

AI-Driven GST Administration and Its Role in Strengthening Fiscal Governance and Macroeconomic Stability

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Abstract

This study examines the implementation of AI applications in GST administration in India while focusing on the impact of AI's role in Tax Compliance Efficiency and Tax reconciliation processes. The study uses a quantitative approach; the research data samples contain 244 respondents, including GST registered Small business taxpayers, tax consultants, and GST officers in Chennai. The SPSS and AMOS software were used to analyse statistical data like correlation analysis, regression analysis and structural equation modelling to evaluate the relationship between AI application in tax compliance, reconciliation and administrative efficiency. The correlation analysis shows a significant relationship between tax compliance efficiency and tax reconciliation ($r=0.435$, $p<0.01$), and between administration efficiency and tax reconciliation ($r=0.261$, $p<0.01$). The regression analysis shows a significant positive impact on tax reconciliation ($\beta=0.318$, $p<0.001$). These findings suggest that AI integration plays an important role in enhancing GST administration, particularly in areas of tax reconciliation and compliance processes. However, the impact varies across different aspects of tax administration.

Keywords: GST, Artificial Intelligence, Administration Efficiency, Tax Compliance Efficiency, Tax reconciliation.

Introduction

The implementation of a new tax regime reform called Goods and Services Tax (GST) in the history of Indian Indirect taxation has constantly gone through many refinements to achieve its goal of making tax compliance simpler for taxpayers, tax consultants and GST administration officers. However, the complexity of GST administration in tackling the vast data generated is the biggest challenge, in which timely compliance, refunds, ITC, and fake invoices have negatively impacted the GST compliance system, which also paves the way for AI technology. AI is a rapidly growing technology in almost every sector, enabling computer systems to perform tasks equivalent to human intelligence, such as visual perception, speech recognition, decision-making, and language translation. AI is based on the idea that machines can learn from data, recognise trends, and make decisions with little human intervention. AI algorithms can improve time and effectively give more exact results. (Indirect Tax, 2023).

AI offers many possible solutions related to GST administration's challenges since it can handle large volumes of data, recognise trends and reconciliation statements. (Singh, 2023) AI-driven solutions enhance tax compliance and regulate finance by detecting non-compliance and voluntary tax evasion through fake invoice billings by monitoring the regulatory framework. (Nembe, 2024) AI helps taxpayers by identifying mismatched data, timely compliance, remembering important data for filing GSTR, providing security and minimising operational costs (Agustine Dwianika, 2023) Big data analytics, AI and Data mining solutions enhance tax administration by building risk-free and error-free workflow and segmenting taxpayers to better target services and compliance actions data mining has the advantage of identifying penalty clauses in regulations. (Mehta, 2019). However there are challenges in the practice adoption of new technology in emerging economies concerns about ethical consideration, transparency, security and bias mitigation.

The implementation of AI in deep learning and data analytics in tax compliance Finance Minister Nirmala Sitharaman stated that this technology will help pinpoint areas of revenue loss, uncover individuals who take advantage of the system, file fraudulent refund claims, possibly establish fake companies, or interact with corrupt organizations, leading to financial harm for the government. These advancements in tax compliance should guarantee fairness and smooth processes for GST taxpayers, tax consultants, and GST administrative officers.

AI in GST reconciliation: Numerous studies have explored the use of advanced technology for handling intricate invoice tasks through AI invoice automation applications. This process includes data extraction, automated invoice matching, fraud detection, invoice categorization, compliance verification, predictive analytics, error reduction and correction, automated approval workflows, and duplicate invoice identification (John, 2024). AI used in GST compliance has the following benefits where AI processing invoices has a history of records like details of vendor names, invoice numbers, dates, items and totals can be verified and compared based on the categories of their nature by handling large set of data reducing error and enhance operation efficiency by timesaving.

AI improve GSTN Capacity: The recent budget emphasises improvements in the GSTN by including AI and analytics (Stanly, 2023) to help companies spot tax evasion and false invoicing, stricter rules have been implemented in input tax credits for smooth flow and an increase in the monthly collection of GST revenues. The focus is on timely compliance for all GST registrants, along with limitations on input tax credits and advanced analytics for detecting evasion.

AI enhance Tax compliance efficiency: Applying AI technology in the different aspects of tax collection and administration will improve tax management, but adopting (Li, 2021) this technology in tax management may face various challenges. AI improves the (Serrano Antón, 2021) ethical and transparency in the tax administration by identifying the risk of potential fraud by optioning taxpayer information. (Huang, 2018) with the development of AI technology creation of forecasting and statistical models for tax, auditing may reduce confusion, complexity and disorder in data process and reduce task risk with complex compliance that misguidance human judgement.

