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WHICH RISKS, WHICH BENEFITS, AND FOR WHOM? A MULTI-GROUP TEST OF THE RISK-BENEFIT FRAMEWORK AMONG USERS AND NON-USERS OF DIGITAL FINANCE IN PAKISTAN

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KEYWORDS	ABSTRACT
digital finance; perceived risk; perceived benefit; attitude; behavioral intention; financial literacy; PLS-SEM; multi-group analysis; Pakistan	Digital finance is the key enabler of financial inclusion in developing economies but in Pakistan, even after the availability of instant-payment infrastructure free at the point of use, digital finance is the second lowest in South Asia. The questions in this study are which perceived risks and benefits influence attitudes towards digital finance. Do those risks and benefits differ for digital transactors and non-digital transactors, and does financial literacy dictate the translation of attitudes into intentions? A model of seven risk dimensions and seven benefit dimensions was estimated based on survey data from 485 bank account holders in Pakistan (276 users and 209 non-users) using the PLS-SEM, with measurement invariance verified via MICOM prior to a permutation-based multi-group comparison, which incorporated the Theory of Reasoned Action, the Technology Acceptance Model, and the risk-benefit framework. All fourteen dimensions are important to users, with psychological risk providing the most powerful deterrent and convenience with the most powerful driver. Among non-users, financial risk, social risk, relative advantage and ease of use are not significant and financial literacy does not moderate the attitude-intention path. Attitude is a much stronger predictor of intention among users than among non-users and eleven out of sixteen paths are significantly different between users and non-users. Thus, experience not only reinforces perceptions, but it also renders those perceptions evaluable—and the users and non-users are not merely two points on a continuum of adoption; they are two populations with differently structured processes of evaluation.
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Introduction

Beyond convenience, digital financial services have three ways in which they are relevant to development. With digitization, the marginal cost of reaching a customer is reduced, making

small-value accounts commercially viable and reaching populations that are beyond the reach of branch-based banking (Demirgüç-Kunt et al., 2022). Digital transaction records establish verifiable credit histories where they did not previously exist, which eases the lending constraint for small businesses. And transferring transactions to traceable channels expands the recorded economy and the tax base. 79 per cent of adults globally used digital financial services by 2025, compared to 51 per cent in 2011 (World Bank, 2025).

The global total is masking that variation that underlies the rationale for this study. At the sub-regional level, 48 per cent of adults in India and Bangladesh, and 47 per cent in Sri Lanka are using digital financial services, while only 25 per cent in Pakistan do so (World Bank, 2025). The gap is not easily related to the cause of supply. In the latest reporting year, Pakistan's retail payment transactions totaled PKR 612 trillion with digital retail payments representing 88 per cent of total retail payments, compared to 78 per cent two years prior (State Bank of Pakistan, 2025). The policy architecture is provided through the National Financial Inclusion Strategy, real time settlement of retail transfers is provided at no cost to the customer through the instant retail payment platform Raast by the central bank, and licensing of the digital retail banks and the Asaan Mobile Account scheme provides access to customers without a smartphone or extensive documentation. Digital channels are thus viewed as the instrument of financial inclusion, as opposed to just being an amenity, while physical access is structurally constrained – 10 bank branches / 100,000 adults (as opposed to Sri Lanka with 17.2 bank branches / 100,000 adults, or India with 14.5 bank branches / 100,000 adults) (State Bank of Pakistan, 2026).

The issue is thus not supply, access or price; services are available, accessible and free at the point of use, but the uptake is a problem. That means that non-adoption is a question of behavior. The risk-benefit framework posits that an adoption entails weighing the perceived risk and the perceived benefit at the same time (Ryu, 2018), and both sides of this ledger have been confirmed in the context of digital finance (Lee, 2009; Gerlach and Lutz, 2019; Jain and Raman, 2021; Abdul-Rahim et al., 2022). The present contribution is based on three limitations of that literature.

First, previous studies have only measured a subset of the dimensions, usually four or five risk dimensions and three or four benefit dimensions (Lee 2009; Khedmatgozar and Shahnazi 2018; Putritama 2019; Wang 2022), and the relative weight of each of these dimensions is unknown, while policy and product decisions need a ranking not a list. Secondly, psychological risk, legal risk and perceived enjoyment have been related directly to intention but not to attitude formation, which is unclear at what stage of the decision they act. Third, and most importantly, the great majority of this work samples people who already use digital finance (Kassim and Ramayah, 2015; Ryu, 2018; Gerlach and Lutz, 2019; Abdul-Rahim et al., 2022) and therefore explains why people continue as opposed to why they do not start — the policy problem lies with those who do not. In the literature where financial literacy has been studied, it has been directly studied as a determinant of intention as a direct determinant (Hermawan et al., 2022; Ullah et al., 2022; Raut and Kumar, 2024), without testing if its effect is only conditional: whether it triggers a favorable attitude or whether it regulates the transition from attitude to intention.

