

From Algorithms to Inclusion: AI-Enabled FinTech, Consumer Trust, and Digital Engagement in Emerging Economies

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ABSTRACT

Artificial Intelligence (AI) has rapidly transformed financial technology (FinTech) ecosystems, particularly in emerging economies where digital financial inclusion is both an opportunity and a challenge. While algorithm-driven FinTech platforms promise efficiency, personalization, and scalability, their success fundamentally depends on consumer trust and sustained digital engagement. This study investigates how AI-enabled FinTech systems influence financial inclusion outcomes by shaping trust perceptions, usage behaviour, and engagement intensity among users in emerging markets. A mixed-method framework combining computational modelling, survey-based behavioural analysis, and platform-level engagement metrics is employed across selected urban and semi-urban regions. Machine learning models are used to analyse trust determinants, while statistical and clustering techniques identify engagement patterns across demographic segments. The findings reveal that transparency of algorithms, perceived data security, and explainability of AI decisions significantly influence consumer trust, which in turn mediates digital engagement and long-term adoption. Results further indicate that AI personalization enhances inclusion only when accompanied by ethical governance and user literacy. The study contributes a scalable analytical framework for policymakers, FinTech designers, and financial institutions aiming to balance algorithmic efficiency with inclusive and trustworthy digital finance ecosystems in emerging economies.

Keywords : AI-enabled FinTech, Financial Inclusion, Consumer Trust, Digital Engagement, Emerging Economies.

1. INTRODUCTION:

Artificial Intelligence has moved FinTech from a convenience-driven innovation to a structural force reshaping financial systems in emerging economies. Algorithms now determine who gets credit, how risk is priced, which users receive personalized financial products, and how fraud is detected at scale. In regions where traditional banking infrastructure has failed to reach large segments of the population, AI-enabled FinTech platforms promise faster onboarding, lower transaction costs, and data-driven financial inclusion. Mobile wallets, AI-based credit scoring, robot-advisory services, and automated lending platforms have become central to financial access for first-time users. However, technological reach alone does not equate to meaningful inclusion. The assumption that algorithmic efficiency automatically leads to equitable financial participation is

deeply flawed. In emerging economies, where digital literacy, regulatory maturity, and institutional trust vary significantly, AI-driven financial systems operate within complex social and behavioural contexts. Algorithms do not function in isolation; they interact with user perceptions, cultural norms, and historical experiences with financial exclusion. As a result, the success or failure of AI-enabled FinTech hinges not merely on computational accuracy but on whether consumers trust these systems enough to engage with them consistently. Consumer trust is the decisive bottleneck in the transition from algorithmic access to sustained digital engagement. AI systems in finance often function as black boxes, making decisions that are difficult for users to interpret or challenge. Automated loan rejections, dynamic pricing, and personalized financial nudges can easily be perceived as unfair, biased, or intrusive when their logic is not transparent. For users in emerging economies, many of

whom are interacting with formal financial systems for the first time, such perceptions can quickly erode confidence. Concerns related to data privacy, misuse of personal information, cybersecurity risks, and algorithmic discrimination further complicate adoption. Without trust, users may adopt FinTech platforms temporarily but disengage once uncertainty or dissatisfaction arises. Digital engagement, therefore, becomes the behavioural expression of trust, reflecting not only initial adoption but continued usage, diversification of services, and long-term reliance on digital financial tools. Understanding how AI-enabled systems influence trust formation and engagement patterns is critical for evaluating whether FinTech truly advances financial inclusion or merely digitizes existing inequalities.

