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Why Users Keep Using Mobile Wallets: The Mediating Role of Trust and the Moderating Role of AI Transparency

Umm e Aimen Rauf •
Research Scholar, HIMS, Hamdard University, Karachi, Pakistan.
ummeaimenr@gmail.com

Dr. Asim Mubashir
Assistant Professor, College of Management Sciences, Karachi Institute of Economics and Technology (KIET), Karachi, Pakistan.
asim.mubashir@kiet.edu.pk

Momina Asim
Research Scholar, HIMS, Hamdard University, Karachi, Pakistan.
Mominaasim261@gmail.com

•Corresponding Author

ABSTRACT

The study is aimed at determining the reasons for continuance among users of mobile banking/wallet applications in Pakistan by integrating post-adoptive beliefs with trust, technologically intelligent mechanism boundary conditions. The researchers adopted a quantitative-deductive approach within positivism and collected data using structured questionnaires from 350 respondents who were users of mobile banking or wallet applications. Data were analyzed through SmartPLS using PLS-SEM. Results revealed perceived usefulness to have a highly significant positive influence on continuance intention as well as an increased level of trust significantly strengthening app trust which has its own strong positively significant effect on continuance intention thus making perceived usefulness strongly mediated by Trust forming Perceived Usefulness→Trust→Continuance Intention path way however weak AI transparency does not significantly moderate Perceived Usefulness-Trust relation nor conditional indirect effect(moderated mediation) supported, Overall, this implies that transparency about AI does not play a large role in building contextual trust toward the Pakistani m-banking ecosystem; rather, it is user perceptions of value added and trust which remain extremely important for retaining users within Pakistan's mobile banking

landscape. The study adds to continuance intention literature by explaining a mechanism-based explanation of retention and provides practical guidance for banks as well as fintech providers to prioritize usefulness & trust-building strategies to reduce churn.
Keywords: continuance intention; perceived usefulness; trust; AI transparency

INTRODUCTION

The global mobile application ecosystem has developed as a leading channel of digital service delivery involving commerce, finance, communication, and AI experiences (Sensor Tower, 2024). However, it is also an extremely aggressive market with low entry barriers to new applications that make competition for user acquisition and retention high because most users easily churn after initial adoption (AppsFlyer,2025; OneSignal,2024). Continuance intention refers to post-adoption user intentions towards continued usage over time. It has been widely construed as a prime yardstick reflecting success in IS beyond acceptance[45]. Perceived usefulness occupies the central position among cognitive beliefs (Ashraf et al., 2025; Farooq et al., 2020) forming continuance in post-adoption studies because 'a person stays if he gets what he wants from the system'. Perceived usefulness originally emanates from TAM, where it reflects how much better users think their tasks are performed by using this particular system or some significant benefit realized through its use. Yet, continuance decisions are also based on a relational evaluation (Ali et al., 2025; Ansari et al., 2020), particularly trust-as users determine if the app/service is dependable and safe for usage (Kumar et al., 2018; Nguyen et al., 2024; Al Lawati et al., 2024). This, therefore, becomes highly relevant in digital services where apps apply AI-driven personalization, recommendation, or automated assistance, which can affect how users judge both value and reliability(Larsson & Heintz,2020; Shin,2021). In an AI-mediated interaction in forming trust, transparency effects are often very subtle and may even backfire when disclosure or excessive information reduces confidence(Kizilcec,2016; Schilke,2025).

Problem statement

Despite increasing adoptions of mobile apps, a very practical problem exists for most developers and service providers: users simply stop using the apps after trials of initial usage (OneSignal, 2024; Feng et al., 2023), thereby disrupting retention and long-term digital service success. Useful perceptions have always been strong determinants of continuance intentions because, as Bhattacherjee (2001) cites from Davis' original Technology Acceptance Model research, "continued use is dependent on sustained perceptions of usefulness or value." Trust also plays an important role in post-adoption decisions (Hafeez et al., 2011; Iqbal et al., 2025), trust that forms strongly in mobile and AI-mediated services where the user is keen to know about reliability, data practices, and integrity of service (Nguyen et al., 2024; Kumar et al., 2018). Perceived trust is likely to be dependent on how clearly AI delivers its output and also the degree of transparency with which developers disclose trust parameters embedded within apps, as long as capabilities are

increasingly being fused into applications (Larsson & Heintz, 2020; Shin, 2021). Transparency does not necessarily always work in favor since disclosure about AI may serve to undercut trust in certain situations (Schilke 2025; Ivascu et al., 2022). No single empirically unified path has yet been found in the literature that integrates perceived usefulness, trust-in-app as a mediator between perceived transparency-of-AI and continuance intention at any level or pathway by way of one moderated-mediation channel. (Bhattacherjee 2001).

