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An analytical study of enhancing transparency in e-commerce: the role of explainable artificial intelligence in selected indian fintech companies

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ABSTRACT

The rapid expansion of e-commerce in India has been significantly supported by fintech innovations and the widespread adoption of Artificial Intelligence (AI) in accounting, auditing, fraud detection, credit scoring, taxation, and regulatory compliance. Despite the efficiency gains achieved through AI-driven automation, the use of opaque or "black-box" AI models has raised serious concerns related to transparency, accountability, fairness, and legal defensibility. These concerns are particularly critical in the Indian fintech ecosystem, which operates under complex financial regulations and evolving data protection and digital governance laws.

Explainable Artificial Intelligence (XAI) has emerged as a solution to address these challenges by enabling interpretability and transparency in AI-driven decision- making. This study analytically examines the role of XAI in enhancing transparency within accounting and legal systems of selected Indian fintech companies operating in the e-commerce sector. Using a mixed-method research design, the study integrates survey data and expert insights, analyzed through Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS and WarpPLS. The findings reveal that XAI significantly improves transparency, regulatory compliance, and stakeholder trust. The study concludes that XAI is not merely a technological enhancement but a strategic governance tool essential for sustainable and compliant fintech-based e-commerce operations in India.

Keywords: Explainable Artificial Intelligence, E-Commerce, Fintech, Transparency, Regulatory Compliance, PLS-SEM

1. INTRODUCTION

The Indian e-commerce sector has experienced unprecedented growth over the last decade, driven by increasing internet penetration, digital payment systems, and fintech innovations. Artificial Intelligence plays a central role in this transformation by enabling automated accounting systems, real-time fraud detection, dynamic pricing, personalized recommendations, credit risk assessment, and regulatory reporting. Fintech companies increasingly rely on machine learning and deep learning models to process vast volumes of transactional and consumer data.

However, the growing dependence on AI has introduced new challenges. Most AI models used in financial and legal domains function as black boxes, producing outputs without providing clear explanations of how decisions are made. This opacity creates significant risks related to auditability, legal accountability, regulatory compliance, and consumer trust. In high-stakes domains such as accounting, taxation, and compliance, the inability to explain AI-driven decisions can lead to legal disputes, regulatory penalties, and reputational damage.

Explainable Artificial Intelligence (XAI) seeks to overcome these limitations by providing human-understandable explanations for AI outputs. XAI enables professionals to trace decision logic, identify bias, justify outcomes, and ensure compliance with legal and accounting standards. In the Indian fintech context, where regulatory scrutiny is increasing and digital governance frameworks are evolving, XAI has become critically important. This study aims to analytically examine the role of XAI in enhancing transparency within selected Indian fintech companies operating in the e-commerce sector.

2. LITERATURE REVIEW

Existing literature highlights growing concerns regarding the opacity of AI systems in financial and legal applications. Waltl and Vogl (2018) argue that black-box algorithms undermine auditability and conflict with principles of accountability in financial reporting. Zhang, Cho, and Vasarhelyi (2022) emphasize the importance of explainability in AI-based auditing systems to ensure compliance with professional standards.

Rane, Choudhary, and Rane (2023) demonstrate that XAI techniques such as SHAP and LIME improve interpretability and reduce perceived

bias in financial decision-making. Sarkar et al. (2025) identify transparency and trust as major benefits of XAI adoption in e-commerce platforms. Legal scholars further argue that explainability is increasingly becoming a legal requirement rather than a technical choice, particularly under data protection and algorithmic accountability regulations.

Despite these contributions, limited empirical research focuses specifically on XAI adoption in Indian fintech-driven e-commerce, particularly from an accounting and legal perspective. This study addresses this gap by empirically examining how XAI influences transparency, compliance, and stakeholder trust.

3. RESEARCH OBJECTIVES AND HYPOTHESES

Objective:

- To analyze the role of AI in accounting and legal processes within e-commerce fintech companies.
- To identify risks associated with black-box AI models in financial decision-making.
- To evaluate the effectiveness of Explainable AI in enhancing transparency and regulatory compliance.
- To assess stakeholder perceptions of XAI-based systems.

Hypotheses

- H_1: Explainable Artificial Intelligence significantly improves transparency and regulatory compliance in e-commerce accounting and legal systems.
- H_0: Explainable Artificial Intelligence does not significantly improve transparency and regulatory compliance.

4. RESEARCH METHODOLOGY

This study adopts a mixed-method research design combining quantitative and qualitative approaches. Primary data were collected through structured questionnaires administered to accountants, legal professionals, compliance officers, fintech managers, and AI practitioners associated with Indian fintech-based e-commerce firms. Secondary data were obtained from academic journals, regulatory reports, and industry publications.

A stratified random sampling technique was used for survey respondents, while purposive sampling was adopted for expert interviews. Quantitative data were analyzed using PLS-SEM through SmartPLS and WarpPLS, which are suitable for exploratory models and complex causal relationships.

