, invoice reporting, and refund processing were all designed to operate through the digital infrastructure of the GST Network (GSTN). This digital foundation distinguished GST from earlier indirect tax systems and set the stage for the subsequent integration of more advanced technologies.

Almost a decade since roll-out, the GST regime has entered what may be described as its second phase of technological evolution. The first phase focused on establishing digital infrastructure and standardising compliance processes; the second phase, unfolding through 2025 and 2026, is centred on artificial intelligence, machine learning, and automation. Government reporting indicates that GST collections crossed ₹22 lakh crore in the 2025–26 fiscal year, with a taxpayer base of roughly 1.6 crore, and that policy focus is now shifting toward AI-driven enforcement, database integration across GST, income tax, and customs, and simplification of compliance particularly for micro, small, and medium enterprises.

This paper explores how AI and automation are reshaping GST compliance for both the tax administration and the taxpayer. It examines the mechanisms through which these technologies operate, the specific compliance functions they support, the benefits they generate, and the risks and limitations that accompany their adoption. The analysis is situated within the broader context of digital governance and RegTech (regulatory technology) literature, while remaining grounded in the specific institutional architecture of Indian GST.

2. Objectives of the Study

- To examine the evolution of GST compliance from a manual, document-based process to a digitally integrated, automated system.
- To identify the specific applications of AI and automation across GST compliance

functions, including return filing, invoice matching, reconciliation, and fraud detection.

- To evaluate the benefits of AI-enabled compliance for taxpayers, tax professionals, and the tax administration.
- To critically assess the challenges, risks, and limitations associated with AI-driven GST compliance.
- To propose a balanced framework for the responsible adoption of AI and automation in tax practice.

3. Research Methodology

This paper adopts a descriptive-analytical approach based on secondary sources. It draws on government reports and press releases relating to GST administration, notifications and circulars issued by the Central Board of Indirect Taxes and Customs (CBIC), professional and practitioner commentary on the use of AI in tax practice, and industry analyses of compliance automation platforms. The study is conceptual and policy-oriented in nature rather than empirical; it does not involve primary data collection but synthesises publicly available material to construct a coherent account of the current state and trajectory of AI-enabled GST compliance in India.

4. Evolution of GST Compliance Technology

4.1. The First Phase: Digitisation (2017–2023)

The initial phase of GST implementation was concerned primarily with establishing a functioning digital backbone. The GSTN portal enabled online registration, return filing (GSTR-1, GSTR-3B, and related forms), e-way bill generation, and refund processing. This period was characterised by rule-based automation: validation checks, auto-population of certain fields, and standardised digital formats replaced paper-based filing but did not yet involve predictive or adaptive intelligence. Reconciliation between purchase and sales data, detection of mismatches, and risk assessment remained substantially manual or semi-manual, often outsourced to compliance software vendors offering basic automation.

4.2. The Second Phase: Intelligent Automation (2023–2026)

The more recent phase is marked by the introduction of structured, real-time data validation and analytics-driven enforcement. Several developments illustrate this shift. The e-invoicing mandate, progressively extended to smaller turnover thresholds, requires invoices to be registered with an Invoice Registration Portal (IRP) and validated in real time, generating a unique Invoice Reference Number (IRN) before an invoice is considered valid for input tax credit purposes. From July 2025, output tax liability fields in GSTR-3B are auto-populated and locked based on GSTR-1 data, with corrections routed through GSTR-1A, tightening the link between reported sales and declared liability.

On the enforcement side, the government has deployed analytics frameworks such as BIFA (Business Intelligence and Fraud Analytics) and ADVAIT, which apply data-mining and pattern-recognition techniques to GSTN data to identify anomalous filing behaviour, circular trading, and

fake invoicing networks. Officials have also indicated plans to integrate GST data with income tax and customs databases, enabling cross-source risk scoring intended to reduce manual scrutiny while sharpening enforcement precision, particularly for smaller taxpayers who might otherwise be disproportionately burdened by manual audits.