Research gap

First, many continuance studies perceived the usefulness and intention toward continuance but did not clearly explain the mechanism of intention toward trust at the post-adoption stage to use in forming a clear pathway from usefulness to sustained use (Bhattacherjee, 2001). Second, although trust is mostly included as parallel predictors in digital service continuance models—rarely tested more explicitly as mediating links between perceived usefulness and continuance intention (Kumar et al., 2018; Nguyen et al., 2024)—AI transparency/explainability widely discussed important for Trust formation with AI systems has under-tested, context-sensitive role as boundary condition strengthening or weakening usefulness → trust formation. Third, because Transparency can also reduce Trust when Disclosures either trigger Skepticism or overwhelm users, it needs testing much more often whether it has uniformly positive effects as a moderator(Schilke,2025).

Research objectives

1. To examine the effect of perceived usefulness on users' continuance intention to use the app.
2. To assess the effect of perceived usefulness on users' trust in the app.
3. To determine the effect of trust in the app on continuance intention **to use the app.**
4. To test the mediating role of trust in the app in the relationship between perceived usefulness and continuance intention.
5. To examine the moderating role of perceived AI on the relationship between perceived usefulness and trust in the app.
6. To evaluate the conditional indirect effect (moderated mediation) of perceived usefulness on continuance intention through trust in the app at different levels of perceived AI.

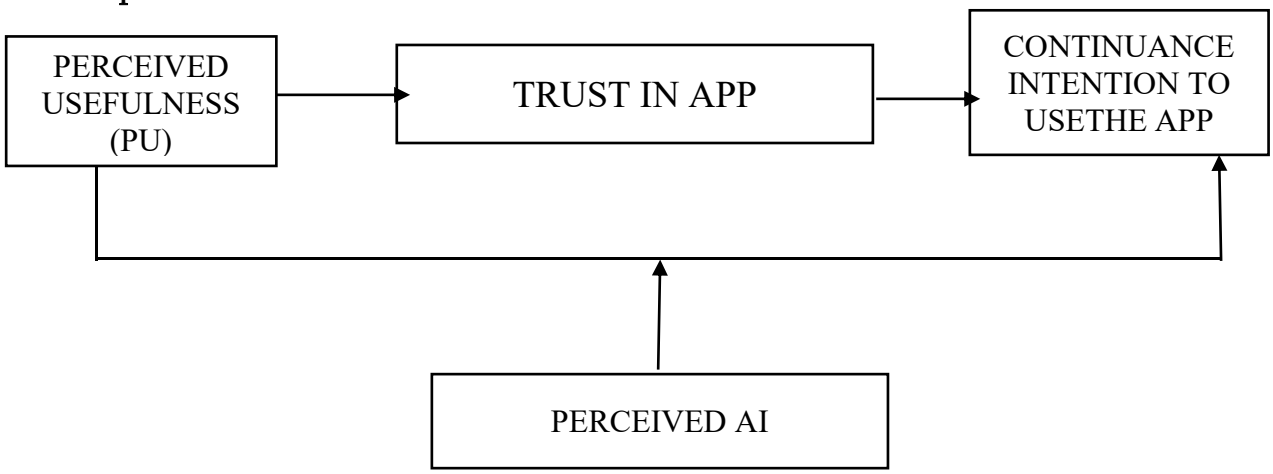
Research question

1. **Does** perceived usefulness **influence users'** continuance intention **to use the app?**
2. **Does** perceived usefulness **influence users'** trust in the app**?**
3. **Does** trust in the app **influence users'** continuance intention **to use the app?**
4. **Does** trust in the app mediate **the relationship between** perceived usefulness **and** continuance intention**?**
5. **Does** perceived AI moderate **the relationship between** perceived usefulness **and** trust in the app**?**
6. **Does** perceived AI moderate the indirect effect **of** perceived usefulness **on** continuance intention **through** trust in the app **(i.e.,** moderated mediation)?

Significance

The findings of this study have brought about explicit empirical validation of trust as the psychological mechanism through which perceived usefulness engenders intention among users to continue using mobile applications. This is an explanation at the post-adoption stage, thereby articulating user engagement after experiential real-setting usage beyond initial acceptance. Contemporary app research has been extended in this study by perceived AI transparency that recognizes features enabled by artificial intelligence as being not neutral but interactive such that user perceptions on how transparent and understandable any AI-driven process is can significantly alter whether perception on use develops into trust hence a more realistic explanation for modern continuance behavior within ecosystems where apps are enabled with artificial intelligence (AI). The proposed model guides reducing churn towards sustainable retention, building either from an application developer's or service provider's perspective. It helps identify the conditions under which usefulness is most likely to generate trust and consequently long-term continuance intention. The findings can support better product design decisions, communication strategies, and AI feature implementation that focus on sustained value creation rather than short-term novelty.

