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Artificial Intelligence Adoption in India's Digital Payment Platforms: A Comparative Study of PhonePe, Paytm, and Razorpay

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Abstract - India's digital payments sector has expanded rapidly over the past decade, and Artificial Intelligence has become central to how payment platforms manage risk, personalize services, and scale operations. This paper undertakes a comparative review of AI adoption across three prominent Indian FinTech platforms — PhonePe, Paytm, and Razorpay — examining how each employs AI-driven tools for fraud detection, customer service, transaction optimization, and personalized recommendations. Drawing entirely on secondary sources, including company disclosures, industry and regulatory reports, and published academic literature, the study evaluates the three platforms along four dimensions: customer experience, operational efficiency, risk and fraud management, and contribution to financial inclusion. The analysis finds that while all three platforms deploy AI to strengthen transaction security and improve user experience, their emphasis differs — PhonePe and Paytm focus more heavily on consumer-facing personalization and engagement, whereas Razorpay's AI applications are more concentrated on merchant-side risk assessment and payment optimization. The paper consolidates these findings into a comparative framework intended to clarify current AI practices, highlight gaps, and identify areas for future research within India's FinTech industry. The study is expected to be useful to researchers, industry practitioners, and policymakers seeking a clearer picture of how AI is reshaping India's digital payment landscape.

Keywords: Artificial Intelligence, FinTech, Digital Payments, Comparative Study, Financial Inclusion.

1. INTRODUCTION

1.1 Problem statement

India's digital payment ecosystem now processes hundreds of millions of transactions every day, which puts heavy pressure on providers to detect fraud quickly, resolve customer queries and keep payments reliable.

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Artificial Intelligence (AI) is widely presented as the answer, yet the leading platforms do not occupy the same position. PhonePe and Paytm serve consumers and merchants, while Razorpay mainly serves businesses that accept payments online. Public information about how each platform uses AI is scattered across annual reports, company blogs and regulatory documents, and it is rarely compared on common terms. Students, practitioners and policymakers therefore find it hard to tell what AI use the companies actually describe, where it is only assumed, and whether it improves customer experience, efficiency, security and inclusion. This paper asks: how do PhonePe, Paytm and Razorpay apply AI across their operations, and how strong is the public evidence for each application?

1.2 Research gap

Existing studies mostly examine a single firm or a single application area, such as fraud detection (Ali et al., 2022; Hilal et al., 2022), or discuss AI in finance in general terms (Cao, 2022). Studies on India's digital payments focus largely on consumer adoption (Sivathanu, 2019). Few compare how competing Indian payment platforms apply AI across several operational areas, and fewer separate what companies themselves document from what is merely assumed for the sector. This study addresses that gap through an evidence-coded, side-by-side comparison of the three platforms.

1.3 Research objectives

1. To understand the scale of India's digital payment ecosystem and why it creates a need for AI-based risk and service tools.
2. To compare PhonePe, Paytm and Razorpay on the AI use they describe publicly for risk and fraud management, customer experience and operational efficiency.
3. To assess what the public evidence shows about the contribution of AI to financial inclusion and where evidence gaps remain.
4. To suggest measures for responsible AI adoption and directions for future research.

2. REVIEW OF LITERATURE (ROL)

2.1 Review of literature

Financial Fraud Detection Based on Machine Learning: A Systematic Literature Review (2022)

Ali and colleagues reviewed machine-learning studies on financial fraud using a structured systematic protocol. They found that support vector machines and artificial neural networks were popular techniques and that credit card fraud was the most studied fraud type. The review also reports gaps and limitations, which shows that fraud models need careful evaluation before they can be relied on in payments.

Financial Fraud: A Review of Anomaly Detection Techniques and Recent Advances (2022)

Hilal, Gadsden and Yawney reviewed anomaly-detection techniques used to identify financial fraud and discussed recent advances and the challenges that remain. Their work supports the idea that fraud detection

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rests on spotting unusual behaviour in large volumes of transaction data, which is the logic behind the risk engines that payment platforms describe.

AI in Finance: Challenges, Techniques and Opportunities (2022)

Cao offers a broad roadmap of AI research in finance, covering the challenges of financial businesses and data, the techniques used, and future opportunities, and comparing classic and modern AI methods. The breadth of AI use in finance indicates that single-application studies capture only part of the picture, which supports a comparison across several operational areas.