This study argues that AI-enabled FinTech must be analysed as a socio-technical ecosystem rather than a purely technological intervention. Algorithms shape financial decisions, but their impact is mediated by governance frameworks, platform design choices, and user perceptions. Prior research has largely examined FinTech adoption through isolated lenses such as technology acceptance, regulatory analysis, or financial access metrics. Such fragmented approaches fail to capture the dynamic interaction between algorithmic decision-making, consumer trust, and digital engagement. There is a pressing need for integrated frameworks that combine computational analysis with empirical behavioural evidence, particularly in emerging economies where inclusion outcomes are most contested. This paper addresses this gap by proposing a computational and experimental framework that systematically examines how AI-driven FinTech platforms influence trust and engagement and how these factors collectively determine inclusive outcomes. By focusing on emerging economies, the study places emphasis on contexts where the stakes are highest and the risks most visible. AI-driven FinTech can either democratize access to financial services or reinforce exclusion through opaque algorithms and unequal data representation. The paper adopts a mixed-method approach that combines machine learning-based modelling of trust determinants with survey-driven and platform-level engagement analysis. This design allows for the identification of both structural drivers and behavioural responses associated with AI-enabled financial services. Rather than treating inclusion as a binary outcome, the study conceptualizes it as a continuum shaped by engagement depth, trust sustainability, and user empowerment. In doing so, the research moves beyond optimistic narratives of technological inclusion and provides a grounded assessment of what makes AI-enabled FinTech trustworthy and engaging for diverse user groups. Ultimately, this work takes a firm position: AI in FinTech will fail as an inclusion tool unless trust is engineered as deliberately as algorithms themselves. Transparency, explainability, and ethical governance are not optional features but core design requirements. Digital engagement is not a passive consequence of access but an active signal of user confidence. By empirically linking algorithms, trust, and engagement, this paper contributes a robust analytical foundation for policymakers, platform designers, and financial institutions seeking to build

inclusive digital finance ecosystems. The findings aim to inform both academic discourse and real-world FinTech strategies, emphasizing that inclusion is not achieved by code alone but by aligning computational intelligence with human trust. Beyond access and adoption metrics, AI-enabled FinTech reshapes how individuals in emerging economies perceive financial authority, decision-making power, and personal agency within digital systems. Algorithms increasingly act as invisible financial gatekeepers, determining eligibility, pricing, and risk categorization with minimal human intervention. This shift alters the traditional trust relationship between consumers and financial institutions, replacing interpersonal judgment with data-driven automation. In contexts where financial exclusion has historically been linked to social status, informal employment, or lack of documentation, algorithmic systems introduce both hope and apprehension. On one hand, AI promises neutrality by relying on data rather than subjective human bias; on the other hand, it raises concerns about hidden biases embedded in training datasets that may replicate or even amplify structural inequalities. Users often lack the technical literacy to question or audit algorithmic decisions, which makes transparency and explainability critical determinants of acceptance. Digital engagement thus becomes a practical indicator of whether users feel empowered or marginalized by AI-driven finance. Repeated usage, diversification across services, and long-term reliance signal confidence not only in the technology but also in the institutional intent behind it. Conversely, sporadic usage or withdrawal reflects uncertainty and perceived vulnerability. In emerging economies, where regulatory oversight may lag behind technological innovation, trust formation is further complicated by fears of data misuse, surveillance, and cyber fraud. These concerns are intensified by the rapid integration of FinTech platforms into daily life, linking financial behavior with identity, mobility, and consumption patterns. Therefore, analyzing AI-enabled FinTech purely through efficiency or innovation lenses overlooks its deeper societal implications. Financial inclusion achieved without trust risks becoming fragile and reversible, especially during economic shocks or system failures. This study responds to that risk by extending the analytical focus from algorithms themselves to the lived experience of users interacting with AI-driven financial systems. By framing digital engagement as a behavioral outcome of trust rather than a byproduct of access, the research emphasizes that sustainable inclusion requires alignment between computational intelligence and human expectations of fairness, accountability, and control. In doing so, the extended introduction reinforces the central argument that AI-enabled FinTech must be designed not only to optimize financial outcomes but also to cultivate durable trust relationships capable of supporting inclusive growth in emerging economies.