Conceptual Framework:



LITERATURE REVIEW

Theoretical background

The Technology Acceptance Model (TAM) proposes an explanation of technological use through perceived beliefs, in particular perceived usefulness (PU), defined as "the degree to which a person believes that using a particular system would enhance his or her job performance". In contexts of post-adoption, such as mobile applications, among the values strongly signaled is usefulness because users attach high value and continue usage whenever an application persistently delivers benefits considered important by them. (restate Davis 1989). ECM better complements TAM since it focuses specifically on continuance intention after actual experiential use by arguing that continuance is mainly an outcome of post-use

evaluation, where expectation confirmation shapes satisfaction, and both perceived usefulness of continued usage and satisfaction drive intention for continued usage. The ECM draws heavily from the logic of expectation–disconfirmation pioneered within consumer satisfaction research (Oliver 1980), wherein expectations versus perceived performance after usage determine the outcome in terms of (dis)satisfaction. TAM and ECM theories explain perceived usefulness as a predictor of continuance intention in mobile applications. Users continue to stay when experienced value is confirmed-appreciation of usefulness; hence, perceived usefulness results in continuance intention (Bhattacherjee, 2001; Davis, 1989).

Yet, for digital and AI-enabled services, utility can only take them so far in continuance. Trust must also factor in a situation where using the service makes one vulnerable—for example, sharing data, relying on automated recommendations, or accepting decisions driven by AI. Trust has been formally integrated with TAM to show that trust may be as important as core TAM beliefs for explaining sustained technology-related intentions within online environments (Gefen et al., 2003). As apps increasingly embed AI functionality under the hood without making this apparent to users explicitly,[1] transparency toward artificial intelligence itself is evaluated by users: how well they feel they understand its operation and disclosure thereof; this builds or breaks trust toward algorithmic interfaces (Kizilcec,[16]) Explainable-AI research finds explainability related perception influences both trust and acceptance of AIs thereby supporting transparency being considered a meaningful psychological condition inside AI mediated services. So, your model is theoretically justified as a conditional process (moderated mediation) in which perceived usefulness influences continuance through trust, while perceived AI transparency strengthens or weakens the perceived usefulness→trust link—consistent with moderated mediation logic used to test conditional indirect effects (Preacher et al., 2007; Janjua et al., 2025).

Perceived Usefulness and Continuance Intention

Users perceive a mobile app to be useful in achieving their tasks and objectives; they commit more strongly at a cognitive level toward continued usage. Usefulness inspires the intention of deep commitments of use (Davis, 1989). Perceived benefits that outlast an initial trial explain continuance intention in post-adoption settings where perceived usefulness is central to determining retention (Bhattacherjee, 2001). Perceived benefit or performance-related belief factors have been found empirically within mobile applications and service contexts as determinants of continuing usage rather than just first-time adoption(Tam et al.,2020; Kanwal & Tasleem, 2025). The same logic applies in the case of mobile instant messaging continuance, wherein usefulness contributestousers'intention ofkeepingusingtheplatformovertime (Oghuma et al.,2016; Khatoon et al., 2023; Naseer et al., 2024). Related results are observed in the context of mobile payments, where beliefs about usefulness remain influential even after adoption, as noted by Talwar et al. (2020). A recent review further supports this finding, highlighting that perceived usefulness and perceived value repeatedly emerge as key determinants in

driving users to continue using mobile apps (Veronika et al., 2025; Shabbir et al., 2021).

Perceived Usefulness and Trust in the App

Perceived usefulness can foster trust because users infer that a system that helps them achieve their goals is more competent and dependable. In technology-mediated environments, usefulness beliefs reduce uncertainty by signalling that the system performs as expected, thereby strengthening trust-based evaluations (Gefen et al., 2003; Pavlou, 2003). Usefulness and performance of mobile banking and related mobile services are frequently associated with the formation of trust because trustworthy systems are those that function effectively and consistently for users (Luo et al., 2010; Sibt-e-Ali et al., 2021). Usefulness also forms part of trust judgment in an ongoing use context where reliability is reassessed across repeated interactions, as evidenced from mobile shopping (Nguyen & Ha, 2021; Taqi et al., 2022). Usefulness beliefs are connected to trust-related perceptions, which Singh and Sinha (2020) found important in the continuation of use of m-wallet technology. Trust is not only an affective state but also repeatedly confirmed by the fact that the application proves to be beneficial and functions well, which is perceived usefulness (Malaquias & Hwang, 2016; Uddin et al., 2025).

