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LEVERAGING DIGITAL GOVERNANCE FOR INCLUSIVE ECONOMIC GROWTH: GST REFORMS AND FISCAL FEDERALISM IN TAMIL NADU

Editors

Dr. A. Anandhiprabha

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Ms. A. Gomathi

Dr. S. Mahalakshmi

Volume - II

A One Day National Seminar on

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Volume II

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ARTIFICIAL INTELLIGENCE AND DATA ANALYTICS IN GST COMPLIANCE: TRANSFORMING INDIA’S TAX ADMINISTRATION



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Abstract

The introduction of the Goods and Services Tax (GST) in India marked a significant reform in the country’s indirect tax structure, aimed at improving transparency, efficiency, and compliance. With the increasing complexity of tax administration and the vast volume of transaction data generated through digital platforms, the integration of Artificial Intelligence (AI) and data analytics has become a critical component of GST compliance and enforcement. AI-driven technologies enable tax authorities to process large datasets, identify patterns, detect anomalies, and prevent tax evasion in real time. Data analytics tools assist in monitoring compliance behaviour, improving audit selection, and enhancing the overall efficiency of tax administration. The Goods and Services Tax Network (GSTN) functions as a digital backbone that supports automated processes such as e-invoicing, e-way bills, and return filing, which generate valuable data for analytical assessment. This paper examines the role of artificial intelligence and data analytics in strengthening GST compliance and transforming India’s tax governance framework. It also explores the opportunities, challenges, and policy implications associated with adopting advanced digital technologies in tax administration. The study concludes that AI-based analytics can significantly enhance transparency, reduce tax evasion, and improve the effectiveness of GST administration in India.

Keywords: *Artificial Intelligence, Data Analytics, GST Compliance, Tax Administration, Digital Governance*

Introduction

The implementation of the Goods and Services Tax (GST) in India in 2017 represented a major milestone in the modernization of the country’s indirect tax system. GST replaced multiple indirect taxes and created a unified tax structure aimed at simplifying compliance and improving efficiency in tax administration. However, managing GST compliance across millions of taxpayers and transactions presents significant administrative challenges. In this context, digital technologies such as artificial intelligence and data analytics have emerged as powerful tools to strengthen tax governance and enhance compliance monitoring.

Artificial intelligence refers to the use of computer systems that can perform tasks typically requiring human intelligence, such as pattern recognition, predictive analysis,

and automated decision-making. Data analytics involves the systematic analysis of large datasets to identify meaningful patterns, trends, and insights. Within the GST framework, these technologies enable tax authorities to analyze vast amounts of transaction data generated through digital systems such as e-invoicing, e-way bills, and GST returns. By leveraging advanced analytics, authorities can detect suspicious activities, identify tax evasion, and improve the efficiency of compliance enforcement.

The integration of AI and data analytics into the GST ecosystem not only enhances transparency but also reduces manual intervention and administrative burden. Consequently, digital technologies are transforming India’s tax administration into a more data-driven and intelligent system.

Digital Architecture of GST and the Role of GSTN

The Goods and Services Tax Network (GSTN) serves as the technological backbone of India’s GST system. It is a sophisticated IT platform that facilitates the registration of taxpayers, return filing, tax payments, invoice matching, and compliance monitoring. The digital architecture of GST is designed to handle large volumes of data generated from millions of taxpayers across the country. This digital infrastructure enables seamless communication between taxpayers, businesses, and tax authorities.

GSTN integrates several digital tools such as e-invoicing, e-way bill systems, and automated return filing mechanisms. These platforms generate vast amounts of structured and unstructured data that can be analyzed using advanced technologies like artificial intelligence and big data analytics. Through these tools, tax authorities can track transactions across supply chains and identify discrepancies in tax reporting.

The integration of AI-based analytical systems with GSTN enhances the ability of tax authorities to detect fraudulent transactions and reduce tax evasion. For instance, predictive analytics can identify high-risk taxpayers based on historical compliance patterns. This enables authorities to focus enforcement efforts more effectively and allocate resources efficiently. As a result, the digital architecture of GST supported by AI and data analytics strengthens transparency and accountability in tax administration.

Role of Artificial Intelligence in GST Compliance

Artificial intelligence plays a crucial role in improving GST compliance by enabling automated monitoring and intelligent analysis of tax data. AI algorithms can process massive datasets quickly and accurately, making it possible to detect irregularities and suspicious activities that may indicate tax evasion. By analyzing transaction patterns and taxpayer behaviour, AI systems can identify anomalies that would be difficult for human auditors to detect.