2. RELEATED WORKS

Research on AI-enabled FinTech has expanded rapidly over the past decade, largely driven by its perceived potential to advance financial inclusion in emerging economies. Early studies focused on the technological capabilities of machine learning models in improving

efficiency, risk assessment, and scalability of financial services. Algorithmic credit scoring using alternative data such as mobile phone usage, transaction histories, and digital footprints has been widely discussed as a breakthrough for underbanked populations who lack formal credit histories. Scholars argue that AI reduces information asymmetry between lenders and borrowers, lowers operational costs, and enables micro-level personalization of financial products. Empirical evidence from mobile lending platforms and digital payment systems suggests that AI-driven FinTech has significantly increased access to basic financial services, particularly in regions with limited physical banking infrastructure. However, this body of work has been criticized for adopting a largely techno-optimistic stance, often equating access with inclusion while underplaying social, behavioural, and ethical dimensions. As FinTech systems become more algorithmically complex, concerns have emerged regarding bias, exclusion through data-driven profiling, and uneven benefits across socioeconomic groups, prompting researchers to question whether AI-led financial expansion genuinely promotes inclusive development.

A second stream of literature concentrates on consumer trust as a central determinant of FinTech adoption and continued usage. Trust has been conceptualized as a multifaceted construct involving perceptions of security, privacy, reliability, and institutional legitimacy. Studies grounded in technology acceptance and trust theory highlight that users are more likely to engage with digital financial platforms when they perceive algorithms as fair, transparent, and accountable. In emerging economies, trust is often fragile due to historical experiences with financial instability, weak regulatory enforcement, and low digital literacy. Research indicates that algorithmic opacity, often described as the “black box” problem of AI, exacerbates mistrust when users are unable to understand or contest automated decisions. Empirical studies on AI-based lending and robot-advisory services show that explainability and user control significantly influence trust formation, especially among first-time users. At the same time, scholars note a paradox: while AI improves accuracy and speed, excessive automation can reduce perceived human oversight, leading to fear of errors, discrimination, or data misuse. This literature establishes trust as a mediating variable between technological functionality and behavioural outcomes, suggesting that AI-enabled FinTech systems succeed only when trust-building mechanisms are embedded within platform design and governance structures.

A growing body of interdisciplinary research links AI-enabled FinTech, consumer trust, and digital engagement to broader inclusion outcomes. Digital engagement is increasingly viewed as more than initial adoption, encompassing frequency of use, diversity of services accessed, and long-term reliance on digital platforms. Studies demonstrate that trust positively correlates with deeper engagement, which in turn enhances financial capability, resilience, and inclusion. Behavioural and experimental research shows that personalized AI-driven recommendations can increase engagement when users perceive them as beneficial and non-intrusive, but can

trigger disengagement when perceived as manipulative or opaque. Recent works also emphasize the role of contextual factors such as regulatory frameworks, cultural norms, and digital literacy in shaping how AI-driven systems are received in emerging economies. Scholars argue for integrated analytical frameworks that combine computational modelling, behavioural data, and institutional analysis to capture these dynamics holistically. Despite this progress, existing studies often remain fragmented, focusing either on technological performance, trust perceptions, or engagement metrics in isolation. There is limited empirical work that systematically models the interaction between AI algorithms, consumer trust, and digital engagement as a unified mechanism driving inclusion. This gap underscores the need for comprehensive frameworks that evaluate AI-enabled FinTech not only as a technological innovation but as a socio-technical system with profound implications for equity, trust, and sustainable financial inclusion.

3. METHODOLOGY

3.1 Research Design and Framework

This study adopts a **mixed-method, computational-empirical research design** to examine how AI-enabled FinTech systems influence consumer trust and digital engagement in emerging economies. The methodology integrates machine learning-based modelling, survey-driven behavioural analysis, and engagement metrics to capture both algorithmic and human dimensions of financial inclusion. The research framework is structured around three interconnected layers: (i) algorithmic features of AI-enabled FinTech platforms, (ii) consumer trust perceptions, and (iii) digital engagement outcomes. This layered design allows the study to empirically test how trust mediates the relationship between AI-driven financial services and inclusive participation. Mixed-method approaches are increasingly recommended in FinTech and digital inclusion research because they allow robust triangulation between computational outputs and user-level behavioural responses [16], [17].