Adoption of Digital Payment Systems in the Era of Demonetization in India: An Empirical Study (2019)

Sivathanu examined how consumers actually used digital payment systems during India's demonetization period, using UTAUT2 and innovation resistance theory. The results show that behavioural intention and innovation resistance affect usage, and that stickiness to cash moderates the relationship. Adoption therefore depends on user comfort and trust, which is where AI-enabled security and service features matter.

Impact of Digital Finance on Financial Inclusion and Stability (2018)

Ozili discusses how digital finance and financial inclusion benefit service users, providers, governments and the economy, while noting that several issues persist and must be addressed for digital finance to work better. The paper is relevant here because any claim that AI improves inclusion on payment platforms needs to be tested against these wider issues.

2.2 Significance of the study

For researchers, the study offers a transparent, evidence-coded comparison that can be extended with primary data. For payment companies, it shows which AI applications peers publicly document and where disclosure is thin. For regulators and policymakers, it highlights why comparable, privacy-preserving reporting on AI outcomes such as false declines, complaint resolution and inclusion would support better oversight. For students, it demonstrates how a comparative study can be built entirely from credible secondary sources.

3. RESEARCH METHODOLOGY

3.1 Research design

The study follows a descriptive and comparative research design based entirely on secondary data. It is a structured review rather than a survey or experiment, and no primary data were collected from customers, merchants or company staff. The three platforms were chosen because they represent two consumer-facing UPI applications with merchant services (PhonePe and Paytm) and one merchant-focused payment gateway (Razorpay).

3.2 Sources of data

Four types of secondary sources were used: (i) company disclosures, namely Paytm's Annual Report 2024–25, PhonePe's Trust & Safety articles of 2025, and Razorpay's product articles; (ii) regulatory material,

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namely the Reserve Bank of India's 2024 Master Directions on cyber resilience and digital payment security controls; (iii) published statistics on UPI volumes and app-wise market share; and (iv) peer-reviewed academic literature reviewed in Section 2. Company evidence was checked up to 10 October 2026.

3.3 Data analysis tools

- Descriptive statistics and Compound Annual Growth Rate (CAGR) to measure growth in UPI transaction volume.
- Percentage share analysis to understand the market position of consumer UPI applications.
- Content analysis of company disclosures, listing the AI applications each company describes and counting them by area.
- Comparison tables and frequency counts to compare platforms by risk and security, customer service and merchant operations.
- Graphical presentation using labelled charts and diagrams that show the values and the applications directly.

3.4 Limitations of the study

- The study relies only on secondary data and has no access to confidential company data or internal models.
- Company disclosures are self-reported and may stress positive developments; effectiveness claims could not be independently verified.
- If a company does not describe an AI application publicly, the study cannot say whether it exists; silence in the sources is not proof of absence.
- Only three platforms are covered, so the findings do not represent the whole Indian FinTech industry.
- The sector changes quickly, so the findings reflect the sources available up to 10 October 2026.

3.5 Scope of the study

The study is limited to India and to the platforms PhonePe, Paytm and Razorpay. UPI statistics cover FY2021–22 to FY2025–26 and the latest month, September 2026, with app-wise market share for August 2026, the latest month published when the study was completed. The comparison covers four dimensions: customer experience, operational efficiency, risk and fraud management, and financial inclusion. The study does not test the technical performance of any AI model and does not rank the platforms by AI maturity.

4. DATA ANALYSIS AND INTERPRETATION

The analysis follows the research objectives. Each part starts with what is being checked, then shows a table or chart built from the secondary sources named below it, and ends with one interpretation.

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4.1 Growth of UPI payments (Objective 1)

This part checks how fast UPI has grown up to the latest month for which data were available, September 2026, because more transactions mean a greater need for automated fraud checks and customer support.