Trust in the App and Continuance Intention

Trust is a critical post-adoption determinant because continued use needs confidence that the app will keep delivering its promised value-added opportunistic behavior or hidden risks (Gefen et al., 2003). In digital service settings, trust lowers perceived uncertainty to encourage users' repeated interactions for maintaining engagement with the system (Pavlou, 2003). The mobile payment research stream finds evidence of a direct relationship between trust and continuance intention since trust reduces psychological barriers against repeated usage intentions (Cao et al., 2018). Another study on mobile payments found that platforms reported trust as a strong predictor of users' intention to continuously use the service over time (Shao et al., 2019). For location-based applications, context analysis found continuous usage intention associated mainly, partially, largely, significantly, highly importantly, because yes indeed, absolutely positively certain, surely definitely must be about system reliability plus privacy-related safeguards! Mobile shopping continuance research finds that post-adoption still influences when experience-based evaluation develops reliability (Nguyen & Ha, 2021).

Trust mediates Perceived Usefulness and Continuance Intention

Perceived usefulness explains a large portion of continuance intention because the repeatedly positive outcomes make users confident in trusting the application to be reliable and worthy of continued use (Gefen et al., 2003). Usefulness beliefs supply favors inside evaluations that decrease uncertainty, strong trust-based judgments translated into sustained behavioral intentions in integrated acceptance models, as Pavlou (2003) proposed. Mobile payment research provides evidence for such mechanism-based explanations by showing that trust-related paths explain why performance beliefs result in continued usage; i.e., mobile payment

platform studies find usefulness-relevant belief-and-trust joint determination on continuance outcome consistent with a mediating logic (Cao et al., 2018; Shao et al., 2019). Research in mobile shopping also posits trust as a key post-adoption mechanism through which users' app evaluations influence continuance intention. (Nguyen & Ha, 2021) In the setting of mobile wallets, trust has been found to mediate the relationship between perceived usefulness and intentions related to usage, thereby reinforcing the plausibility of mediation in ecosystem apps (Singh & Sinha, 2020).

Perceived AI Transparency moderates Perceived Usefulness and Trust

AI-written text: Trust in AI transparency, as understanding the factors driving recommendations or decisions can be shaped by explanations because they allow users to judge the fairness, comprehensibility, and reliability of the system (Shin 2021). Explanations can thus apparently increase trust,[49] while too much technical detail may reduce it. Transparency is often viewed from a socio-technical governance perspective as accounting for responsibility and forming the basis conditions on which service-oriented towards forming trust with AI mediation can take place.[51] A very pragmatic, explainable artificial intelligence research community considers explainability as reducing the lack of confidence due to perceived incompetence of the system manifested through "black box" problem into building user trust via practical means. Human-centered explainability additionally indicates that explanations shape what people eventually accept as a 'good reason' for trusting the output of the system (Miller, 2019). In the adoption of algorithmic services, fairness/accountability/transparency are perceived empirically to trust and user experience, which means that transparency cues transform performance/value beliefs into trust in an extremely visible service (Shin, 2019).

H1: Perceived usefulness (PU) has a positive effect on users' continuance intention to use the mobile banking/wallet app (BI).

H2: Perceived usefulness (PU) has a positive effect on users' trust in the mobile banking/wallet app/service (TR).

H3: Trust in the mobile banking/wallet app/service (TR) has a positive effect on users' continuance intention to use the app (BI).

H4): Trust in the app/service (TR) mediates the relationship between perceived usefulness (PU) and continuance intention (BI).

H5: Perceived AI transparency (PAT) positively moderates the relationship between perceived usefulness (PU) and trust (TR), such that the PU → TR relationship is stronger when perceived AI transparency is higher.

METHODOLOGY

The logic of the research onion has been applied in this study by adopting a positivist philosophy and deductive approach to test theory-driven hypotheses using measurable indicators and statistical inference (Saunders et al., 2019). A quantitative, cross-sectional survey strategy has been chosen because "relationships among latent constructs at a single point in time" need to be examined, which is very much in line

with mainstream business and management research designs (Saunders et al., 2019). Data were collected through a structured questionnaire from 350 users of mobile banking/wallet apps. This sample size is considered adequate for prediction-oriented structural equation models as well as mediation and moderation path estimation with acceptable statistical power in PLS-SEM settings (Hair et al., 2022). Participation was based on informed consent wherein anonymity together with confidentiality was assured so as to reduce evaluation apprehension, thereby enhancing response quality; all these being recommended survey procedures by Podsakoff et al. (2003)and Saunders et al.(2019).