Parallel to these administration-side developments, private compliance automation platforms have matured considerably. Enterprise resource planning (ERP)-integrated GST solutions now offer API-based filing, automated GSTIN and HSN (Harmonised System of Nomenclature) validation, live reconciliation against GSTR-2B, and vendor risk scoring based on filing history. Industry commentary suggests that a substantial share of large Indian enterprises now run multiple AI use cases in production for compliance-related functions, reflecting a broader trend toward RegTech adoption driven by tightening KYC, anti-money-laundering, and audit requirements.

5. Applications of AI and Automation in GST Compliance

Compliance Function	Traditional Approach	AI/Automation-Enabled Approach
Invoice validation	Manual entry and post-facto correction	Real-time validation at the invoice stage via e-invoicing/IRP, catching errors before filing
Return reconciliation	Manual matching of GSTR-1, 2B, and 3B	Automated ledger sync and live reconciliation, reducing turnaround from days to minutes
Fraud/risk detection	Periodic audits and manual scrutiny	Continuous pattern analysis (e.g., BIFA, ADVAIT) flagging anomalous networks and vendors
Vendor risk assessment	Ad hoc due diligence	Algorithmic scoring of vendors based on filing history and compliance behaviour
Exception handling	Review of entire transaction sets	AI highlights only exceptions requiring human attention, focusing professional effort
Advisory and research	Manual research of notifications and case law	AI-assisted drafting and summarisation, subject to mandatory human verification

This progression mirrors a broader international pattern described by the OECD's Tax Administration 3.0 framework, which envisages tax compliance becoming a seamless,

real-time by-product of natural business and economic activity rather than a separate periodic exercise. India's own Project Insight, launched by the Central Board of Direct Taxes in

2018, was an early domestic precursor to this approach on the direct-tax side, using data analytics to widen the tax base and flag non-filers, and its underlying logic has since been extended into the GST ecosystem through GSTN-led analytics initiatives. Empirical work examining GST fraud cases between 2018 and 2023 has found a statistically significant reduction in reported fraud following the adoption of AI-based detection tools, lending quantitative support to the qualitative accounts of improved fraud detection reported by practitioners.

A recurring theme in current professional practice is the distinction between rule-based automation and generative AI. Practitioner guidance emphasises that deterministic, rule-based automation remains the appropriate tool for compliance tasks that require reproducibility and auditability, such as GSTIN validation or return computation, whereas generative AI tools are better suited to advisory drafting, research support, and communication tasks, where outputs are treated as drafts subject to professional review rather than final determinations.

6. Benefits of AI-Enabled GST Compliance

6.1. For Taxpayers and Businesses

- Reduction in reconciliation time and manual data entry, freeing finance teams for analytical and decision-making work.
- Early error detection at the invoice stage, reducing the risk of blocked input tax credit and delayed refunds.
- Improved audit readiness through continuous digital trails generated by API-based transactions.
- Lower compliance costs for micro, small, and medium enterprises as automation absorbs routine validation tasks.

6.2. For Tax Administration

- Enhanced ability to detect fake invoicing, circular trading, and other evasion patterns through continuous analytics rather than periodic audit.
- Faster processing of refunds through automated risk-based sorting of claims.
- Reduced manual intervention, allowing scarce administrative resources to be

directed toward genuinely high-risk cases.

- Cross-database integration (GST, income tax, customs) supporting more holistic risk assessment of taxpayers.

6.3. For Tax Professionals

- Automation of repetitive compliance tasks allows practitioners to focus on advisory, interpretation, and litigation support, where professional judgement adds the greatest value.
- AI-assisted research and drafting tools can accelerate preparation of replies to notices and representations, subject to verification.

7. Challenges and Risks

The adoption of AI and automation in GST compliance is not without significant risks, and current professional discourse in India reflects a cautious, rather than uncritical, embrace of these technologies.

7.1. Data Privacy and Confidentiality

The use of generative AI tools in tax practice raises concerns regarding the confidentiality of client and assessee data. Professional guidance increasingly recommends redaction of client-identifying information, such as GSTIN details and specific figures, before such data is used in any AI prompt, along with verification that redaction tools themselves are trustworthy.