This study estimates seven risk dimensions (security, financial, performance, time, social, psychological and legal) and seven benefit dimensions (economic benefit, convenience, seamless transactions, relative advantage, compatibility, ease of use and perceived enjoyment) simultaneously, specifies financial literacy as a moderator of the attitude intention path, and estimates the model separately for users and non-users and tests for measurement invariance before comparing them. Thus, it asks what aspects of perceived risk and benefit influence attitudes towards digital finance, how each of these aspects of perceived risk and benefit differ between users and non-users, and whether financial literacy acts as a moderator of the attitude to intention link.

Differences in magnitude of the coefficient are not the only answers. Four of the constructs that shape users' attitudes do not have any significant relationship with non-users' attitudes, while the moderating role of financial literacy becomes insignificant among non-users. Experience does not just sharpen perceptions, it also makes it possible for people to perceive what they can – which has direct implications for the specification of adoption models, and why financial education and promotional messaging only has a limited effect on the population they are targeting.

Theoretical framework and hypotheses

Integrating the risk–benefit framework with TRA and TAM

Three frameworks are integrated – each providing what the others lack. The Theory of Reasoned Action is that behavior is determined by intention, which in turn is determined by attitude and subjective norm (Ajzen and Fishbein, 1980) and provides the behavioral sequence and the position of attitude as the proximal determinant of behaviors, but not the content of beliefs from which attitude is constructed. Subjective norm is not stored since the social aspect of the decision is already captured in a substantive sense as a social risk in the risk set and since retaining both would lead to a redundant evaluative and a normative belief about the same content.

The Technology Acceptance Model posits that attitudes will be shaped by perceived ease of use and perceived usefulness, which in turn will shape use (Davis, 1989). It provides perceived ease of use as a technology specific belief retained as a benefit dimension. Perceived usefulness is not kept separately, as it combines exactly the benefits (the economic gain, convenience, relative advantage, seamlessness) that this study breaks out and adding it to its components would confuse the estimates. The risk–benefit framework then provides the unspecified belief content of TRA (Peter and Tarpey, 1975; Ryu, 2018). The modelling of trust is not done, because the function of trust is spread out over the security, legal and the psychological risk dimension, which express the concrete concerns that summaries generalized mistrust.

The integrated model is thus a three-layer model: decomposed risk and benefit beliefs, attitude, and financial literacy to govern the conversion. It is estimated separately for users and non-users and controls age, gender, education and income.

Perceived risk and attitude are the second factor.

The perceived risk is the subjectively expected loss in a course of action; and it is the apprehension of loss, not its objective probability, which bears on evaluation. The seven dimensions are: security risk, that is the risk of financial and personal information getting compromised by unauthorized access, which is the most consistently mentioned barrier in the literature (Lee, 2009; Ryu, 2018; Jain and Raman, 2021); financial risk, monetary loss due to fraud, transaction error or undisclosed charges (Jain and Raman, 2021); performance risk, risk that the system may not function as intended; time risk, time spent learning the system and fixing any mistakes (Kassim and Ramayah, 2015); social risk, involves loss of standing within a reference group that may result from adopting an unfamiliar practice, and is of particular weight in a collectivist environment; psychological risk, the emotional cost of transacting without an intermediary (Namahoot and Laohavichien, 2018); and legal risk, uncertainty about liability and recourse when the consumer-protection regime is incomplete (Haqqi and Suzianti, 2020; Gupta et al., 2023). Each is assumed to have a negative effect on attitude and is tested separately for each group:

H1–H7. Security risk (H1), financial risk (H2), performance risk (H3), time risk (H4), social risk (H5), psychological risk (H6) and legal risk (H7) negatively impact attitude towards digital finance among users (H1A – H7A) and non-users (H1B – H7B).

Benefit and Perceived Attitude

Perceived benefit—subjectively expected gain, including economic benefit, which is the cost savings relative to the alternative (branch banking); convenience, the ability to do things at any time and place; seamless transactions, uninterrupted and disintermediated transactions; relative advantage, superiority of the digital channel over the alternative by definition; compatibility, fit with existing routines; ease of use, perceived absence of effort (Davis, 1989; Turel et al., 2011); and perceived enjoyment, hedonic value of use, (already examined in relation to satisfaction, but not in relation to attitude formation) (Gerlach and Lutz, 2019).

H8–H14. Relative advantage (H11A/B), compatibility (H12A/B), ease of use (H13A/B) and perceived enjoyment (H14A/B) have positive effect on attitude towards digital finance among users and non-users while economic benefit (H8A/B), convenience (H9A/B) and seamless transactions (H10A/B) have positive effect on attitude towards digital finance among users.

The attitudes and intentions were discussed in Section 2.4, along with the importance of financial literacy as a moderator.

In TRA and in the adoption literature that is based on the model (Ajzen and Fishbein, 1980; Davis, 1989), attitude is the proximal determinant of intention. It is expected to be more effective among users, whose attitudes are constructed from first and secondhand experiences and more readily available and confident, than among non-users, whose attitudes are built from secondhand experiences.

H15. Attitude towards digital finance positively affects intention to adopt or continue using it, among users (H15A) and among non-users (H15B).