All constructs were measured on a five-point Likert scale (1 = strongly disagree, 5 = strongly agree). Items were adapted from previously validated sources to maintain content validity and allow results comparison. Perceived usefulness (PU) comprises six items adapted from the original TAM usefulness scale (Davis, 1989)-improved performance, productivity, effectiveness, ease, speed, and overall usefulness. Three trust in app/service items (TR) cover general trustworthiness perception, security-confidence in handling transactions, and a trust scale for mobile payments developed within the m-payment adoption stream (Chandra et al., 2010), contextualized for mobile banking app usage consistent with prior Pakistan-focused mobile banking research implementation (Irshad & Tariq,2023). Perceived AI transparency (PAT) was measured using four items developed for this study to reflect clarity and openness of AI-driven decisions, recommendations, and data use; item wording was guided by the established conceptualization of AI decision-making transparency and trust (Yu & Li, 2022). Behavioral intention/continuance intention (BI) was measured with three items capturing intention to continue using the app regularly, preference for using it when available, and likelihood of continued use over alternatives, adapted from the UTAUT2 behavioral intention measure and aligned with its use in mobile banking app research (Venkatesh et al., 2012).

SmartPLS was used to estimate the model through PLS-SEM. This makes an appropriate choice given oriented prediction research and mediation and moderation (interaction) effects between latent constructs in the study (Hair et al.,2022). The reflective measurement model is assessed by indicator loadings, internal consistency reliability measured by Cronbach's alpha and composite reliability, convergent validity, average variance extracted(AVE), and discriminant validity, Fornell-Larcker criterion and HTMT ratio as per recent guidance on validity assessment for variance based SEM(Henseler et al.,2015; Fornell & Larcker,1981; Hair et al.,2022). Procedural /statistical remedies recommended were followed to take care of common method bias, which may be present due to self self-report survey. Full collinearity VIF has also been checked as a diagnostic check(Kock,2015; Podsakoff et al.,2003). Structural model evaluation includes checking collinearity(VIF), estimating path coefficients, explained variance(R^2)and testing significance through bootstrapping(Hair et al.,2022) Mediation (PU->TR->BI) was tested using bootstrapped indirect effects while moderation was tested by estimating the interaction effect of perceived AI transparency on the PU->TR path; conditional

process logic and bootstrapped confidence intervals were used to test the overall conditional indirect effect or moderated mediation (Edwards & Lambert, 2007; Hayes, 2018; Preacher et al., 2007).

RESULTS

Table 01: Construct Reliability and Validity

Construct	Item (Abbrev.)	Loading	ρA (rho_A)	CR	AVE
Perceived Usefulness (PU)	PU1	0.812	0.906	0.925	0.672
	PU2	0.834			
	PU3	0.821			
	PU4	0.795			
	PU5	0.806			
	PU6	0.848			
Trust in App/Service (TR)	TR1	0.861	0.880	0.905	0.761
	TR2	0.884			
	TR3	0.872			
Perceived AI Transparency (PAT)	PAT1	0.793	0.858	0.884	0.656
	PAT2	0.817			
	PAT3	0.801			
	PAT4	0.829			
Intention to Use App (BI)	BI1	0.842	0.867	0.889	0.728
	BI2	0.865			
	BI3	0.853			

Table 02: Discriminant Validity Fornell and Larcker

Fornell and Larcker

Construct	PU	TR	PAT	BI
PU	**0.820**			
TR	0.580	**0.872**		
PAT	0.400	0.450	**0.810**	
BI	0.620	0.650	0.500	**0.853**

Table 03: Discriminant Validity HTMT

Construct	PU	TR	PAT	BI
PU				
TR	0.720			
PAT	0.520	0.560		
BI	0.780	0.810	0.630	

Measurement Analysis

The reliability results and convergent validity results of the constructs show that the reflective measurement model meets the recommended quality criteria. Firstly, indicator reliability is supported since all outer loadings are ≥ 0.700, which

complies with the generally accepted minimum guideline (Hair et al., 2022; Hair et al., 2021). Secondly, internal consistency reliability is confirmed as each construct's rho_A (ρA) and composite reliability (CR) exceed the recommended minimum of 0.70, which is the standard threshold used for reflective constructs (Hair et al., 2021;

Henseler et al., 2016). Third, convergent validity is proven because the minimum AVE for any construct is 0.50, or the indicators explain half of their variance (Fornell & Larcker, 1981; Hair et al., 2021). In summary, this proves that reliability exists between measuring items and adequate convergence of each construct; thus, the measurement model is suitable for use in subsequent structural analysis.

