

A Study on the Impact of AI-Driven KYC Verification on Customer Onboarding Efficiency in Digital Payment Platforms

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Abstract - The rapid growth of digital payment platforms in India has placed customer onboarding, and specifically Know Your Customer (KYC) verification, at the center of both regulatory compliance and user experience. Traditional document-based KYC processes are often slow, error-prone, and resource intensive, prompting platforms to adopt artificial intelligence (AI) driven identity verification. Objective: This study examines the impact of AI-driven KYC verification on customer onboarding efficiency in digital payment platforms. Methodology: A descriptive research design based on secondary data was adopted. Publicly available statistics from the Reserve Bank of India's Digital Payments Index, NPCI's UPI transaction data, government press releases, and peer-reviewed/industry literature on AI-based KYC (FY2021-22 to FY2024-25) were compiled and analyzed using trend and comparative growth analysis in MS Excel. Findings: The RBI Digital Payments Index rose by approximately 23% between September 2022 and September 2024, while annual UPI transaction volumes nearly quadrupled, from 46 billion to 186 billion transactions, over the same broad period. Both trends are directionally consistent with the view that AI-enabled e-KYC infrastructure has supported faster, higher-volume customer onboarding, though customer trust and data-privacy concerns are highlighted in the literature as comparatively weaker dimensions. Conclusion: AI-driven KYC verification appears to be an important enabler of onboarding efficiency and payments-ecosystem growth in India, but a definitive, disaggregated statistical test of this relationship is constrained by the aggregate nature of currently published secondary data — a limitation discussed in Section 9.

Keywords: *Artificial Intelligence, KYC Verification, Customer Onboarding, Digital Payment Platforms, Financial Technology, Operational Efficiency*

1. Introduction

India's financial technology (FinTech) sector has expanded rapidly over the past decade, driven by the proliferation of smartphones, affordable data, and public digital infrastructure

such as the Unified Payments Interface (UPI) and Aadhaar-based identity systems. Digital payment platforms, ranging from bank-led UPI applications to non-bank wallets and lending apps, now serve hundreds of millions of Indian users, and customer onboarding has become a critical first touchpoint that determines whether a new user completes registration or abandons the process midway.

A central component of onboarding in regulated financial services is Know Your Customer (KYC) verification, a process mandated by the Reserve Bank of India (RBI) to prevent identity fraud, money laundering, and unauthorized account creation. Traditional KYC relied on physical documents, in-person verification, and manual cross-checking, a process that was slow, costly, and prone to human error. The introduction of electronic KYC (e-KYC), particularly Aadhaar-based e-KYC, allowed platforms to verify identity using government-linked biometric and demographic data, significantly reducing onboarding time.

More recently, artificial intelligence has been layered onto e-KYC processes to further automate and strengthen verification. AI-driven KYC systems typically combine optical character recognition (OCR) for document reading, facial recognition and liveness detection for biometric matching, and machine learning models for risk scoring and anomaly detection. Such systems can validate a government ID, match a live selfie against the document photograph, and flag suspicious patterns within seconds, replacing what was previously a multi-day manual review.

The RBI's Master Direction on KYC and successive amendments have progressively accommodated digital and video-based customer identification, reflecting regulatory recognition of these technologies. The Digital India mission and the broader UPI ecosystem have further created an environment in which fast, low-friction onboarding is treated as a competitive necessity rather than a convenience. At the same time, the shift to AI-driven verification raises questions around algorithmic accuracy, data privacy, customer trust, and

the digital divide, particularly for users less familiar with smartphone-based verification.

Against this backdrop, this study investigates how AI-driven KYC verification affects customer onboarding efficiency on digital payment platforms, the benefits and challenges perceived by customers, and the extent to which these systems are viewed as trustworthy and secure.

2. Literature Review

A review of recent literature (2020–2025) highlights a growing body of research on AI-enabled identity verification and digital onboarding in financial services. Table 1 summarises key studies.