Financial literacy is shown to be directly linked with the intention to adopt (Hermawan et al., 2022; Ullah et al., 2022; Raut and Kumar, 2024). The specification, which is more precise, is that financial literacy does not directly lead to a better attitude, but rather to a higher probability that one will be translated into an intention to act, that is, to give a person the confidence that he can assess the fees, understand the limits of transactions, detect fraud and get out of trouble in case of mistakes. That isn't a statement of a main effect, but a boundary condition and it indicates a moderating, not an antecedent role (Amnas et al., 2024).

H16. Financial literacy has a positive moderating effect between attitude and intention among the users (H16A) and non-users (H16B).

Two and a half differences between users and non-users

The relationships as described above should not be equal for all groups because diffusion theory assumes that adoption is a staged process, with different considerations affecting different stages (Rogers, 2003). A stronger statement can be made, some of the constructs are based on an experiential reference point. Relative advantage involves an alternative being used; ease of use involves a judgement of the effort of using the behavior; financial risk involves knowledge of the cost of a transaction and the consequences if the transaction fails; social risk involves a reference group where the behavior is visible. If that reference point doesn't exist the belief may not be evaluable at all, in which case the corresponding path should not only be weaker but null.

H17. There are significant differences in the relationships listed in H1 - H16 between digital finance users and non-users.

Methods

Adult bank account holders in Pakistan were targeted as the population of interest. This restriction is based on the research question: that all the digital financial services in this market are linked to a bank account, and the population in this market that has a bank account but chooses not to use the services is the banked population. The notion of non-users, thus, has a limited connotation throughout this paper: a person who has a bank account but does not employ the digital channels linked to their account. The unbanked, half of Pakistani adults, are not in the scope, as their barriers are structural and thus a different model would be needed.

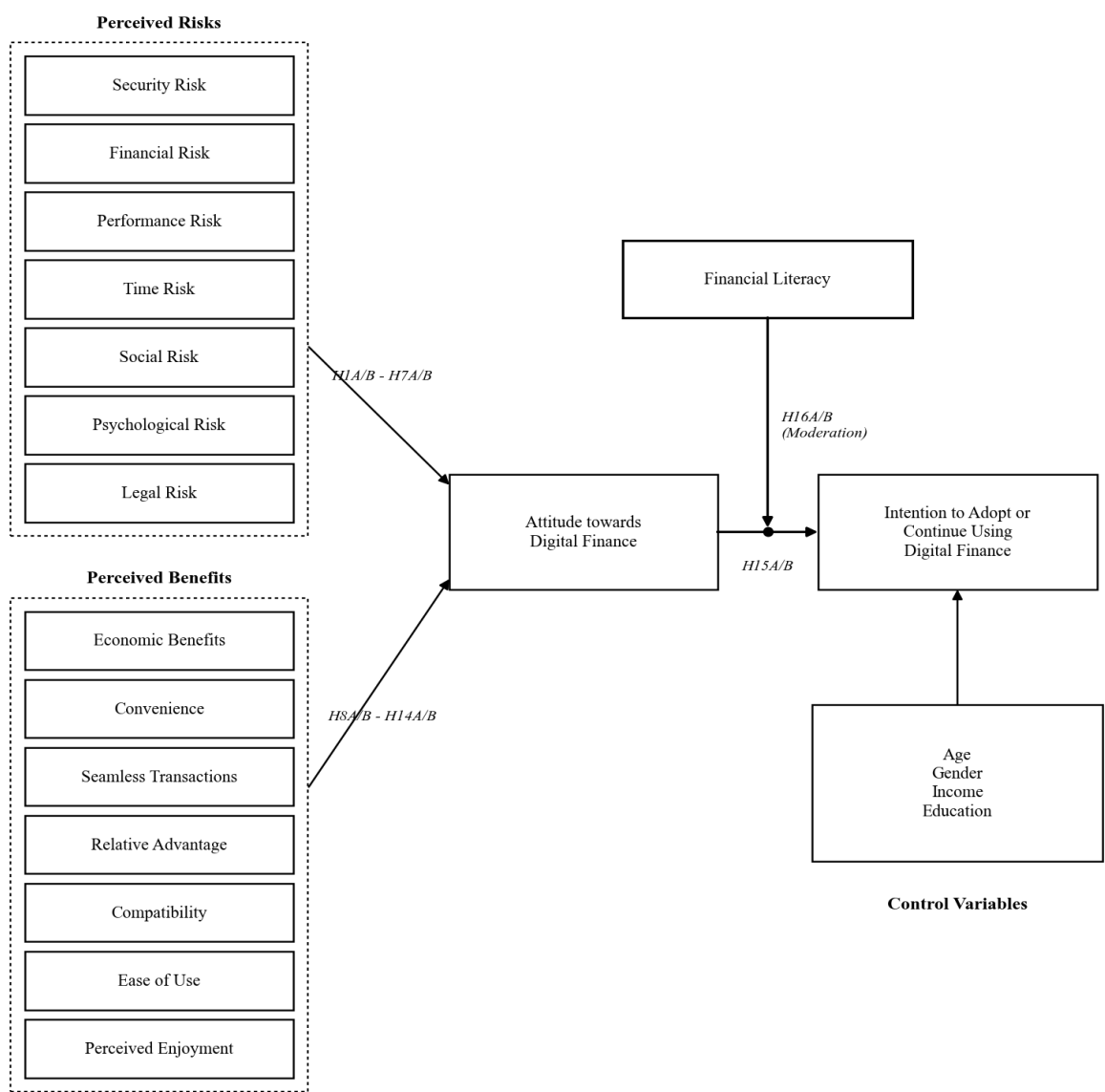
Sample size was determined a priori using G*Power (Faul et al., 2009) with F-test for linear multiple regression ($f^2 = 0.15$), $\alpha = 0.05$, power = 0.95 and fourteen predictors of attitude (194 minimum cases per group); the minimum was doubled to ensure adequate power for the multi-group comparison (Hair et al., 2017).