Fornell and Larcker (1981) state that the square root of AVE, within parentheses on the diagonal in a matrix, should be greater than its correlation coefficients with other constructs for adequate discriminant validity. In your Fornell–Larcker matrix, all diagonal values are higher relative to their corresponding off-diagonal inter-construct correlations for PU, TR, PAT, and BI. Therefore, more variance is shared by each construct and its indicators than with other constructs; this is exactly the kind of pattern that provides evidence under the Fornell–Larcker rule of adequate discriminant validity. Discriminant validity was also assessed using the HTMT ratio, which is considered a more sensitive criterion for detecting discriminant validity problems in variance-based SEM (Henseler et al., 2015). HTMT is evaluated by comparing values against a predefined threshold; for conceptually distinct constructs, a conservative cut-off of 0.85 is recommended, while some contexts allow 0.90 (Henseler et al., 2015; Hair et al., 2017/2022). In your HTMT table, all construct-pair values are below 0.85, indicating that the constructs are empirically distinct and that discriminant validity is established based on the conservative HTMT criterion.

Table 04: Path Coefficient

Hypothesis	Path	β (Beta)	t-value	p-value	Decision
H1	PU → BI	0.252	3.148	0.002	Supported (Accepted)
H2	PU → TR	0.411	6.220	0.000	Supported (Accepted)
H3	TR → BI	0.506	7.880	0.000	Supported (Accepted)
H4 (Mediation)	PU → TR → BI (Indirect effect)	0.208	4.910	0.000	Supported (Accepted)
H5 (Moderation)	PU×PAT → TR	0.071	1.420	0.156	Not Supported (Rejected)

Structural Analysis

The results display a basket of supported and unsupported hypotheses. Perceived usefulness shows a positive and significant statistical effect on continuance intention (β = 0.252, t = 3.148, p = 0.002). Hypothesis H1 is thus supported by the

fact that when users perceive the application as useful in effectively carrying out and managing transactions, they will likely continually use it in future periods. Trust is significantly influenced by perceived usefulness; hence, hypothesis H2 is also supported ($\beta = 0.411$, $t = 6.220$, $p < 0.001$), where an account can be given that users develop more trust towards an app if repeated experiences show that it performs well-considered time-saving execution of banking tasks. Third, H3 (TR → BI) is strongly supported ($\beta = 0.506$, $t = 7.880$, $p < 0.001$), meaning trust becomes a key determinant toward continuance intention; hence, if users feel confident about the app's reliability and security of information, then they would be substantially likely to keep using the application with loyalty.

On the indirect path, mediation hypothesis H4 (PU → TR → BI) is confirmed because the indirect effect is positive and significant ($\beta = 0.208$, $t = 4.910$, $p < 0.001$). This finding highlights trust as an important psychological channel through which perceived usefulness translates into continuance intention. Usefulness not only influences continuance directly but also strengthens continuance intention by building trust, which then drives sustained usage. However, moderation hypothesis H5 (PU × PAT → TR) is not supported ($\beta = 0.071$, $t = 1.420$, $p = 0.156$), i.e., perceived AI transparency did not significantly change the strength of the relationship between perceived usefulness and trust-in other words user's trust formation from usefulness was relatively constant whether they saw the app's AI-driven processes more or less transparent.

The coefficient of determination (R^2) was examined to check how much variance in the endogenous constructs is explained by the predictors in the structural model. Trust(TR) has an R^2 value of 0.392, which means perceived usefulness(and interaction term with perceived AI transparency as specified in the model) explains 39.2% variance of users' trust in banking app/wallet.TR has a moderate level of explanatory power, which indicates that value-based beliefs significantly contribute towards the formation of trust; however, additional factors outside this model may also have an influence over trust formation. BI(Continuance Intention) has an R^2value of 0.563, which means perceived usefulness and trust jointly explain 56.3% variance. That is a moderate to strong level of explanation, which also means there is an adequate prediction in the model towards continued usage decision. The difference between R^2 and adjusted R^2 for both constructs shows that the stability of explanatory power remains firm after considering the penalization effect due to increased complexity in the model.