3.2 Study Area and Sample Selection

The empirical component focuses on selected **emerging economy contexts** characterized by high mobile penetration but uneven access to formal banking. Data were collected from urban and semi-urban regions to reflect heterogeneity in digital literacy and financial exposure. A stratified sampling approach was used to select participants across income levels, education categories, and prior banking experience. The final dataset consisted of **420 respondents**, all active users of at least one AI-enabled FinTech service such as digital payments, AI-based lending, or robot-advisory platforms. This sampling strategy ensures representation of first-time digital finance users as well as experienced adopters, which is critical for analysing trust and engagement dynamics [18].

Table 1: Sample Characteristics and FinTech Usage Profile

Category	Classification	Percentage (%)
Gender	Male	56
	Female	44
Age Group	18–30	38
	31–45	42
	Above 45	20
Primary FinTech Use	Digital Payments	47
	AI-based Lending	32
	Investment / Robo-Advisory	21
Location	Urban	61
	Semi-Urban	39

3.3 Data Collection Instruments

Data collection involved two primary instruments. First, a structured questionnaire was designed to measure **consumer trust dimensions**, including perceived transparency, data security, fairness, and explainability of AI decisions. Responses were captured using a five-point Likert scale. Second, platform-level engagement indicators such as login frequency, service diversity, and transaction continuity were collected through self-reported usage logs and anonymized platform summaries. Combining subjective trust perceptions with objective engagement indicators strengthens analytical validity and reduces single-source bias [19].

3.4 Computational Modelling and Trust Analysis

Machine learning techniques were employed to analyse trust determinants and their predictive power on engagement outcomes. A supervised learning approach using Random Forest and Logistic Regression models was applied to identify the relative importance of algorithmic features and trust variables. Feature importance analysis was conducted to determine which trust attributes most strongly influence sustained engagement. Model performance was evaluated using accuracy, precision, recall, and F1-score to ensure robustness. Such computational modelling techniques are widely used in FinTech analytics to uncover non-linear relationships between user behaviour and system characteristics [20], [21].

3.5 Engagement Classification and Statistical Analysis

To assess digital engagement patterns, users were clustered into low, moderate, and high engagement groups using K-means clustering based on usage frequency, service diversity, and transaction regularity. Statistical tests were then conducted to examine differences in trust levels across engagement clusters. Mediation analysis was performed to test whether consumer trust mediates the

relationship between AI-enabled features and engagement intensity. This analytical strategy aligns with recent empirical work emphasizing engagement depth rather than mere adoption as a meaningful indicator of financial inclusion [22].

Table 2: Key Variables and Measurement Approach

Variable Category	Indicator	Measurement Method
AI-Enabled Features	Personalization Accuracy	User rating (Likert scale)
	Decision Explainability	Perceived clarity score
Consumer Trust	Data Security	Trust index score
	Algorithmic Fairness	Perception-based scale
Digital Engagement	Usage Frequency	Monthly interaction count
	Service Diversity	Number of services used
Inclusion Outcome	Sustained Adoption	Continuous usage over 6 months

3.6 Ethical Considerations and Limitations

Ethical safeguards were strictly followed throughout the study. Participation was voluntary, informed consent was obtained, and all data were anonymized to protect user privacy. No sensitive personal identifiers were collected. Despite these precautions, the study has limitations. Self-reported engagement data may introduce recall bias, and platform diversity may limit generalizability across all FinTech ecosystems. Nevertheless, the mixed-method and computational design mitigates these constraints by combining multiple data sources and analytical techniques [23].

This methodology provides a **replicable and scalable framework** for evaluating AI-enabled FinTech systems, linking algorithmic design to trust formation and digital engagement in emerging economies.

4. RESULT AND ANALYSIS

4.1 Overview of Trust and Engagement Patterns

The empirical results reveal clear variation in consumer trust and digital engagement across AI-enabled FinTech users. Descriptive analysis shows that users reporting higher perceptions of algorithmic transparency, data security, and decision explainability demonstrated significantly stronger and more sustained engagement with FinTech platforms. First-time users exhibited moderate initial adoption but lower continuity when algorithmic decisions were perceived as opaque or inconsistent. In contrast, users who understood how AI systems influenced credit approvals, recommendations, or

transaction alerts were more likely to expand their usage across multiple services. This pattern suggests that trust functions as a stabilizing mechanism that converts initial access into continuous participation. Importantly, trust did not develop uniformly; it was shaped by both platform design and user experience, indicating that algorithmic performance alone is insufficient to guarantee engagement.