A self-administered online questionnaire was sent to a sample of the population via social media, invitation e-mail, online communities, and provincial distribution was determined by the 2023 census, to which demographic quotas were applied by age/sex and by province/employment sector, and data were collected across six weeks. Non-probability convenience sampling was employed because there is no sampling frame of the bank account holders of Pakistan due to the

privacy legislation and absence of a centralized register (Etikan et al., 2016). The questionnaire was sent to six hundred people and 495 returned it filled out (82.5 per cent return rate); ten multivariate outliers, identified by Mahala Nobis distance, were excluded and 485 questionnaires were used for analysis. The data set is complete (no missing items) because all items were mandatory.

The research framework that emerged from this is shown in Figure 1.

Figure 1. Research framework.



Group membership was determined using a filter question following the consent item that asked if the respondent had used any digital financial service associated with their bank account, such as mobile banking, an internet banking portal, an e-wallet or a digital payment application, in the last six months. Respondents who answered the item in the affirmative were considered users and directed to an instrument in terms of present experience, while those who answered negatively were considered non-users and directed to an instrument in terms of expectation. This 6-month window ensures that lapsed users are not included in the current users, and classification is based on a stated behavioral criterion. The resulting final sample of 276 users (56.9 per cent) and 209 non-users (43.1 per cent) is above the recommended 100 observations per group for stable PLS-SEM estimates (Hair et al., 2017).

The participation was voluntary and anonymous, informed consent was given on the first page, no identifying information was collected, and institutional ethical approval was obtained prior to data collection.

Measures

All constructs were measured reflectively with multi-item five-point Likert scales (1 = strongly disagree, 5 = strongly agree) adapted from validated instruments: the security, financial, performance, economic benefit, convenience and seamless transaction scales from Jain and Raman (2021); time risk from Kassim and Ramayah (2015); relative advantage and compatibility from Wang et al. (2018); ease of use from Turel et al. (2011); perceived enjoyment from Gerlach and Lutz (2019); attitude from Cheng et al. (2006); intention from Tian et al. (2023); and financial literacy from Martin et al. (2021). The wording of the scales was adjusted to the Pakistani context without changing their psychometric properties. Control variables were age, gender, education and income.

Content validity was achieved by the following: Items were derived from previously validated scales; Four academic experts in Digital Finance, Marketing, Technology Adoption and Quantitative Methodology reviewed the items; A pilot study was carried out with 50 respondents; and some specific expert scrutiny was done to check the overlap between the performance and security risk scales, one of which asks about strength of built-in security systems. 1 of these items was kept in its validated form to maintain the properties of the source scale, and the empirical results confirmed the discriminant validity between the two constructs (Section 4.2).

Analytical strategy

Partial least squares (PLS) structural equation modelling was selected to estimate the model for several reasons: the model is large relative to the sample (seven latent constructs and sixteen paths estimated in the two groups of 276 and 209); the objective is explanation and the importance of each predictor, rather than to confirm a fit function that must be globally satisfied (Hair et al., 2019); and a latent interaction term is specified, which would present identification issues with covariance-based estimation.

Assessment was conducted based on the guidelines in literature (Hair et al., 2017; Hair et al., 2019; Sarstedt et al., 2021). The measurement model was assessed using indicator loadings (≥ 0.70), Cronbach's alpha and composite reliability (≥ 0.70), average variance extracted (≥ 0.50), cross-loadings, Fornell–Larcker criterion (Fornell and Larcker, 1981) and the HTMT ratio (≤ 0.90 ; Henseler et al., 2015); and the structural model was assessed using variance inflation factors, path coefficients with bootstrapping (10,000 resamples; one-tailed tests of directional hypotheses), and R^2 and f^2 effect sizes (Chin, 1998; Cohen, 1988). The multi-group comparison proceeded with a two-step approach, following the suggestions of Henseler et al. (2016) and Matthews (2017), where firstly the measurement invariance of composites (MICOM) was assessed and secondly differences in the paths were tested using permutation (with 5,000 resamples, cut-off criterion $p < 0.05$ two-tailed; Ringle et al., 2020).