Table 1: Summary of Literature Reviewed (2020–2025)

Author(s) & Year	Research Objective	Key Findings	Research Gap
Parate et al. (2023)	Examine AI applications in KYC identity verification	AI-based biometric authentication and document analysis reduce manual effort and accelerate <u>onboarding</u> while lowering fraud risk	Limited empirical data on customer-side perception of AI verification
Kumar et al. (2023)	Develop and evaluate an e-KYC authentication system using Aadhaar-based photo matching	Automated photo and document verification reduced processing errors compared with manual paper-based <u>onboarding</u>	Study focused on system design rather than customer <u>onboarding</u> efficiency metrics
Relationship of E-KYC Process on Customer Perception and Trust, Philippine Universal Banks (2023)	Examine e-KYC's relationship with customer perception and trust in online banking	e-KYC adoption was associated with improved customer perception, though trust concerns persisted among some segments	Conducted outside the Indian regulatory and UPI context
Ghaffari et al. (2021)	Explore blockchain-based decentralised identity for fraud prevention	Verifiable credentials and decentralised identifiers can reduce <u>onboarding</u> time and improve compliance	Limited integration with existing AI-based KYC pipelines
TCS Whitepaper on AI-Enabled KYC (2022)	Assess AI/NLP applications in onboarding and periodic KYC risk profiling	Conversational AI and automated outreach improve KYC completion rates and reduce mismatched data issues	Industry whitepaper; lacks independent statistical validation
McKinsey (2023)	Assess agentic AI's role in KYC/AML transformation in banking	Agentic AI improves automation and productivity across the client lifecycle, though financial institutions capture limited return on compliance spend	Focused on institutional cost-efficiency rather than customer-facing <u>onboarding</u> experience
Soundenkar et al. (2024)	Examine AI-powered risk management and biometric KYC for fraud detection	Biometric-enhanced KYC (facial, voice, fingerprint) improves security and user-forward identity verification	Ethical and regulatory dimensions discussed conceptually without primary customer survey data
Agentic AI Microservice Framework for KYC Pipelines (2024)	Propose an AI microservice framework for deepfake and document fraud detection in KYC	Modular AI pipelines improve detection of emerging fraud patterns beyond static deep learning models	Focused on technical architecture rather than <u>onboarding-time</u> or customer-experience outcomes
International onboarding system using deep learning and RPA (2025)	Design an end-to-end AI-driven onboarding system using facial recognition, OCR	Combining biometric and document features with automated decisioning improved <u>onboarding</u>	Evaluated on technical performance metrics rather than customer satisfaction or

Collectively, these studies confirm that AI-driven KYC systems improve processing speed, reduce manual effort, and strengthen fraud detection. However, a recurring gap is the limited availability of primary survey data capturing how customers of Indian digital payment platforms themselves perceive AI-driven verification, particularly regarding trust, transparency, and comfort with biometric data collection. The

present study addresses this gap through a structured quantitative survey instrument.

3. Research Objectives

- To study the implementation of AI-driven KYC verification in digital payment platforms.
- To examine the impact of AI-based KYC on customer onboarding efficiency.
- To analyse customer perception towards AI-enabled identity verification.
- To identify the benefits and challenges of AI-driven KYC systems.

4. Research Methodology

This study adopts a descriptive research design based entirely on secondary data, aimed at analysing publicly available statistics on digital payment adoption, KYC-related regulatory milestones, and published industry/academic findings on AI-driven identity verification. Secondary sources include the Reserve Bank of India's Digital Payments Index (RBI-DPI) and Master Direction on KYC, National Payments Corporation of India (NPCI) UPI transaction statistics, Government of India press releases (PIB/Ministry of Finance), and peer-reviewed or industry studies on AI-based KYC systems identified in the literature review (Section 2). Data spanning FY2021-22 to FY2024-25 were compiled from these published sources and analysed using trend, percentage-growth, and comparative analysis in MS Excel to assess the relationship between the diffusion of digital/AI-enabled KYC infrastructure and onboarding-related indicators such as transaction volume growth and the RBI-DPI consumer-centricity sub-index. As this is a secondary-data study, no primary survey or respondent sampling was undertaken; all figures cited in Sections 5-8 are drawn directly from the cited public sources.

5. Trend Analysis: RBI Digital Payments Index

The RBI-DPI is an official composite index (base = 100 for FY2017-18) that tracks digital payment penetration across five weighted parameters: payment enablers, supply- and demand-side infrastructure, payment performance, and consumer centricity (which itself captures awareness, complaints, frauds, and system downtime — dimensions directly relevant to onboarding and verification quality).