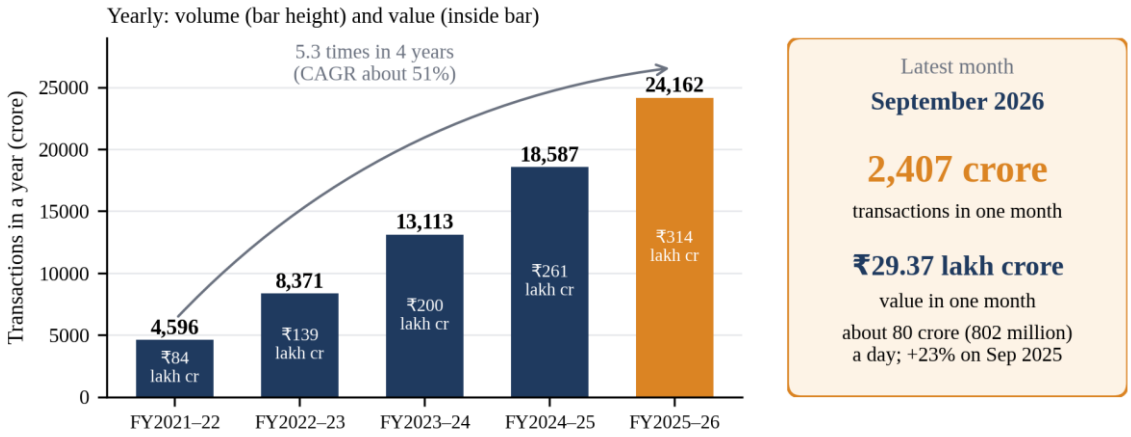


Fig. 1 UPI transaction volume and value, FY2021–22 to FY2025–26, and the latest month (September 2026). Source: Ministry of Finance data as reported by Outlook Money (2026); September 2026 data from NPCI as reported by DD India (2026); CAGR calculated by the author.

Interpretation: The diagram has two parts. The bars on the left show UPI volume for five financial years, with the value written inside each bar, and the box on the right shows the latest month. Volume rose from 4,596 crore in FY2021–22 to 24,162 crore in FY2025–26, about 5.3 times in four years (CAGR of roughly 51%), while value rose from ₹84.16 lakh crore to ₹314.23 lakh crore (Outlook Money, 2026). In September 2026 alone, UPI processed 2,407 crore transactions worth ₹29.37 lakh crore, an average of about 802 million transactions a day and 23% more than in September 2025 (DD India, 2026). At this scale, checking payments manually is not realistic, which explains why platforms stress automated risk scoring and service tools.

4.2 Size of the platforms among UPI apps (Objectives 1 and 2)

This part shows where PhonePe and Paytm stand among UPI apps in August 2026, the latest month for which NPCI's app-wise data had been published when this study was completed (the September breakup was not yet available). Google Pay is not part of this study, so it is not shown separately. Razorpay serves businesses that accept payments rather than consumers who send UPI payments, so it has no share in this split; the diagram says so explicitly.

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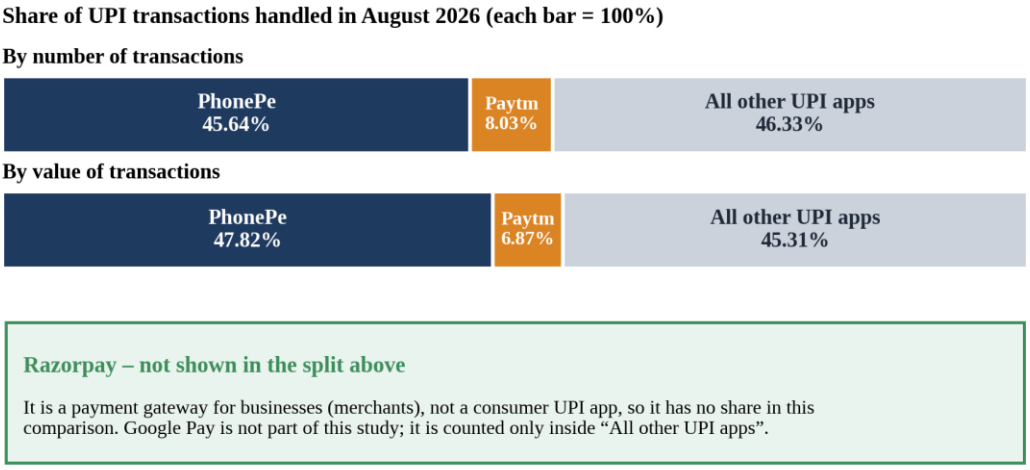


Fig. 2 Share of UPI transactions handled by PhonePe, Paytm and all other apps, August 2026. Source: NPCI app-wise data as reported by Entrackr (2026); "All other UPI apps" is the remainder, calculated by the author.