Common method bias was handled on a procedural basis (separated construct blocks, mixed item polarity and guaranteed anonymity), as well as statistically, using Harman's single factor test on the unrotated exploratory factor solution and the full collinearity test recommended by Kock (2015). The limitations of the tests that cannot remove the residual risk carried by a single-source, single-occasion design are acknowledged.

Results

The sample profile and descriptive statistics are provided in the table below.

The 485 respondents are mostly male (74.6 per cent) young to middle aged and highly educated (84.7 per cent with a bachelor's degree or higher). Five bands of income distribution are used, and the provincial distribution is broadly similar to the 2023 census (with Balochistan purposely oversampled at 12.4 per cent (vs the population's 6.2 per cent) to obtain an analyzable number of responses). This profile is shown in Table 1.

Table 1. Demographic and behavioral profile of respondents (n = 485).

Characteristic	Category	n	%
Age	15–29	183	37.7
	30–44	159	32.8
	45–59	102	21.0
	60+	41	8.5
Gender	Male	362	74.6
	Female	123	25.4
Education	Secondary or less	47	9.7
	Higher secondary	27	5.6
	Bachelor's degree	246	50.7
	Master's or higher	165	34.0
Monthly income (PKR)	Less than 50,000	101	20.8
	50,000–99,999	82	16.9
	100,000–149,999	109	22.5

Occupation	150,000–199,999	96	19.8
	Above 200,000	97	20.0
	Salaried	264	54.4
	Self-employed	131	27.0
	Student	39	8.0
Province	Other	51	10.5
	Punjab	259	53.4
	Sindh	110	22.7
	Balochistan	60	12.4
	Khyber Pakhtunkhwa	36	7.4
User status	Islamabad (ICT)	20	4.1
	User	276	56.9
	Non-user	209	43.1

Note. n = 485 valid responses.

Online recruitment has resulted in a higher proportion of users (56.9 per cent) than the national rate of adoption, which is around 25 per cent. The 209 non-users are also analytically interesting, as for them connectivity is not the barrier, leaving perceptual barriers as the only barrier.

Construct in the five-point rating scale is 2.81–3.49. Social and financial risk (3.10 each) attract the highest agreement among the risk dimensions and psychological risk (2.81) the lowest, while convenience is the highest-rated benefit (3.49). Attitude (3.19) and intention (3.27) are slightly above the mid-point, with self-assessed level of financial literacy being moderate (3.09). Standard deviations are within a small range (0.80 to 0.89) and all values of skewness and kurtosis are within normal ranges. Perceptions are not therefore polarized (as in non-adoption is not very much feared or as in adoption is not very much desired) and there is no evidence of ceiling or floor effects.

Table 2. Descriptive statistics for the latent constructs (n = 485)

Construct	Mean	SD	Skewness	Kurtosis
Security risk	2.992	0.844	−0.050	−0.411
Financial risk	3.098	0.848	−0.106	−0.347
Performance risk	2.823	0.858	0.011	−0.626
Time risk	3.013	0.852	0.085	−0.322
Psychological risk	2.807	0.865	0.122	−0.449
Social risk	3.104	0.840	−0.046	−0.463
Legal risk	2.903	0.859	0.066	−0.473
Economic benefit	3.380	0.828	−0.007	−0.510
Convenience	3.491	0.852	−0.167	−0.686
Seamless transactions	3.283	0.841	−0.192	−0.440
Relative advantage	3.197	0.858	−0.102	−0.599

Compatibility	3.092	0.857	-0.028	-0.425
Ease of use	3.278	0.833	-0.059	-0.360
Perceived enjoyment	3.382	0.802	-0.170	-0.405
Attitude	3.188	0.885	-0.028	-0.291
Intention	3.274	0.885	-0.130	-0.280
Financial literacy	3.095	0.841	0.031	-0.457

Note. Five-point Likert scale. For risk constructs a higher mean indicates greater perceived risk; for all others, a more favourable perception.

Measurement model

All 55 indicator loadings exceed 0.70 (range 0.781–0.904), all Cronbach's alpha values exceed 0.766, all composite reliabilities exceed 0.864, and all AVE values exceed 0.679 (Table 3). Reliability and convergent validity are therefore established for all seventeen constructs.

Table 3. Measurement model: reliability and convergent validity

Construct	Items	Loadings	CA	CR	AVE
Attitude	4	0.878–0.895	0.909	0.936	0.785
Intention	3	0.886–0.904	0.877	0.924	0.802
Security risk	3	0.823–0.844	0.784	0.873	0.696
Financial risk	3	0.800–0.897	0.813	0.886	0.722
Performance risk	3	0.816–0.890	0.805	0.884	0.718
Time risk	3	0.811–0.869	0.807	0.884	0.719
Social risk	4	0.813–0.841	0.846	0.896	0.684
Psychological risk	3	0.840–0.874	0.822	0.893	0.737
Legal risk	3	0.814–0.862	0.796	0.879	0.708
Economic benefit	3	0.782–0.861	0.786	0.873	0.697
Convenience	3	0.837–0.883	0.819	0.890	0.730
Seamless transactions	3	0.834–0.856	0.803	0.884	0.717
Relative advantage	3	0.843–0.883	0.824	0.895	0.739
Compatibility	3	0.816–0.860	0.798	0.881	0.711
Ease of use	3	0.781–0.856	0.766	0.864	0.679
Perceived enjoyment	3	0.808–0.839	0.772	0.867	0.685
Financial literacy	3	0.818–0.841	0.771	0.868	0.686

Note. CA = Cronbach's alpha; CR = composite reliability; AVE = average variance extracted. Thresholds: loadings, CA and CR ≥ 0.70 ; AVE ≥ 0.50 . All 55 indicators retained.