Table 1: RBI Digital Payments Index (RBI-DPI), Selected

Period	RBI-DPI Value
September 2022	377.46
March 2023	395.57
March 2024	445.50
September 2024	465.33

Source: Reserve Bank of India / Statista compilation of RBI-DPI releases.

Interpretation: The index rose by roughly 23% between September 2022 and September 2024, indicating sustained growth in digital payment infrastructure, performance, and consumer-centric factors — the segment of the index most closely tied to onboarding friction, verification reliability, and fraud/complaint rates.

6. Trend Analysis: UPI Transaction Volume

Because UPI onboarding is itself gated by KYC/e-KYC verification, year-on-year growth in UPI transaction volume serves as a widely used proxy indicator for the scalability and efficiency of India's digital identity-verification infrastructure.

Table 2: Annual UPI Transaction Volume, FY2021-22 to FY2024-25

Financial Year	Transaction Volume (Billion)	YoY Growth (%)
FY2021-22	46	—
FY2022-23	84	82.6
FY2023-24	131	56.0
FY2024-25	186	42.0

Source: FACTLY analysis of NPCI data; Ministry of Finance/PIB press releases.

Suggested Figure 1: Column chart depicting annual UPI transaction volume growth, FY2021-22 to FY2024-25.

Interpretation: Transaction volumes roughly quadrupled between FY2021-22 and FY2024-25. While YoY growth rates have moderated as the base has grown, absolute volumes continued to expand sharply, consistent with faster, less friction-heavy onboarding as e-KYC and AI-assisted verification have scaled across banks and payment apps.

7. Hypothesis

H0 (Null Hypothesis): The diffusion of AI-driven KYC verification is not associated with improved customer onboarding efficiency indicators in digital payment platforms.

H1 (Alternative Hypothesis): The diffusion of AI-driven KYC verification is associated with improved customer onboarding efficiency indicators in digital payment platforms.

8. Comparative Analysis of Secondary Indicators

Table 3 juxtaposes the RBI-DPI consumer-centricity trend with UPI volume growth over the same broad period to assess directional association, since a formal chi-square test requires individual-level categorical data that is not available from these aggregate published sources.

Table 3: Directional Comparison of RBI-DPI Growth and UPI Volume Growth

Indicator	Approx. Growth (FY2021-22 to FY2024-25)	Direction
RBI-DPI (Sept 2022-Sept 2024 window)	~23%	Upward
UPI Annual Transaction Volume	~304% (46bn to 186bn)	Upward

Interpretation: Both indicators moved in the same upward direction over the review period, which is consistent with — though does not on its own statistically prove — the hypothesis that improvements in digital identity-verification infrastructure, including AI-assisted e-KYC, coincide with higher onboarding throughput on digital payment platforms. Establishing a formally tested statistical association (e.g., via regression or a chi-square test on disaggregated data) would require platform-level onboarding-time and verification-

method data that is not publicly published at the individual transaction level; this is noted as a limitation in Section 9.

9. Discussion

The secondary data examined in this study are broadly consistent with the literature reviewed in Section 2, which indicates that AI-driven KYC verification improves onboarding speed and fraud detection relative to manual, document-based processes (Parate et al., 2023; Kumar et al., 2023). The near-quadrupling of UPI transaction volumes between FY2021-22 and FY2024-25, alongside a sustained rise in the RBI-DPI, corroborates the view that faster, technology-enabled onboarding has supported the scale-up of India's digital payments ecosystem.

At the same time, this directional association should be interpreted cautiously. The growth in both indicators reflects the combined effect of several factors beyond AI-driven KYC alone, including expanding smartphone and internet penetration, merchant acceptance infrastructure, and government-led awareness campaigns (Government of India, 2023). The literature's concerns regarding trust and data-privacy in AI-based verification (Ghaffari et al., 2021; Soundenkar et al., 2024) are not directly testable using these aggregate indicators, since the RBI-DPI's consumer-centricity component is published only as a composite sub-index rather than disaggregated by complaint type or verification method.

This constitutes an important limitation of the secondary-data approach adopted here: while national-level trends support the broad direction of H1, a definitive test of the relationship between AI-driven KYC specifically (as distinct from e-KYC or digital payments generally) and onboarding efficiency would require platform-level data — for example, average onboarding completion time before and after AI-based verification adoption, disaggregated fraud/complaint rates, or vendor-reported verification accuracy — which individual payment platforms do not currently publish.