Interpretation: The diagram divides the UPI transactions of August 2026 into PhonePe, Paytm and all other apps. PhonePe handled 45.64% of transactions by number and 47.82% by value, while Paytm handled 8.03% by number and 6.87% by value; the remaining 46.33% by number and 45.31% by value went to all other UPI apps (Entrackr, 2026). PhonePe is therefore about 5.7 times as large as Paytm by number of transactions. Razorpay cannot be placed on this scale because it is a payment gateway for businesses, not a consumer UPI app. Size says little about how advanced a platform's AI is, so the platforms are compared in the next parts by the AI applications they describe rather than by market share.

4.3 AI applications described by each platform (Objective 2)

This part lists the AI applications that each company describes in its own annual report or published articles (Table 1) and shows them as blocks (Fig. 3), so that the applications themselves can be read directly from the diagram.

Table 1 AI applications described by each company

Platform	AI applications described by the company	Number
PhonePe	Real-time fraud and risk detection; device and behavioural risk signals	2
Paytm	Fraud and risk detection; conversational AI support agents; merchant analytics and segmentation	3
Razorpay	Fraud and risk detection for merchants; machine-learning-based payment routing	2

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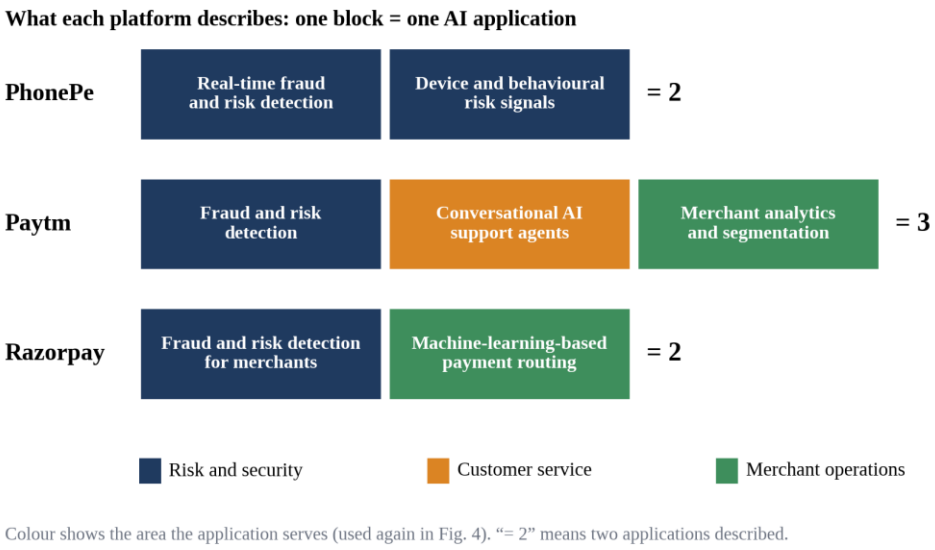


Fig. 3 AI applications described by each platform, one block per application. Source: One 97 Communications Limited (2025); PhonePe (2025a, 2025b); Razorpay (2023, n.d.-a, n.d.-b); counted by the author.

Interpretation: The diagram shows one block for each AI application a company describes, so the number of blocks is the count in Table 1. PhonePe has two blocks (real-time fraud and risk detection, and device and behavioural risk signals), Paytm has three (fraud and risk detection, conversational AI support agents, and merchant analytics and segmentation) and Razorpay has two (fraud and risk detection for merchants, and machine-learning-based payment routing). All three describe AI or machine learning for fraud and risk detection. The colours show the area each application serves, which is used in the next part. These counts only reflect what the companies say publicly and should not be read as a ranking of AI strength.

4.4 Where the platforms apply AI (Objective 2)

This part groups the same applications by the area they serve (Table 2). Basis of the counts: each application in Table 1 is placed in one area by what it does. Fraud, risk and device-signal applications go to risk and security, conversational support agents to customer service, and merchant analytics and payment routing to merchant operations. A number is the count of applications placed in that area, and 0 means that none is described in the sources reviewed, which is not proof that none exists.