Three criteria were used to measure the discriminant validity. Each indicator has a higher loading onto its corresponding construct than onto any other construct. The square root of AVE is greater than all the inter relationship of constructs, and the highest relationship is between attitude and intention (0.700) compared to $\sqrt{\text{AVE}}$ of 0.886 and 0.896. However, under the more conservative HTMT criterion the highest ratio is 0.782 (attitude with intention), still less than 0.90 and the

stricter criterion of Henseler et al. (2015) of 0.85. The HTMT correlation of the two items identified by their conceptual proximity at the design stage is 0.044, and the two items are empirically well separated from each other, although one item mentions security systems.

Path Coefficients by Group – Structural model

There is no reason to worry about collinearity: all inner-model VIF values range between 1.012 and 1.057, well below the conservative VIF value of 3. Table 4 shows the standardised coefficients and t values for each group.

That all 14 antecedent paths are important among the user population is worthy of comment, not celebration. The criterion for significance is quite weak here, because the 276 cases and one-tailed tests yield significance for coefficients of the order of 0.13; the attitude dimensions are conceptually adjacent by construction, so that it is expected that they are significant in a similar fashion, and, finally, the f2 values reported below place most of the values in the small to medium range so that the fourteen dimensions make a contribution collectively rather than individually. The interpretation is therefore done by magnitude, and the user column is to be read against the non-user column, of which 5 of 16 paths are not significant.

Psychological risk is the most significant dimension to deter users ($\beta = -0.255$, $p < 0.001$) compared to security ($\beta = -0.212$), performance ($\beta = -0.201$) and social risk ($\beta = -0.195$). This is different for non-users: security risk leads (-0.231) and is the only dimension that is larger for non-users than for users, while financial risk (-0.057 , $p = 0.183$) and social risk (-0.074 , $p = 0.237$) are not significant, so H2B and H5B are rejected.

Convenience has the highest loading of all the dimensions of benefit (0.314), followed by economic benefit (0.277) and compatibility (0.247). Among non-users the magnitudes drop, and the order changes at the top with economic benefit first (0.241), followed by convenience (0.129); relative advantage (0.062, $p = 0.230$) and ease of use (0.066, $p = 0.174$), are not significant and H11B and H13B are rejected.

The strongest relationship in the model is that of attitude, and the strength of this relationship is quite different between the different groups: $\beta = 0.824$ ($t = 34.906$) among the users versus $\beta = 0.329$ ($t = 5.474$) among non-users, both $p < 0.001$. H15A and H15B are supported (H12A and H12B are not).

Table 4. Structural path coefficients by group (users n = 276; non-users n = 209)

H	Path	β (users)	t	β (non-users)	t
H1	SEC → ATT	-0.212***	5.088	-0.231***	3.948
H2	FINR → ATT	-0.160***	3.397	-0.057 n.s.	0.906
H3	PERF → ATT	-0.201***	5.891	-0.119*	1.864
H4	TIME → ATT	-0.135***	3.688	-0.140*	1.906
H5	SOC → ATT	-0.195***	5.735	-0.074 n.s.	0.716
H6	PSY → ATT	-0.255***	7.583	-0.103*	1.715

H7	LEG → ATT	-0.182***	5.029	-0.174**	2.915
H8	ECO → ATT	0.277***	7.783	0.241***	3.898
H9	CONV → ATT	0.314***	9.303	0.129*	1.733
H10	SEAM → ATT	0.238***	6.507	0.181**	2.978
H11	REL → ATT	0.222***	6.032	0.062 n.s.	0.738
H12	COMP → ATT	0.247***	7.080	0.143**	2.546
H13	EASE → ATT	0.229***	6.962	0.066 n.s.	0.937
H14	ENJ → ATT	0.217***	6.172	0.146*	2.041
H15	ATT → INT	0.824***	34.906	0.329***	5.474
H16	FL × ATT → INT	0.234***	6.621	-0.029 n.s.	0.453

Note. Standardised coefficients, 10,000 bootstrap resamples, one-tailed tests. *** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; n.s. = not significant. Controls: age, gender, education and income.

Moderation by financial literacy

Financial literacy has positive and significant relationship with attitude among the users ($\beta = 0.234, p < 0.001$) and is slightly negative and not significant among the non-users ($\beta = -0.029, p = 0.325$). H16A is supported and H16B is rejected.

