

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

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Abstract - Digital payment platforms have witnessed rapid growth over the past decade, and customer onboarding has emerged as a critical determinant of user acquisition and retention. Know Your Customer (KYC) verification, a mandatory regulatory requirement, has traditionally been a slow, manual, and error-prone process. The emergence of Artificial Intelligence (AI) technologies such as optical character recognition, facial recognition, liveness detection, and machine learning has transformed KYC verification into a fast, accurate, and secure process. This study examines the impact of AI-driven KYC verification on customer onboarding efficiency in digital payment platforms. The objective of the study is to analyze how AI-based verification affects onboarding speed, accuracy, security, and customer experience, while also identifying the associated challenges. The study adopts a descriptive research design based entirely on secondary data collected from academic journals, industry reports, and regulatory publications. The findings reveal that AI-driven KYC substantially reduces onboarding time, improves document verification accuracy, strengthens fraud detection, and enhances overall customer satisfaction, although concerns relating to data privacy and algorithmic bias remain. The study concludes that AI-driven KYC verification is a critical enabler of efficient and secure customer onboarding, and its continued refinement will play a decisive role in the future of digital identity verification within the financial services sector.

Keywords: Artificial Intelligence, KYC Verification, Customer Onboarding, FinTech, Digital Payments, Fraud Detection

1. INTRODUCTION

The financial services industry has undergone a significant transformation with the growing adoption of digital technologies. Digital payment platforms now allow consumers to transfer funds, pay bills, recharge mobile connections, and access financial products instantly through smartphones. This transformation has been driven by increasing internet penetration, smartphone adoption, and supportive government initiatives promoting cashless transactions. As digital payment platforms compete for market share, the process through which a new customer joins the platform, commonly referred to as customer onboarding, has become a key differentiator. Customer onboarding is the first interaction a user has with a digital platform, and its efficiency directly influences user satisfaction, trust, and long-term retention. A lengthy or cumbersome onboarding process often leads to high drop-off

rates, where prospective customers abandon registration midway. One of the most important, and often most time-consuming, steps in onboarding is Know Your Customer (KYC) verification, a regulatory requirement designed to prevent fraud, money laundering, and identity theft.

Artificial Intelligence has emerged as a transformative force in financial services, enabling automation of repetitive tasks, enhancing fraud detection, and personalizing customer experiences. Within the domain of KYC verification, AI technologies such as optical character recognition (OCR), facial recognition, liveness detection, and machine learning algorithms have replaced or supplemented traditional manual verification methods. These technologies allow digital payment platforms to verify customer identities within minutes rather than hours or days, while simultaneously improving accuracy and reducing the risk of fraudulent onboarding.

Despite the widespread adoption of AI in KYC processes, there remains limited academic research that specifically examines the relationship between AI-driven KYC verification and customer onboarding efficiency in the context of digital payment platforms. This study aims to bridge that gap by reviewing existing literature, analyzing available industry data, and presenting a structured discussion of the benefits, challenges, and future directions of AI-driven KYC verification. The findings of this study are expected to be useful to FinTech companies, policymakers, regulators, and academic researchers seeking to understand the evolving landscape of digital identity verification.

1. CONCEPTUAL BACKGROUND

1.1 Financial Technology (FinTech)

Financial Technology, commonly known as FinTech, refers to the use of technology to design and deliver financial services in a more efficient, accessible, and customer-friendly manner. The FinTech ecosystem encompasses digital payments, online lending, insurance technology, wealth management, and digital identity verification. Over the past decade, FinTech has evolved from simple online banking portals to sophisticated, AI-powered platforms capable of delivering personalized financial services in real time. The digital payment ecosystem, in particular, has expanded rapidly due to increased smartphone penetration, affordable internet access, and supportive regulatory frameworks promoting financial inclusion.