Table 2 AI applications described, by area (number and the applications counted)

Area	PhonePe	Paytm	Razorpay
Risk and security	**2** – Real-time fraud and risk detection; device and behavioural risk signals	**1** – Fraud and risk detection	**1** – Fraud and risk detection for merchants
Customer service	**0** – None described	**1** – Conversational AI support agents	**0** – None described
Merchant operations	**0** – None described	**1** – Merchant analytics and segmentation	**1** – Machine-learning-based payment routing
Total	**2 applications**	**3 applications**	**2 applications**

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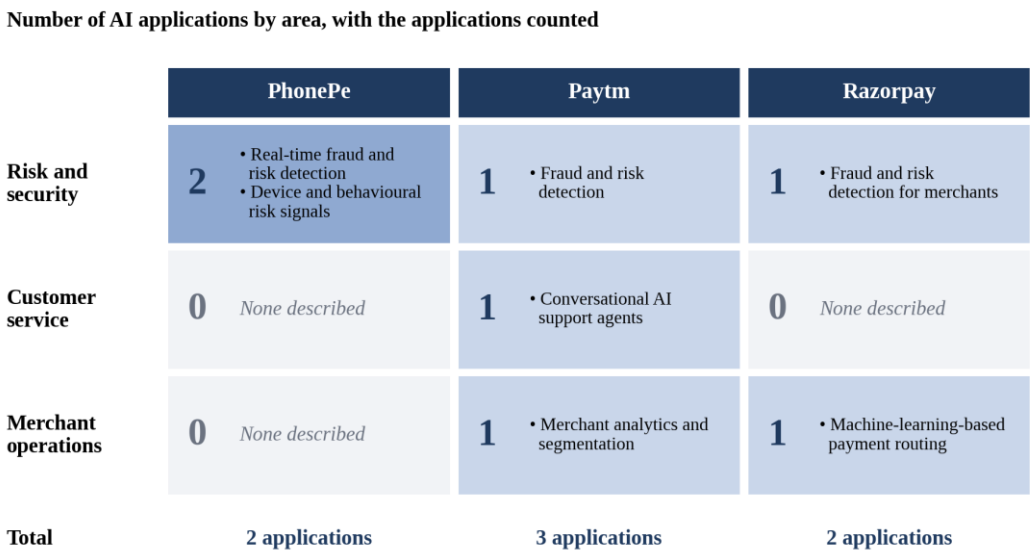


Fig. 4 Number of AI applications described by each platform in each area, with the applications counted. Source: author's grouping of the applications in Table 1.

Interpretation: The diagram shows each count together with the applications behind it. PhonePe's 2 in risk and security stands for two applications, real-time fraud and risk detection and device and behavioural risk signals, while its 0 in customer service and in merchant operations means that no such application is described in its sources. Paytm has one application in each area. Razorpay has one in risk and security (fraud and risk detection for merchants), none in customer service and one in merchant operations (payment routing). The totals of 2, 3 and 2 match Table 1. PhonePe's emphasis is therefore on protecting users, Paytm's is spread across all three areas, and Razorpay's leans to the merchant side, which fits their different business models.

4.5 AI across the four study dimensions (Objectives 2 and 3)

This part checks the four dimensions of the study by counting how many of the three platforms describe AI use in each (Table 3). Basis of the counts: an application counts towards a dimension by what it does. Fraud, risk and device-signal applications count towards risk and fraud management, merchant analytics and payment routing towards operational efficiency, and conversational support agents towards customer experience. Financial inclusion counts only if a company itself links an AI application to wider access for under-served users. Each platform is counted once per dimension, so a number is a count of platforms out of three, not of applications.

Table 3 Platforms describing AI use, by dimension, and the application behind each

Dimension	PhonePe	Paytm	Razorpay	Platforms describing AI use
Risk and fraud management	Fraud and risk detection; device and behavioural risk signals	Fraud and risk detection	Fraud and risk detection for merchants	**3 of 3**

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Dimension	PhonePe	Paytm	Razorpay	Platforms describing AI use
Operational efficiency	None described	Merchant analytics and segmentation	Machine-learning-based payment routing	**2 of 3**
Customer experience	None described	Conversational AI support agents	None described	**1 of 3**
Financial inclusion	None described	None described	None described	**0 of 3**