AI role in Tax reconciliation: The integration of AI and blockchain system (Adelekan, 2024) in tax administration also presents challenges like data privacy, complexity in the tax system and robust regulations but it evolves for the betterment of tax compliance blockchain technology recognizes following patterns automates and segments the transaction history by offering accuracy, efficiency and transparency. (Goltz, 2017) Using AI in tax compliance helps in identifying the penalty clauses any changes in regulations can tracked, and notified to taxpayers to enhance compliance.

AI role in Administration efficacy: (Serrano Antón, 2021) AI provides insight into tax administrations by improving tax efficiency and transparency in administration further it also improves administration services to taxpayers by ensuring obtaining tax information for automated tasks, fighting tax evasion avoiding the risk during tax audits and governing the right and guarantees taxpayers. This paper attempts to evaluate how artificial intelligence affects several facets of GST implementation in India to present a whole picture of how artificial intelligence is changing tax collection under the GST framework.

1.1 Research Objective and question

This study focuses on the relationship between AI integration in GSTN compliance efficiency where Artificial intelligence technology revolutionised in GST tax compliance process and has increased the overall efficacy of GST administration.

RQ1: How does the integration of AI applications in GST compliance in Tax reconciliation help taxpayers in India?

RQ2: How does the integration of AI technology enhance AI Analytics in tax compliance efficacy?

RQ3: How does the integration of AI technology role in the administration of the overall tax collection efficacy?

RQ4: To what extent does the AI integration play a major role in Tax compliance efficacy, Tax reconciliation and Administration efficacy?

2. Methodology

The study focuses on a quantitative approach to investigate the association between AI Applications in GST, AI enhancement on tax compliance efficiency, AI role in tax Reconciliation and AI role in Administration efficiency among taxpayers in India.

2.1 Sampling and Data Collection

This study focuses on primary data collection to assess the usefulness of AI-integrated solutions for taxpayers, tax consultants and GST administration to enhance tax compliance seamlessly and protect the interests of genuine taxpayers. Further, this study aims to investigate AI's role in GST administration efficiency, tax compliance efficiency and AI's application of GST role in tax reconciliation. This study sample data was collected from GST-registered small business taxpayers, tax consultants and GST officers where 300 questionnaires were distributed out of 244 samples that only have valid responses. Convent sample methods were used where responses were received through Google form using purposive and quota sampling was employed in this study.

2.2 Hypothesis of the study

H1: AI Applications in the GST enhance tax compliance efficiently has a positive influence on GST taxpayers.

H2: AI Applications in the GST Reconciliation have a positive influence on GST taxpayers

H3: AI's role in the GST Administration efficiently has a positive influence on GST taxpayers

H4: AI technology integration helps overall tax compliance efficacy, tax reconciliation and administration efficacy

2.3 Sample Description

The data show that the majority of the respondents fall in the age group of 30 to 40 (30.74%) followed by the 20 to 30 age group (27.87%) followed by a small representation of the old age group. Based on the category of gender also most males make up the majority of those involved in GST compliance at 58.20% and female 41.80%. education qualification plays a vital role in tax compliance behaviours where the majority of the respondents hold an undergraduate degree of 32.38% followed by a postgraduate degree of 33.61%. In terms of business types the largest groups are services sectors 26.23% and manufacturing 22.54% followed by retail 18.85%. in terms of the annual turnover the respondents majority of the business have a turnover of less than 40 lakhs 40.16% and 40 to 80 lakhs 26.23% this represents the small and medium-sized enterprises (SMEs) in the GST filing process. The chart shows that 60% of businesses rely on tax consultants or accountants whereas only 40% opt for self-filing. In terms of software used for GST filing highlight Tally is 30.74%, and Zoho Books is 25.82%.

2.4 Operation definition of variables

The initial two indicators of the AI application in GST are the Independent variables GSTN reconciliation, tax compliance efficiency (GST taxpayers compliance) and the dependent variable is Administration efficacy.

Table 1: operation definition variables table

Variables	Scale of measurement	Sign expected	Reference
Dependent variable			
administration efficiency	Linkert scale questionnaire	+	(Singh, 2023)
Independent variable			
Tax compliance efficiency	Linkert scale questionnaire	+	(Indirect Tax, 2023)
GST reconciliation	Linkert scale questionnaire	+	(Agustine Dwianika, 2023)

2.5 Data Analysis

After the process of data collection variables were coded and classified for data analysis in SPSS in the form of descriptive and inferential statistics. The statistical tools used were Correlation, regression, factor analysis and SEM (CFA) model were implemented in this study.