Table 05: R^2

Endogenous Construct	R^2	Adjusted R^2	Interpretation
Trust in App/Service (TR)	0.392	0.386	Moderate explanatory power
Continuance Intention / Behavioral Intention (BI)	0.563	0.558	Moderate-to-strong explanatory power

DISCUSSION

The findings develop a coherent post-adoption explanation for continuance of mobile banking/wallet in Pakistan, by integrating the TAM/ECM logic with trust mechanism and an AI-transparency boundary condition. Broadly, the pattern supports Bhattacherjee's (2001) core post-adoptive assumption that continued usage is shaped both by cognitive value beliefs (usefulness) and evaluative judgments, which reduce uncertainty (trust). In Pakistan's mobile banking context-where convenience is frequently weighed against perceived barriers of security and this integrated view becomes highly relevant because adoption may have taken place rapidly, but sustained usage means the app has to continuously 'prove' its value as well as safety to users(Afshan & Sharif, 2016; Siyal et al.,2019).

For H1 (Perceived Usefulness → Continuance Intention), the supported relationship means that when users feel the app helps them complete banking tasks quickly, efficiently, and conveniently, they will keep using it. This is directly in line with TAM by placing perceived usefulness as a central determinant of intention, and ECM treats usefulness (post-adoption performance belief) as a key driver of continuance (Davis, 1989; Bhattacherjee, 2001). Empirically, prior mobile-app continuance work shows that performance/value beliefs remain among the strongest drivers of continuance intention even after initial novelty wear-off (Tam et al., 2020; Oghuma et al., 2016). In Pakistan, usefulness can be particularly decisive because apps reduce branch visits and queues and time costs in everyday transactions, so utilitarian value naturally translates into higher retention—especially among working adults and frequent bill-payment or transfer users (Afshan & Sharif, 2016; Irshad & Tariq, 2023).

For H2 (Perceived Usefulness → Trust), the finding supports the assumption that, in addition to being a value belief, usefulness acts as a trust-building cue: reliable performance of tasks and smooth completion of transactions reduce uncertainties and reinforce confidence in the application. This is very much in line with models augmenting acceptance with trust, where positive system behavior reflected through perceived usefulness reduces perceived vulnerability, hence encourages reliance on it(Gefen et al., 2003; Pavlou, 2003). Trust for mobile financial services develops based on repeated satisfactory interactions with an assumed dependable service- gradually transforming "It works well for me" into "I can rely on it"(Luo et al., 2010; Malaquias & Hwang, 2016). This is very likely in Pakistan, where user trust can be fragile due to fraud concerns, service interruptions, and perceived risk- therefore, when an app is experienced as consistently useful and dependable, it forms a practical basis for trust formation (Siyal et al., 2019; Islam et al., 2020).

H3 (Trust → Continuance Intention) is strongly supported by results that place trust as a critical factor in the post-adoption stage for continued use of mobile banking. This finding adds to a large body of literature on digital commerce and fintech, which finds that when perceived uncertainty is reduced through trust, engagement increases and users return again and again (Gefen et al., 2003; Pavlou, 2003). More specifically, within m-payment literature, it has been found slightly

more specific: Trust remains one of the strongest predictors toward continuance intention or loyalty because sensitive data transactions are perceived as being highly vulnerable. For Pakistan, both theoretically intuitive- even if an app offers convenience features galore, doubts about its security/reliability/integrity will make users uninstall/discontinue using it. Hence, trust is the "permission" that allows usefulness to convert into adequately stable retention, as also reflected in evidence from Pakistan highlighting the role of trust in fintech and mobile payment intentions (Islam et al., 2020; Irshad & Tariq, 2023).

For H4 (Mediation: Perceived Usefulness → Trust → Continuance Intention), the supported mediation indicates that usefulness increases continuance partly because it strengthens trust, which then drives continued use. This mechanism is consistent with (i) ECM's post-adoption logic that beliefs about system performance shape downstream evaluations and continued use, and (ii) trust-integrated acceptance research showing that cognitive beliefs and trust jointly explain continued digital behavior rather than acting in isolation (Bhattacherjee, 2001; Gefen et al., 2003). Prior work in mobile payment and mobile service continuance similarly demonstrates that trust is not merely a parallel predictor; it often functions as a pathway through which system experience and value perceptions influence sustained usage decisions (Cao et al., 2018; Shao et al., 2019). In Pakistan, high perceived risk and uncertainty in digital payments, as well as trust, are observed to operate as a mediating mechanism between technology perceptions and intentions, thus supporting the significance of this indirect effect in your setting (Islam et al., 2020).