The content of a moderating effect is a statement about a slope and is best conveyed by simple slopes. The attitude → intention slope for users is 0.590 at one standard deviation below the mean of financial literacy, 0.824 at the mean and 1.058 at one standard deviation above the mean of financial literacy (Figure 2). All three are positive, and whilst the positive shift in attitude is the same at every level of literacy, the change in intention is greater at higher literacy (0.59 SD) compared to lower (1.06 SD), a difference of ~79 per cent in the "return on an equal shift in attitude. As attitude rises the lines move outwards, showing that financial literacy is least important for those who have an indifferent attitude to digital finance and is most important for those who already have a favorable attitude.

Figure 2. Simple slopes of the attitude intention relationship at low, mean and high levels of financial literacy (users, H16A).

Note. Slopes from Table 4: -0.590 at one SD below the means of financial literacy, 0.824 at the mean, 1.058 at one SD above. Direct effect of financial literacy is not plotted; hence different lines will have different levels of gradient. [INSERT FILE FOR FIGURES HERE.

Explanatory power/effect sizes

By conventional standards (Chin, 1998), the specification in the pooled model explains 48.1 per cent of the variance in attitude (adjusted $R^2 = 0.466$) and 52.8 per cent of the variance in intention (adjusted $R^2 = 0.525$). Attitude and intention were estimated in two separate groups (the user group, $n = 276$; and the non-user group, $n = 209$), for which R^2 , adjusted R^2 and Q^2 were reported here. The comparison is done in Section 5.4.

The f^2 effect sizes range from small to medium with the largest being economic benefit ($f^2 = 0.135$) and convenience ($f^2 = 0.113$) and the smallest financial risk ($f^2 = 0.014$) and social risk ($f^2 = 0.033$). By contrast, the effect of attitude on intention is very large ($f^2 = 1.036$), as is the interaction term (small to medium; $f^2 = 0.045$). Thus, attitude is made up of many little actions and then, when it is time to do, attitude acts with a powerful impact.

Measurement invariance and multi-group comparison

Configural invariance is by construction: the same indicators, the same scale anchors, the same data treatment and estimation settings were provided to both groups. For each of the 17 constructs compositional invariance was examined by comparing the obtained correlation between the composite scores in both groups against an empirical distribution of 5000 permutations of group membership; the obtained correlation was higher than the 5 per cent quantile of the empirical distribution for all 17 constructs, indicating that differences in the path coefficients can be interpreted as differences in relationships and are not artefacts of the measurement models (Henseler et al., 2016).

In fact, all but five of the 16 comparisons have significant differences between users and non-users according to the permutation test (Table 5), which supports H17. The pattern is the finding; the differences are not distributed evenly across the model.

No significant difference exists between groups on security, performance, time and legal risk – these are assessed in the same way regardless of whether the respondent has transacted or not. Financial risk ($\Delta = 0.103$, $p = 0.041$), social risk ($\Delta = 0.121$, $p = 0.028$) and psychological risk ($\Delta = 0.152$, $p = 0.012$) do differ, in each case more strongly among users. In contrast, there is no difference between economic benefit and seamless transactions and perceived enjoyment, but there is a difference between convenience ($\Delta = 0.185$, $p = 0.003$), ease of use ($\Delta = 0.163$, $p = 0.011$), relative advantage ($\Delta = 0.160$, $p = 0.014$) and compatibility ($\Delta = 0.104$, $p = 0.038$), with the stronger effect again being among users.

The two biggest discrepancies have been found where attitude has been translated into intentions. The biggest difference is that between the attitude intention path (0.495; $p < 0.001$); the attitude explained approximately 68 per cent of the variance in intention among users but about 11 per cent of the variance among non-users. There is a significant difference between the financial literacy interaction of 0.263 ($p < 0.001$) from a strong positive effect among the users of financial literacy to no effect among non-users.

Table 5. Permutation test of path coefficient differences between users and non-users

H	Path	β (users)	β (non-users)	$ \Delta $	p (two-tailed)	Difference
H1	SEC $\rightarrow$ ATT	-0.212***	-0.231***	0.019	0.672	No
H2	FINR $\rightarrow$ ATT	-0.160***	-0.057 n.s.	0.103	0.041	Yes
H3	PERF $\rightarrow$ ATT	-0.201***	-0.119*	0.082	0.089	No
H4	TIME $\rightarrow$ ATT	-0.135***	-0.140*	0.005	0.893	No
H5	SOC $\rightarrow$ ATT	-0.195***	-0.074 n.s.	0.121	0.028	Yes

H6	PSY → ATT	−0.255***	−0.103*	0.152	0.012	Yes
H7	LEG → ATT	−0.182***	−0.174**	0.008	0.852	No
H8	ECO → ATT	0.277***	0.241***	0.036	0.421	No
H9	CONV → ATT	0.314***	0.129*	0.185	0.003	Yes
H10	SEAM → ATT	0.238***	0.181**	0.057	0.354	No
H11	REL → ATT	0.222***	0.062 n.s.	0.160	0.014	Yes
H12	COMP → ATT	0.247***	0.143**	0.104	0.038	Yes
H13	EASE → ATT	0.229***	0.066 n.s.	0.163	0.011	Yes
H14	ENJ → ATT	0.217***	0.146*	0.071	0.197	No
H15	ATT → INT	0.824***	0.329***	0.495	< 0.001	Yes
H16	FL × ATT → INT	0.234***	−0.029 n.s.	0.263	< 0.001	Yes

Note. Permutation test, 5,000 resamples, run after MICOM established configural and compositional invariance. Two-tailed $p < 0.05$ indicates a significant difference. $|\Delta|$ = absolute difference between group coefficients.