2.6 Reliability Test

The value of 0.935 indicates excellent reliability for the four items measured in TCE (tax compliance efficiency) are highly interrelated whereas, for the TR (Tax reconciliation), Cronbach’s alpha value indicated 0.851 showing a good internal consistency reliability in measuring the variable.AE(Administration efficiency) indicates the alpha value of 0.731 showing the acceptable internal reliability for four items. Thus the values shows the reliable constructs for further analysis.

Table 2: Reliability test

variables	α Value	No of items
TCE	.935	4
TR	.851	4
AE	.731	4

Source: Primary data

2.7 Validity test

The validity test shows a high KMO value of 0.861 where Barlett’s test ($p < 0.001$) for the sample size appears an adequate degree of freedom is 66 with a chi-square value of 2820.389. This table shows that sampling is very adequate for factor analysis indicating the strong partial correlation among the variables.

Table 3: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.861
Bartlett's Test of Sphericity	Approx. Chi-Square	2820.389
	df	66
	Sig.	.000

Source: Primary data

3. Results and discussion

3.1 Descriptive analysis

The result displays the tax compliance efficiency of TCE items mean range from 3.52 to 3.57 and low standard deviation (0.601- 0.621) indicates a positive evaluation. In contrast, Tax reconciliation shows the highest standard deviation of 0.609 to .0881 where the mean range from 2.98 to 3.56 shows a more diverse positive on the tax reconciliation. The administrative efficiency construct shows a mean range between 3.01 to 3.91 with the highest standard deviation of 0.865- 1.121 suggesting that respondent has notably different views about AI integration in GST administration efficacy demonstrating the most diverse range of opinions among respondents.

Table 4: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
TCE 1	244	2	5	3.52	.618
TCE 2	244	2	5	3.57	.621
TCE 3	244	2	5	3.57	.601
TCE 4	244	2	5	3.55	.610
TR 1	244	2	5	3.56	.609
TR 2	244	1	5	3.03	.874
TR 3	244	1	5	2.98	.870
TR 4	244	1	5	3.03	.881
AE 1	244	1	5	3.01	.865
AE 2	244	1	5	3.82	1.036
AE 3	244	1	5	3.75	1.084
AE 4	244	1	5	3.91	1.121

Source: Primary data

3.2 Correlation analysis

The study investigates the relationship between tax compliance efficiency (TCE), Tax reconciliation (TR) and Administration efficiency (AE) which reveals that there is a significant relationship between the variables. There is a moderate positive correlation with both Tax compliance efficiency and Tax reconciliation ($r = 0.435, p < 0.01$). Administration Efficiency and Tax reconciliation have a meaningful association ($r = 0.261, p < 0.01$) has a moderate positive correlation. However, there is no association between Tax compliance and Administration efficiency with no significant ($r = 0.003$).

Table 5: Correlation analysis

		TCE	TR	AE
TCE	r	1		
TR	r	0.435**	1	
AE	r	.003	.261**	1

Source: Primary data

3.3 Regression Analysis

The regression model was conducted and the result showcased $F = 11.138, P < 0.001$ were R- Square value of 0.085 (adjusted $R^2 = 0.077$) this suggests the model had approximately 8.5% variance in Administration efficiency. There is a positive significance between the dependent variable Administration efficiency and the independent variable Tax reconciliation with beta value of 0.318, ($t = 4.701, p < 0.001$). however there is no significance relationship between the dependent variable Administration efficiency and the independent variable Tax compliance efficiency with beta value of -0.106 ($t = -1.560, p = 0.120$).

Table 6: Regression analysis

Model		Unstandardized Coefficients		Standardized Coefficients		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	3.002	.321			
	TCE → AE	-.144	.093		9.356	.000
	TR → AE	.359	.076	-.106	-1.560	.120
R = .291, R ² = 0.085, Ad R ² = 0.077, F = 11.138, P = .000				.318	4.701	.000
a. Dependent Variable: AE						
Source: Primary data						

4 Conclusion

The investigation of the AI application in GST administration reveals significant insights to the transformation of the Indian tax administration system. The study finding reveals the impact of AI Tax reconciliation processes. Firstly the positive association between the AI role in Administration integrating the AI technology in GSTN for better compliance which eradicates the bogus ITC claims and facilitates business intelligence and financial analytics system verification at the time of registration. The integration of AI GST administration has generated automated notice to avoid penalties for taxpayers and generate revenue by blocking revenue leakage in the compliance system

The correlation analysis highlights how AI applications are interconnected across different aspects of GST administration it shows the strong relationship between AI-driven GST tax reconciliation processes and administrative efficiency suggesting that continued investment in research and development in AI technologies for tax reconciliation could yield significant administration benefits. These findings contribute to the growth of AI implementation in GST administration and can provide valuable insights for policymakers and administrators.

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