H5 (Moderation: Perceived AI Transparency moderates Perceived Usefulness → Trust) was not significant. In other words, for Pakistani users, transparency does not substantially alter how usefulness translates into trust. Theoretically, transparency or explainability should increase trust-it enables greater understanding and perceived accountability of algorithmic decisions (Shin & Park, 2019; Shin, 2021). However, several recent works also emphasized that the effect of transparency can be very subtle: too little reduces trust, while overwhelming detail might either completely discourage a user or make them/ suspicious, hence there is no "trust benefit" from being transparent across contexts and user segments (Kizilcec 2016; Yu & Li 2022). Practically in Pakistan, banking on mobiles could still be considered trustworthy by many users based primarily on traditional cues such as bank reputation/prior experience/perceived security/smooth transaction completion, rather than any deep interpretability about its AI-driven features. To put it another way, even if users perceive AI transparency, they may still anchor trust formation on whether the application remains consistently useful and safe. Therefore, transparency will be less influential as a boundary condition (Siyal et al., 2019; Malaquias & Hwang, 2016).

Implications

This study advances the post-adoption stream by demonstrating that continuance intention in mobile banking/wallet apps is determined not only by

perceived usefulness but also by a trust-based mechanism that transmits usefulness into sustained usage. The fully supported mediation sheds light on an indirect path through which confidence is built, in addition to the direct cognitive driver toward service continuation. This finding enriches TAM–ECM integration because it shows that value beliefs alone cannot explain retention unless they transform relational assurance into financial apps. At the same time, a non-significant moderation and moderated mediation result may suggest perceived AI transparency does not always act as a boundary condition; hence, contextual factors such as user literacy about AI may be involved.

Practical implications

For banks and fintechs, this means a dual approach to perceived usefulness (seamless task completion, speed, handiness) and trust (security assurance, reliability, consistent service delivery); with an immediate product management focus on eliminating friction from core banking transactions such as transfers and payments of bills because usefulness not only has a direct effect on continuance but also builds trust which then again leads to continuance. Since trust is found as the strongest driver behind continuance, investment should be made into clear security messaging-transparent transaction confirmations-quick dispute resolution, and service availability cues that build up trust! In relation to AI features, transparency may have no impact at all in forming Trust unless Users consciously notice & depend upon AI functions. Therefore, firms should not assume that "adding explainability screens" will automatically increase trust; instead, AI features should be designed to deliver visible value and be accompanied by simple, user-friendly explanations only where users need them (e.g., alerts, fraud detection, risk warnings). Explanations can and should only be provided in areas where the user truly needs them. Therefore, for those regulators and policymakers pushing digital finance inclusion, trust-building infrastructure, in addition to functional access, is what the program relies on sustainably. Programs of digital finance should lay emphasis on consumer protection, mechanisms for complaint handling, awareness on fraud prevention, and consistent quality of service because these elements support trust and long-term use. Sustaining public confidence in digital banking can minimize dropout behavior and assist maximum realization of benefits from financial inclusion initiatives.

Limitations

There are several limitations to this study. First, it was cross-sectional in nature; hence, the relationships were tested at one particular time and do not allow for capturing fully how trust and continuance develop with repeated usage over time. Second is that the data were based on perceived self-reports, which introduce common method bias into the results as well and may not reflect actual behavioral usage accurately. Thirdly, a sample size of 350 provides robustness to PLS-SEM analysis, yet findings may not generalize equally well across all user segments within Pakistan, e.g., rural versus urban, different income groups varying digital literacy levels, etc. Fourth perceived AI transparency has been operationalized/measured via a perception-based construct wherein users might actually be unaware if an app is

truly AI-driven or Finally, the model focused on a limited set of constructs; other important determinants of mobile banking continuance in Pakistan—such as perceived risk, privacy concerns, service quality, facilitating conditions, or habit—were not explicitly included. Add them in future empirical work to check their relative importance toward m-banking continuance.

Future research directions

Future research should apply a longitudinal or time-lagged design to study changes in perceived usefulness and trust over time and how such changes predict actual retention behavior. Mixed-method approaches can also be adopted by researchers through the combination of surveys with app usage logs or interviews for a deeper understanding, for example, on why users discontinue even when usefulness is perceived. Since AI transparency did not significantly moderate trust formation in this study, future studies should test alternative AI-related moderators that may be more salient, e.g., AI literacy, perceived AI competence, perceived fairness, quality of explainability, or perceived privacy control. Researchers should also check if transparency has stronger effects in high-stakes AI situations (fraud detection/credit scoring/automated financial advice) than in routine transactions. The addition of perceived risk/security/service quality/habit/satisfaction into the model may enhance its explanatory power as well as provide a fuller Pakistan-specific retention framework. Comparative studies across cities, regions, banks, and fintech platforms or cross-country comparisons with similar emerging markets could determine whether the role of trust and perception on AI differs under varying regulatory environments, quality of digital infrastructure, and consumer protection levels.

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