1.2 Artificial Intelligence in FinTech

Artificial Intelligence refers to computer systems capable of performing tasks that typically require human intelligence, such as pattern recognition, decision-making, and natural language understanding. In the FinTech sector, AI is applied across multiple functions, including fraud detection, credit scoring, customer service chatbots, algorithmic trading, and identity verification. The primary benefits of AI in financial services include increased operational efficiency, reduced human error, enhanced security, faster processing times, and the ability to analyze large volumes of data to detect anomalies and irregular patterns that may indicate fraudulent activity.

1.3 Know Your Customer (KYC)

Know Your Customer (KYC) refers to the regulatory and procedural framework through which financial institutions verify the identity of their customers before providing services. KYC is a mandatory requirement enforced by financial regulators to prevent money laundering, terrorist financing, and identity fraud. Traditional KYC processes involved manual submission and verification of physical documents, such as identity proofs and address proofs, which were then cross-checked by human agents. This traditional approach, while effective to a certain extent, was time-consuming, resource-intensive, and prone to human error, often resulting in delayed onboarding and a poor customer experience.

1.1 AI-Driven KYC Verification

AI-driven KYC verification integrates multiple advanced technologies to automate and enhance the identity verification process. Optical Character Recognition (OCR) enables the automatic extraction of information from identity documents, eliminating the need for manual data entry. Facial recognition technology compares a customer's live image with the photograph on their submitted identity document to confirm identity. Liveness detection ensures that the person undergoing verification is physically present and not using a photograph, video, or mask to spoof the system. Machine learning algorithms continuously analyze verification data to detect patterns associated with fraudulent behavior, thereby improving fraud detection capability over time. Collectively, these technologies enable a faster, more accurate, and more secure KYC verification process.

1.2 Customer Onboarding Efficiency

Customer onboarding efficiency refers to the speed, accuracy, and overall ease with which a new customer can complete the registration process on a digital platform. Efficient onboarding is characterized by minimal documentation requirements, quick verification turnaround times, and a seamless user interface. Factors affecting onboarding efficiency include the quality of the verification technology employed, the clarity of instructions provided to the customer, network connectivity, and the platform's ability to handle exceptions or errors without requiring extensive manual intervention. Improving onboarding efficiency is directly linked to higher customer acquisition rates and reduced abandonment during registration.

2. REVIEW OF LITERATURE

Agarwal and Sinha (2021) examined the broader application of artificial intelligence in financial services and found that AI adoption significantly improved operational efficiency and customer service quality across banking and FinTech institutions, while also highlighting the need for robust governance frameworks to manage associated risks.

Chatterjee (2021) reviewed machine learning-based approaches to digital identity verification and concluded that machine learning models substantially outperform rule-based verification systems in terms of both speed and accuracy, particularly when handling large volumes of onboarding requests.

Jain and Verma (2021) studied the application of optical character recognition in document verification and found that OCR technology reduced manual data entry errors considerably, while also decreasing the average time required to process identity documents during onboarding.

Rao (2021) provided a regulatory and technological perspective on the evolution of FinTech in India and noted that regulatory support for digital KYC, including video-based KYC guidelines, played a crucial role in enabling the widespread adoption of AI-based verification methods.

Bansal and Kaur (2022) analyzed the impact of AI-based KYC verification on customer onboarding in FinTech firms and reported a significant reduction in onboarding time along with improved customer satisfaction scores, although they noted persistent concerns regarding data security.

Gupta (2022) explored the use of facial recognition technology in financial services and highlighted its effectiveness in preventing identity fraud, while also raising ethical concerns related to consent, data storage, and potential bias in facial recognition algorithms.

Patel and Desai (2022) investigated liveness detection techniques used in biometric authentication systems and found that combining liveness detection with facial recognition considerably reduced the incidence of spoofing attempts during remote onboarding.

Mehta (2022) reviewed regulatory perspectives on KYC compliance and observed that automation of KYC processes assisted financial institutions in more consistently meeting regulatory reporting and compliance requirements compared to manual processes.

Kumar and Sharma (2023) studied fraud detection mechanisms powered by artificial intelligence in digital payment systems and found that machine learning-based fraud detection systems identified suspicious

onboarding attempts with considerably higher accuracy than traditional rule-based systems.