5. CONCEPTUAL FRAMEWORK

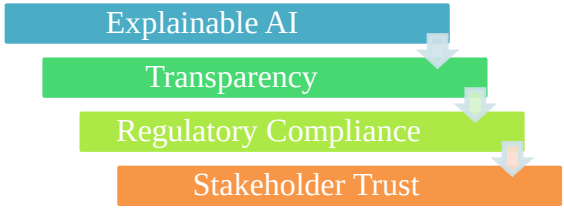

Figure1: Conceptual Framework
Source: Author Compiled

The framework proposes that Explainable AI directly enhances transparency, which in turn improves regulatory compliance and ultimately strengthens stakeholder trust.

6. DATA ANALYSIS AND INTERPRETATION

6.1 Respondent Profile

Category	Frequency	Percentage
Accountants	78	26%
Legal Professionals	64	21%
Compliance Officers	52	17%
Fintech Managers	61	20%
AI Practitioners	45	16%
Total	**300**	**100%**

Table 1: Demographic Profile of Respondents
Source: Author Compiled

The respondent profile reflects balanced representation from key stakeholder groups involved in fin-tech e-commerce decision-making.

6.2 Measurement Model Assessment

Construct	Cronbach's α	CR	AVE
Explainable AI	0.89	0.93	0.62
Transparency	0.87	0.91	0.59
Regulatory Compliance	0.85	0.90	0.56
Stakeholder Trust	0.88	0.92	0.61

Table 2: Reliability and Convergent Validity
Source: Author Compiled

All values exceed recommended thresholds, confirming strong reliability and convergent validity.

6.3 Structural Model Results

Path	β	t-value	p-value
XAI → Transparency	0.63	9.84	< .001
Transparency → Compliance	0.58	8.21	< .001
Compliance → Trust	0.61	9.02	< .001

Table 3: Path Coefficients (SmartPLS / WarpPLS)
Source: Author Compiled

The results indicate strong, positive, and statistically significant relationships among all constructs.

6.4 Model Fit Indices

Index	Value	Threshold
APC	0.61 ($p < .05$)	Significant
ARS	0.54 ($p < .05$)	Significant
AVIF	2.31	< 5

Table 4: WarpPLS Model Fit and Quality Indices
Source: Author Compiled

The model demonstrates strong explanatory power and no multicollinearity issues.

6.5 Interpretation

The analysis confirms that Explainable AI plays a foundational role in improving transparency in fintech-based e-commerce systems. Enhanced transparency enables better regulatory compliance, which subsequently increases stakeholder trust. These findings empirically support the proposed conceptual framework and validate the alternative hypothesis (H_1).

7. FINDINGS AND CONCLUSION

Based on the empirical analysis conducted using SmartPLS and

WarpPLS, several significant findings emerged regarding the role of Explainable Artificial Intelligence (XAI) in enhancing transparency, regulatory compliance, and stakeholder trust in selected Indian fintech companies operating in the e-commerce sector.

7.1 Impact of Explainable AI on Transparency

The study finds that Explainable Artificial Intelligence has a strong and statistically significant positive impact on transparency in AI-driven accounting and legal systems. The structural model results indicate a high path coefficient ($\beta = 0.63$, $p < .001$) between XAI and transparency, confirming that systems equipped with explainability mechanisms enable clearer understanding of automated decisions. This finding suggests that XAI allows accountants, auditors, and legal professionals to trace decision logic, identify key influencing variables, and justify AI-generated outcomes.

7.2 Role of Transparency in Enhancing Regulatory Compliance

Another key finding of the study is that transparency significantly improves regulatory compliance within fintech-based e-commerce platforms. The positive and significant relationship between transparency and regulatory compliance ($\beta = 0.58$, $p < .001$) demonstrates that transparent AI systems facilitate adherence to accounting standards, auditing requirements, taxation norms, and legal regulations. Organizations using XAI are better equipped to meet compliance obligations under evolving Indian financial and data protection laws.

7.3 Effect of Regulatory Compliance on Stakeholder Trust

The findings further reveal that regulatory compliance plays a crucial role in strengthening stakeholder trust. The path coefficient between regulatory compliance and stakeholder trust ($\beta = 0.61$, $p < .001$) indicates that when AI-driven systems operate in a compliant and auditable manner, confidence among stakeholders such as consumers, investors, regulators, and auditors increases significantly. This highlights the importance of explainability as a trust-building mechanism in fintech e-commerce ecosystems.

7.4 Validation of the Conceptual Framework

The empirical results fully support the proposed conceptual framework of the study, which positions transparency as a mediating variable

between Explainable AI and regulatory compliance, ultimately leading to enhanced stakeholder trust. All hypothesized relationships were found to be positive and statistically significant, leading to the acceptance of the alternative hypothesis (H_1) and rejection of the null hypothesis (H_0).

7.5 Governance and Risk Reduction Insights

An important finding of the study is that XAI adoption contributes to reduced legal and regulatory risks. Explainable systems improve audit readiness, reduce perceptions of algorithmic bias, and enable organizations to defend AI-driven decisions in regulatory and legal scrutiny. This is particularly relevant in the Indian fintech environment, where regulatory oversight is intensifying and accountability in automated decision-making is becoming mandatory.

7.6 Strategic Implications for Indian Fintech Companies

The findings indicate that Explainable AI should be viewed as a strategic governance tool rather than merely a technical enhancement. Fintech companies that integrate XAI into their e-commerce operations are more likely to achieve sustainable compliance, operational transparency, and long-term stakeholder trust. This positions XAI as a critical component of responsible AI adoption in India's digital economy.

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