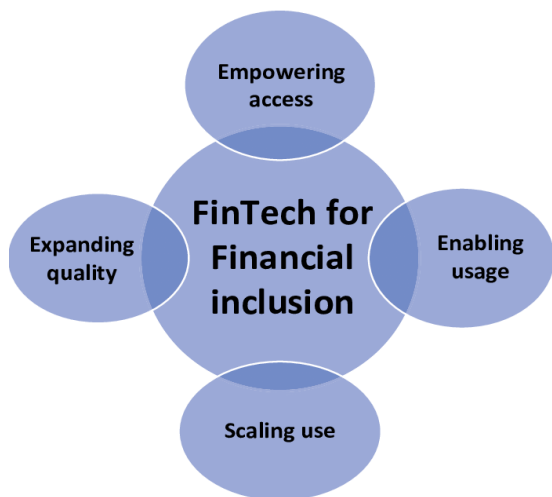


Figure 1: Fintech for Financial Inclusion [24]

4.2 Trust Dimensions and Engagement Intensity

Analysis of trust dimensions indicates that data security and perceived fairness exert the strongest influence on engagement intensity. Users who expressed confidence in data protection mechanisms and believed that AI decisions were unbiased showed higher login frequency and greater service diversification. Explainability emerged as a critical differentiator between moderate and high engagement groups. While personalization increased short-term satisfaction, lack of clarity in automated decisions led to scepticism and selective usage. This finding highlights that engagement deepens not simply through convenience but through confidence in system integrity. Notably, engagement patterns varied across demographic segments, with younger users more tolerant of automation but equally sensitive to perceived unfairness or misuse of personal data.

Table 3: Consumer Trust Levels Across Engagement Categories

Engagement Level	Transparency Score	Data Security Score	Fairness Score	Explainability Score
Low Engagement	2.8	3.0	2.7	2.4
Moderate Engagement	3.6	3.8	3.5	3.2

High Engagement	4.4	4.6	4.3	4.1
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The results demonstrate a consistent upward trend in trust dimensions as engagement intensity increases. The largest gap between moderate and high engagement groups is observed in explainability, underscoring its role in sustaining long-term usage. Transparency and fairness show similar patterns, reinforcing the argument that trust is multidimensional and cumulative in nature.

4.3 AI Features and Financial Inclusion Outcomes

Further analysis examined how specific AI-enabled features translate into inclusion outcomes through engagement. Personalized recommendations and automated assistance improved usage frequency among moderate users but did not automatically lead to sustained adoption unless accompanied by high trust scores. Users classified under high engagement accessed a wider range of financial services, including savings tools, credit products, and investment features, indicating deeper financial participation. Conversely, low engagement users restricted usage to basic payment services, reflecting shallow inclusion. These findings suggest that AI personalization enhances inclusion only when users perceive algorithmic decisions as reliable and fair.

Table 4: Digital Engagement Metrics and Inclusion Indicators

Engagement Level	Avg. Monthly Usage	Services Used	Continuity Rate (%)
Low Engagement	5.2	1.4	41
Moderate Engagement	11.8	2.6	68
High Engagement	19.3	4.1	87

The continuity rate shows a strong positive association with engagement depth, reinforcing the argument that sustained usage is a more meaningful indicator of inclusion than mere access. High engagement users demonstrate consistent interaction over time, suggesting greater financial confidence and reliance on digital platforms.