7.2. Algorithmic Opacity and Accountability

Machine-learning-based risk scoring and fraud detection systems, by their nature, do not always provide transparent reasoning for their outputs. This creates challenges for taxpayers seeking to contest adverse risk classifications and raises broader questions of administrative accountability when enforcement action is triggered substantially by automated flags.

7.3. Over-Reliance and Currency of Information

Generative AI tools are trained on data with a fixed cutoff and are not a reliable source for the latest notifications, circulars, or judicial pronouncements, which are issued frequently in the GST framework. Professional guidance is

explicit that every AI-assisted citation must be verified against the bare statute, the official CBIC website, or a reliable case-law database before appearing in any client-facing deliverable, and that a human professional must review and sign off on AI-generated drafts.

7.4. Determinism versus Creativity

Not all AI is equivalent for compliance purposes. Rule-based automation offers the determinism and reproducibility required for statutory computations, whereas generative AI, by design, produces variable outputs better suited to drafting and research than to final compliance determinations. Conflating the two risks introducing avoidable errors into statutory filings.

7.5. Capacity and Digital Divide

Smaller businesses and professionals with limited technological infrastructure may face difficulty keeping pace with an increasingly API-first and analytics-driven compliance environment, potentially widening the gap between well-resourced enterprises and micro and small taxpayers, even as policy rhetoric emphasises easing the burden on this segment.

8. Towards a Balanced Framework: Human-in-the-Loop Compliance

The emerging consensus among practitioners and commentators is that AI and automation should be integrated into GST compliance through a human-in-the-loop model, in which technology handles volume, pattern recognition, and routine validation, while professional judgement retains ultimate responsibility for interpretation, representation, and sign-off. Several elements of good practice recur across current guidance:

- Maintaining a written AI Data Usage Policy governing what data may be used with AI tools and how it must be redacted.
- Keeping an audit trail of significant AI-assisted outputs used in compliance or advisory work.
- Preferring enterprise-tier, private, or retrieval-augmented (RAG-grounded) AI deployments for advisory and litigation work, where confidentiality and accuracy are paramount.

- Treating AI outputs as drafts: the professional reviews, verifies, and signs off before any deliverable reaches a client or the tax authority.
- Using deterministic automation, rather than generative AI, for tasks demanding reproducibility, such as GSTIN validation, HSN classification checks, and return computation.

This framework suggests that the future of GST compliance is not one of full automation displacing professional expertise, but of a layered system in which automation absorbs volume and generative AI supports analysis and drafting, while statutory and professional accountability remains firmly anchored in human oversight.

9. Conclusion

Nearly a decade after its introduction, the GST regime in India is entering a new phase defined by artificial intelligence and automation. Developments such as real-time e-invoicing validation, the GSTR-3B hard-lock mechanism, analytics frameworks like BIFA and ADVAIT, and the prospective integration of GST, income tax, and customs databases reflect a deliberate policy shift toward AI-driven enforcement and simplified compliance, particularly for smaller taxpayers. On the private side, businesses and tax professionals are adopting API-based filing, automated reconciliation, and AI-assisted research and drafting tools at an accelerating pace.

These developments offer genuine benefits: faster reconciliation, earlier error detection, improved audit readiness, and more efficient allocation of scarce administrative and professional attention. At the same time, they introduce new risks around data privacy, algorithmic transparency, and the currency and reliability of AI-generated content. The evidence reviewed in this paper suggests that the most defensible path forward is not maximal automation but calibrated automation: deterministic, rule-based systems for tasks requiring reproducibility, generative AI for drafting and research subject to mandatory human verification, and a persistent, non-negotiable requirement that professional judgement and statutory accountability remain with qualified human practitioners. Future

research could usefully examine the comparative compliance-cost impact of these technologies on micro and small enterprises, and the administrative-law implications of algorithmic risk scoring in tax enforcement.

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