Singh and Bhatt (2023) examined data privacy and algorithmic bias concerns in AI-based financial services and cautioned that without adequate transparency and fairness measures, AI-driven verification systems could inadvertently disadvantage certain customer groups.

Das and Roy (2023) analyzed customer onboarding efficiency in digital payment platforms and found that automation of

verification steps was the single most influential factor in reducing overall onboarding time and improving customer retention during the registration phase.

Sharma and Singh (2024) conducted a systematic review of machine learning applications in customer onboarding and concluded that continuous model retraining was essential to maintain high verification accuracy as fraud patterns evolved over time.

Research Gap

The reviewed literature demonstrates extensive research on individual components of AI-driven KYC, such as facial recognition, OCR, and fraud detection, as well as broader studies on FinTech adoption and regulatory compliance. However, there is a noticeable lack of studies that specifically and comprehensively examine the combined impact of AI-driven KYC verification on customer onboarding efficiency within digital payment platforms as an integrated process. Most existing studies focus on individual technologies in isolation or on general FinTech adoption trends, rather than on the specific relationship between AI-based verification systems and measurable onboarding outcomes. This study attempts to address this gap by providing an integrated analysis of AI-driven KYC verification and its overall impact on customer onboarding efficiency.

1. OBJECTIVES OF THE STUDY

- To examine AI-driven KYC verification in digital payment platforms.
- To analyze its impact on customer onboarding efficiency.
- To evaluate customer perceptions regarding verification speed, accuracy, and security.
- To identify challenges in AI-based verification processes.
- To suggest improvements for digital onboarding systems.

2. RESEARCH METHODOLOGY

Research Design

The study adopts a descriptive research design, aimed at systematically describing the impact of AI-driven KYC verification on customer onboarding efficiency based on existing knowledge and secondary evidence.

Data Source

The study relies entirely on secondary data collected from peer-reviewed academic journals, research articles, industry and FinTech reports, publications by the Reserve Bank of India (RBI), and reports published by the National Payments Corporation of India (NPCI).

Tools Used

The study employs literature review analysis, comparative analysis of traditional versus AI-driven KYC processes, and conceptual analysis to synthesize findings from the reviewed sources.

Scope of the Study

The scope of this study is limited to digital payment platforms operating in the financial services sector, with a specific focus on the KYC verification stage of customer onboarding. The study does not examine platform-specific implementations but instead presents a generalized analysis applicable across digital payment platforms.

Limitations of the Study

As the study is based entirely on secondary data, it does not include primary data collection through surveys or interviews. Statistical figures presented are indicative estimates derived from secondary sources and general industry trends, and may vary across individual platforms and time periods. The findings are therefore conceptual and descriptive in nature rather than based on original empirical measurement.

3. FINDINGS AND DISCUSSION

The reviewed literature and secondary industry data provide consistent evidence that AI-driven KYC verification meaningfully improves customer onboarding efficiency in digital payment platforms. Table 1 presents a comparative overview of key verification parameters under traditional manual KYC processes versus AI-driven KYC processes, while Table 2 presents the indicative trend in adoption of AI-based KYC verification over recent years.

Table 1: Comparative Statistics of Traditional KYC vs.

Verification Parameter	Traditional (Manual) KYC
Average Onboarding Time	18 - 25 minutes
Document Verification Accuracy	82 - 87%
Fraudulent Application Detection Rate	60 - 65%
Manual Intervention (per 100 cases)	70 - 80 cases
Customer Drop-off During Onboarding	20 - 30%
Average Cost per Verification	High (labour-intensive)
Customer Satisfaction Score (out of 5)	3.2

AI-Driven KYC Verification in Digital Payment Platforms

Table 2: Indicative Trend in Adoption of AI-Based KYC Verification Among Digital Payment Platforms (2021-2026)

Year	Est. % of Platforms Using AI-Based KYC	Approx. Onboarding Volume (Million Users, Indicative)
2021	~25%	~10 million
2022	~35%	~15 million
2023	~45%	~20 million
2024	~55%	~25 million
2025	~65%	~30 million
2026	~75%	~35 million

2023	68%	3	65
5 - 8%	~70% reduction		
2024	79%	4	30
2025 (est.)	~85%	5	15
2026 (est.)	93%	5	60

Source: Compiled by the author based on industry reports (RBI, NPCI, FinTech industry publications, 2022-2026) and reviewed literature.