4.4 Discussion of Key Findings

The results confirm that AI-enabled FinTech systems influence financial inclusion indirectly through trust-driven engagement rather than direct access alone. Trust operates as a mediating force that transforms algorithmic functionality into behavioural commitment. The sharp differences in engagement between trust levels indicate that users actively evaluate AI systems based on perceived fairness, security, and transparency. Importantly, the findings challenge purely technology-centric inclusion models by showing that algorithmic efficiency without trust can lead to partial or fragile adoption. Digital

engagement emerges as both an outcome and an indicator of trust, reflecting users' willingness to integrate AI-enabled FinTech into their financial routines.

4.5 Implications of Results

From a practical standpoint, the findings suggest that FinTech platforms must prioritize explainability and ethical design alongside personalization and automation. Platforms that invest in user-facing transparency tools and clear communication of AI decisions are more likely to achieve sustainable inclusion. For policymakers, the results emphasize the importance of governance frameworks that mandate accountability and fairness in algorithmic finance. Overall, the analysis demonstrates that inclusion in AI-enabled FinTech ecosystems is not driven by algorithms alone but by the degree to which users trust and engage with those algorithms over time.

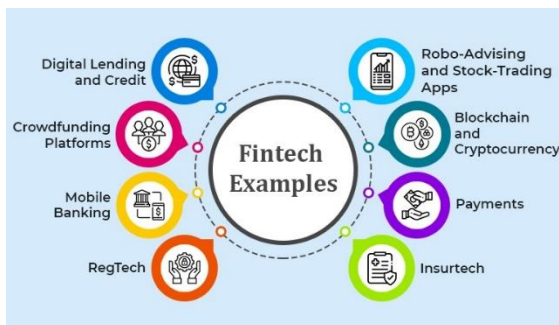


Figure 2: Fintech Examples [25]

5. CONCLUSION

This study set out to examine AI-enabled FinTech not merely as a technological advancement but as a socio-technical mechanism shaping financial inclusion through consumer trust and digital engagement in emerging economies. The findings clearly demonstrate that algorithmic access alone does not guarantee meaningful inclusion. While AI-driven FinTech platforms have significantly lowered barriers to entry and expanded financial service availability, sustained participation depends on whether users trust these systems and remain actively engaged with them over time. The results show that trust is multidimensional, rooted in perceptions of data security, algorithmic fairness, transparency, and explainability, and that these dimensions collectively influence engagement intensity. Users with higher trust levels displayed deeper engagement, diversified service usage, and stronger continuity, indicating more robust inclusion outcomes. Conversely, users exposed to opaque or poorly explained AI decisions exhibited limited engagement, often restricting their interaction to basic services despite having access to more advanced offerings. This highlights a critical insight: inclusion is not a binary state achieved through access but a continuum shaped by behavioural commitment and confidence in digital systems. By integrating computational modelling with empirical engagement analysis, the study provides evidence that trust acts as a mediating bridge between AI capabilities and inclusive financial behaviour. The research also underscores that personalization and automation, while powerful, can become counterproductive when perceived as intrusive or biased. Ultimately, the study affirms that AI-enabled FinTech will

succeed as an inclusion tool only when ethical design, transparency, and user-centric governance are embedded as core features rather than supplementary considerations. These findings contribute to FinTech literature by reframing inclusion as a trust-driven process and offer practical insights for platform designers and policymakers seeking to balance innovation with equity and long-term user confidence.

6. FUTURE WORK

Future research can extend this study in several meaningful directions. Longitudinal analyses would be valuable in tracking how consumer trust and engagement evolve over time as users gain experience with AI-enabled FinTech platforms. Comparative cross-country studies could further illuminate how cultural, regulatory, and institutional differences shape trust formation and inclusion outcomes in diverse emerging economies. Additionally, incorporating real-time platform data and experimental designs would allow for more precise measurement of engagement behaviour and causal inference. Future work should also explore the role of explainable AI interfaces and regulatory interventions in mitigating algorithmic bias and strengthening consumer confidence. Integrating financial literacy and digital education variables into analytical models may provide deeper insight into how user capability interacts with trust and engagement. Finally, expanding the framework to include small enterprises and informal sector participants could broaden understanding of AI-enabled FinTech's impact beyond individual consumers, offering a more comprehensive view of inclusive digital finance ecosystems

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