One of the key applications of AI in GST administration is fraud detection. Machine learning models can analyze historical tax data to identify patterns associated with fraudulent activities such as fake invoicing, circular trading, and tax credit fraud. These models continuously learn from new data, improving their ability to detect emerging forms of tax evasion. AI also supports risk-based audit selection by identifying taxpayers

with a higher probability of non-compliance. In addition, AI technologies can automate routine administrative tasks such as return verification, invoice matching, and compliance monitoring. This reduces the workload of tax officials and improves operational efficiency. By enhancing the accuracy and speed of compliance analysis, artificial intelligence contributes significantly to the effectiveness of India’s GST enforcement framework.

Data Analytics in Tax Monitoring and Enforcement

Data analytics has become an essential component of modern tax administration, particularly in systems that generate large volumes of digital transaction data. Under the GST regime, every invoice, tax return, and supply chain transaction is recorded digitally, creating an extensive dataset that can be analyzed for compliance monitoring. Data analytics tools allow tax authorities to examine these datasets systematically to identify patterns, trends, and potential irregularities. Advanced analytical techniques such as predictive analytics, descriptive analytics, and network analysis are used to improve tax enforcement. Predictive analytics helps authorities anticipate potential non-compliance by analyzing historical taxpayer behaviour and identifying risk indicators. Network analytics can uncover complex fraud schemes by mapping relationships between businesses involved in suspicious transactions.

Another significant advantage of data analytics is the ability to conduct real-time monitoring of tax activities. Automated systems can analyze incoming data continuously and flag unusual transactions for further investigation. This proactive approach enables tax authorities to detect fraud earlier and prevent significant revenue losses. Consequently, data analytics strengthens the capacity of tax administrations to ensure compliance while improving transparency and accountability in the GST system.

Challenges in Implementing AI and Data Analytics in GST

Despite the significant benefits of artificial intelligence and data analytics in tax administration, several challenges remain in their implementation within the GST framework. One major challenge is the management and quality of large volumes of data generated by the GST system. Ensuring data accuracy, consistency, and reliability is essential for effective analytics and decision-making. Another critical challenge relates to cybersecurity and data privacy. The GST system handles sensitive financial and transactional information of businesses and individuals. Therefore, protecting this data from cyber threats and unauthorized access is a major concern. Strong cybersecurity frameworks and data protection policies are required to maintain the integrity of the GST digital ecosystem. Additionally, the implementation of AI technologies requires skilled personnel, advanced technical infrastructure, and significant financial investment. Many tax administrations face limitations in terms of technological capacity and trained professionals capable of managing sophisticated analytical tools. Furthermore, businesses—particularly small and medium enterprises—may encounter difficulties in adapting to complex digital compliance systems.

Addressing these challenges requires continuous investment in digital infrastructure, regulatory frameworks, and capacity-building initiatives to ensure the successful integration of AI and data analytics into GST administration.

Policy Implications and Future Prospects

The increasing adoption of artificial intelligence and data analytics in GST administration has significant implications for public policy and tax governance. Governments must develop comprehensive digital strategies that integrate advanced technologies into tax systems while ensuring transparency, accountability, and data security. Effective regulatory frameworks are essential to govern the use of AI technologies and protect taxpayer information.

In the future, the GST system is likely to become increasingly automated and data-driven. Emerging technologies such as blockchain, cloud computing, and advanced machine learning algorithms could further enhance the efficiency and transparency of tax administration. Blockchain technology, for example, may provide secure and tamper-proof transaction records that improve supply chain transparency and reduce fraud.

Policymakers must also focus on improving digital literacy among taxpayers and businesses to ensure smooth adoption of technological innovations. Capacity-building programs for tax officials are equally important to enable effective use of AI-based analytical tools. By embracing digital transformation and strengthening institutional capabilities, India can create a more efficient and transparent tax administration system that supports economic growth and fiscal stability.

Conclusion

The integration of artificial intelligence and data analytics into the GST framework represents a significant transformation in India’s tax administration. These technologies enable tax authorities to process large volumes of data efficiently, detect tax evasion, and enhance compliance monitoring. The digital infrastructure provided by the GST Network facilitates automated processes such as e-invoicing, e-way bills, and return filing, which generate valuable data for analytical assessment.

AI-driven systems improve the accuracy and speed of compliance analysis, allowing tax authorities to identify high-risk taxpayers and fraudulent activities more effectively. At the same time, data analytics tools enable real-time monitoring of transactions, thereby strengthening transparency and accountability in the GST ecosystem. However, challenges related to data quality, cybersecurity, and technological capacity must be addressed to ensure the effective implementation of these technologies. Overall, artificial intelligence and data analytics have the potential to transform India’s tax administration into a more efficient, transparent, and intelligent system. By leveraging advanced digital technologies and strengthening policy frameworks, the GST system can achieve higher levels of compliance and contribute to sustainable economic development.

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