AI significantly reduces onboarding time

As shown in Table 1, the average onboarding time reduces substantially when AI-driven verification replaces manual processes, primarily because document reading, cross-verification, and identity matching are automated rather than performed manually.

OCR improves document processing speed

Optical character recognition eliminates the need for manual data entry from identity documents, allowing customer information to be extracted and validated within seconds, thereby accelerating the overall verification workflow.

Facial recognition enhances identity verification

Facial recognition technology enables real-time comparison between a customer's live image and their submitted identification document, significantly improving the reliability of identity confirmation compared to manual visual checks.

AI reduces manual intervention

As indicated in Table 1, the number of cases requiring manual review decreases considerably with AI-driven verification, allowing human agents to focus only on genuinely ambiguous or exception cases rather than routine verifications.

Fraud detection capability increases security

Machine learning algorithms are capable of identifying subtle patterns associated with fraudulent applications, such as document tampering or repeated use of the same identity across

multiple accounts, thereby strengthening the overall security of the onboarding process.

Customer experience improves through faster onboarding

Faster and smoother onboarding directly translates into improved customer satisfaction, as reflected in the higher satisfaction scores associated with AI-driven verification shown in Table 1, and contributes to lower customer drop-off during registration.

Data privacy and algorithm bias remain concerns

Despite the benefits, the literature consistently highlights concerns regarding the storage and handling of sensitive biometric and personal data, as well as the potential for algorithmic bias in facial recognition and machine learning models, which may disproportionately affect certain groups of customers.

Regulatory compliance becomes easier through automation

Automated KYC systems generate consistent, traceable digital records of the verification process, which simplifies regulatory reporting and audit requirements compared to manual, paper-based verification records.

SUGGESTIONS

- Improve OCR accuracy through continuous algorithm refinement and support for diverse document formats.
- Enhance image quality detection mechanisms to minimize verification failures caused by poor lighting or blurred images.
- Strengthen cybersecurity measures to protect sensitive biometric and personal data from breaches.
- Develop transparent and explainable AI decision systems to build customer trust in automated verification outcomes.
- Conduct regular model retraining to keep pace with evolving fraud patterns and techniques.
- Maintain human review mechanisms for exception handling in ambiguous or borderline verification cases.
- Launch customer awareness programs to educate users on the benefits and safe use of AI-driven verification systems.

- Strengthen regulatory compliance frameworks to ensure responsible and fair use of AI in KYC verification.

CONCLUSION

AI-driven KYC verification has emerged as a foundational component of efficient and secure customer onboarding in digital payment platforms. By replacing slow, manual, and error-prone verification processes with automated technologies such as OCR, facial recognition, liveness detection, and machine learning, digital payment platforms have been able to significantly reduce onboarding time, improve verification accuracy, and enhance fraud detection capabilities.

The findings of this study indicate that while AI-driven KYC verification offers substantial benefits in terms of speed, accuracy, and customer satisfaction, certain challenges, particularly relating to data privacy and algorithmic bias, must be addressed to ensure the responsible and equitable use of these technologies. Digital payment platforms must therefore balance the pursuit of efficiency with strong data protection practices and transparent AI governance.

Looking ahead, the continued evolution of AI technologies is expected to further enhance the accuracy, speed, and security of digital identity verification. As regulatory frameworks continue to adapt to technological advancements, AI-driven KYC verification is likely to become even more integral to customer onboarding processes, playing a decisive role in shaping the future of financial inclusion and digital identity verification across the FinTech sector.

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