10. Findings

1. The RBI Digital Payments Index rose from 377.46 (September 2022) to 465.33 (September 2024), an increase of approximately 23%.
2. Annual UPI transaction volume grew from 46 billion (FY2021-22) to 186 billion (FY2024-25), a roughly four-fold increase.

3. Year-on-year UPI volume growth, while still strongly positive, moderated from 82.6% (FY2022-23) to 42.0% (FY2024-25) as the transaction base expanded.
4. Both the RBI-DPI and UPI volume trends moved in the same upward direction over the review period, consistent with the broad direction of H1.
5. The consumer-centricity component of the RBI-DPI, which captures awareness, complaints, frauds, and downtime, is published only as an aggregate figure and cannot be isolated to verification-method-specific outcomes using publicly available data.
6. The literature consistently attributes onboarding-time reductions specifically to AI-enabled components of e-KYC, such as OCR, facial-recognition liveness checks, and automated risk scoring (Parate et al., 2023; Kumar et al., 2023).
7. Multiple studies identify customer trust and data-privacy perception as comparatively weaker dimensions of AI-driven verification relative to speed and convenience (Ghaffari et al., 2021; Soundenkar et al., 2024).
8. Regulatory developments, including RBI's video-based and Aadhaar-based e-KYC provisions, have progressively expanded the legal basis for AI-assisted remote verification.
9. No publicly available disaggregated dataset currently permits a formal chi-square or regression test isolating AI-driven KYC's effect from other drivers of onboarding-efficiency growth.
10. The overall secondary-data trend is directionally supportive of, but not a statistically definitive test of, the hypothesis that AI-driven KYC verification improves onboarding efficiency.

11. Suggestions

- Continuously improve AI algorithms used in document and biometric verification to reduce false rejections and false acceptances.
- Enhance cybersecurity infrastructure protecting biometric and identity data collected during onboarding.
- Increase customer awareness campaigns explaining how AI-driven KYC works and how data is protected.

- Strengthen data privacy safeguards and ensure clear, accessible consent mechanisms.
- Accelerate e-KYC implementation across smaller and regional digital payment platforms.
- Establish stronger AI governance frameworks, including bias audits of verification models.
- Introduce continuous monitoring of AI-KYC system performance rather than one-time validation.
- Ensure ongoing regulatory compliance with RBI's KYC master direction and related guidelines.
- Provide employee training on AI-KYC exception handling and escalation procedures.
- Plan for future integration of emerging AI capabilities such as agentic AI and decentralised identity verification.

12. Conclusion

This study set out to examine the impact of AI-driven KYC verification on customer onboarding efficiency in digital payment platforms, guided by four specific objectives: understanding implementation patterns, assessing impact on onboarding efficiency, analysing benefits and challenges, and situating these within India's broader digital-payments trajectory. Drawing on secondary data from the RBI Digital Payments Index and NPCI's UPI transaction statistics, alongside peer-reviewed and industry literature, the study finds that the period of most rapid AI-assisted e-KYC adoption has coincided with a roughly 23% rise in the RBI-DPI and a near four-fold increase in annual UPI transaction volumes between FY2021-22 and FY2024-25.

The literature reviewed indicates that AI-driven KYC systems, combining OCR, biometric matching, and machine learning-based risk scoring, meaningfully reduce onboarding time and strengthen fraud detection relative to manual, paper-based verification, while also introducing new considerations around algorithmic accuracy, data privacy, and customer trust (Ghaffari et al., 2021; Soundenkar et al., 2024). The secondary-data trends examined here are directionally consistent with this literature, though, as discussed in Section 9, aggregate published statistics cannot isolate the specific contribution of AI-driven verification from other concurrent drivers of digital-payments growth.

In conclusion, AI-driven KYC verification appears to be an important enabler of onboarding efficiency and ecosystem-level growth in India's digital payments landscape. Realising its full potential will require continued attention to data privacy, algorithmic transparency, and customer trust alongside further gains in speed and automation. Future research combining platform-level operational data (e.g., onboarding completion times, verification-method-specific fraud rates) with the national-level trends presented here would allow for a more statistically definitive test of the relationships proposed in this study.

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