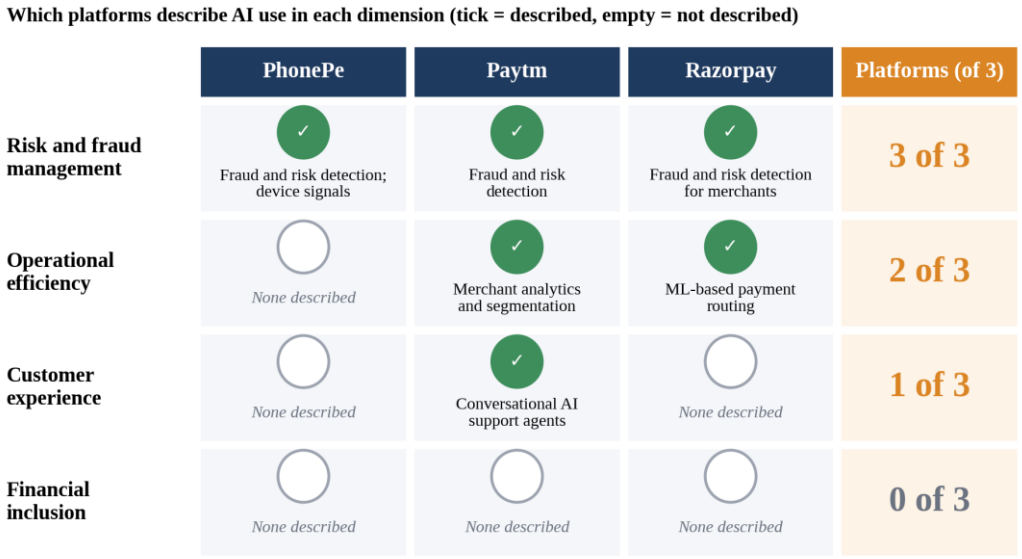


Fig. 5 Platforms describing AI use in each dimension, with the application behind each tick. Source: author's analysis of the sources reviewed.

Interpretation: The diagram marks each platform that describes AI use in a dimension with a tick and names the application behind it. All three platforms do so for risk and fraud management (PhonePe counts once even though it describes two applications there). Two do so for operational efficiency (Paytm through merchant analytics and segmentation, and Razorpay through payment routing), and one does so for customer experience (Paytm's conversational AI support agents). None describes an AI contribution to financial inclusion, so the 0 means that no platform's sources link AI to inclusion. None of the companies' sources reports results checked by an independent party. Gains in customer experience and inclusion therefore remain possible benefits rather than proven ones, which is consistent with Ozili's (2018) caution that digital finance brings benefits alongside issues that still need to be addressed.

5. FINDINGS, SUGGESTIONS AND CONCLUSION

5.1 Findings

1. UPI volume grew about 5.3 times between FY2021–22 and FY2025–26 (CAGR of roughly 51%) and reached 2,407 crore transactions in the single month of September 2026, creating strong pressure for automated risk and service tools.

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2. Fraud and risk detection is the one AI application described by all three platforms.
3. Beyond fraud, the emphasis the companies describe follows the business model: PhonePe stresses device and behavioural protection, Paytm spreads across risk, service and merchant analytics, and Razorpay concentrates on merchant risk and payment routing.
4. Public evidence is uneven. Paytm's annual report is the most explicit source, while PhonePe and Razorpay evidence comes mainly from company articles.
5. No platform provides independent outcome data, and none describes an AI-specific contribution to financial inclusion.
6. Market share does not indicate AI maturity, and Razorpay cannot be compared with consumer UPI apps on market share.

5.2 Suggestions

- Payment platforms should publish standard AI disclosures stating the use case, whether it is a pilot or live, the metric used and the baseline.
- Platforms should report false declines, complaint resolution time and fraud losses together, so that security gains are not achieved at the cost of customer friction.
- Human escalation should remain available for blocked transactions and disputes, and customers should be told when they are dealing with an automated agent.
- AI controls should be aligned with the RBI's cyber resilience and digital payment security directions (RBI, 2024), including monitoring and incident response.
- Multilingual and accessibility features should be tracked for small merchants and first-time users so that inclusion potential can be turned into measurable evidence.
- Researchers should extend this study with primary data such as merchant and user surveys and track company disclosures over several years.

5.3 Conclusion

AI is now part of how India's leading payment platforms manage risk, serve customers and support merchants, and the scale of UPI explains why. The comparison shows a shared focus on fraud and risk detection and different secondary emphases that follow each platform's business model. At the same time, public evidence is uneven and independent outcome data are missing, so claims about customer experience, efficiency and especially financial inclusion should be treated as potential benefits until measured. Responsible adoption therefore needs transparent disclosure, strong governance and outcome-based evaluation, and this study offers a framework for researchers, practitioners and policymakers to build on.

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