Discussion

That security risk reduces attitude in both groups is in the same direction as the wide range of cross-national evidence (Lee, 2009; Ryu, 2018; Jain and Raman, 2021) and is slightly larger without experience (−0.231 versus −0.212). One way of forming beliefs about security is getting salient and memorable reports of fraud, while the experience that would inform otherwise is uneventful. Security risk is not unique, but it does partially disarm.

The more important outcome is that the biggest deterrent among the users is psychological risk (−0.255) and not a security risk. This is the opposite of what is often found, which is that security outweighs, and the opposite is telling. When authentication controls are in evidence and in effect, the deterrent is not the actual risk, but the emotional toll of transacting without an intermediary: knowing you’ve sent funds to the wrong person, getting locked out, or not being able to back out of a mistake. This cost is felt, and is not expected, hence it is more than double among a user than among a non-user (−0.103) and the group difference is significant ($p = 0.012$). It is exacerbated by dense navigation and painful error handling.

Financial risk and social risk are both complete among non-users and have the same structure. The concern cannot become real enough to influence evaluation: Financial risk demands knowledge of the cost of the transaction, and of what happens when it goes wrong, and a person who is not a transactor has never had an opportunity to learn such knowledge. Social risk must have a reference group, where the behavior can be seen and thus judged and where the non-user is not subjected to this judgement. Social risk is, by contrast, a significant obstacle among users (−0.195), with a high-context scenario being one in which a failure is not just a private inconvenience, but a social event.

Legal risk is the only dimension that acts differently in the two groups, and with very similar estimates (-0.182 and -0.174 , $p = 0.852$ for the difference); this is because regulatory uncertainty is based on public information, and information is equally available for both groups. It is therefore a constraint shared by all, which is why it is legal risk – the one constraint that promotional activity cannot reach and only institutional change can. Performance and time risk are also important factors in both groups, and there is no difference between the two groups' coefficients; that indicates that expectations will be raised as people gain experience, and the time risk will not be reduced by familiarity.

Attitude, the perception–experience gap

Convenience is the most positive dimension for users (0.314) and the least positive dimension for non-users (0.129) and is the largest of all benefit dimensions ($p = 0.003$). This calls in question the notion of convenience as a given in models for adoption. Convenience is not presumed, it is achieved: someone who has experienced the inconvenience of having to go to a bank, or a shopkeeper to whom cash is paid, is in a situation that would seem quite convenient in its own terms.

The two benefit paths that don't work for non-users are for the same reasons. Relative advantage is comparative, and a comparison on one thing that is not used is a conjecture and not a comparison. The first is ease of use: TAM assumes people are assessing effort, which implies that some effort has been taken. This ease of use is therefore not a failure of TAM but is a specification of the boundary – TAM is a better predictor of continued use than first use.

In comparison, three benefits are transferred across the experience boundary with little loss: economic benefit (0.277 against 0.241 , $p = 0.421$), seamless transactions (0.238 against 0.181 , $p = 0.354$) and perceived enjoyment (0.217 against 0.146 , $p = 0.197$). Each can be assessed without use: cost savings can be calculated from information provided in a fee schedule; the value of a transaction that does not fail is obvious to anyone whose online payment has failed; and enjoyment can be inferred from other applications. The practical implication is straightforward: economic and reliability claims can be communicated to both groups in a single message; convenience, ease of use and relative advantage cannot be communicated at all. There is a need for them to be delivered.

Attitude to intention – conditional financial literacy

The strongest relationship in the model and the most divergent between groups is the attitude intention path (0.824 versus 0.329 , $\Delta = 0.495$, $p < 0.001$). Attitude is very nearly the only determinant of intention among users, and accounts for about 1 in 10 among non-users. Attitudes developed from past experiences are more easily recalled and more likely to predict intentions to act, whereas attitudes constructed from second-hand information are less firmly held and can be easily overruled by other factors: perceived behavioral control, institutional trust, and mere inertia. The single attitude–intention specification is thus mis specified for at least one of the components: pre and post adoption models are not the same model with different coefficients.

Financial literacy findings are the clearest in this study's findings from the literature. Literacy has been generally seen as a direct determinant of adoption (Hermawan et al., 2022; Ullah et al., 2022; Raut and Kumar, 2024) and on this basis, the financial education program is expected to increase the number of adoptions by non-users. The following results do not support it: Readers exhibit a strong moderation of attitude (0.234) and none for the non-readers (-0.029 , n.s.), with the difference being significant ($p < 0.001$). This mechanism is that financial literacy is not an evaluation itself, but a capability to act on an evaluation, e.g. to compare the fees of different applications, to understand what a transaction limit means, to notice a fraudulent request and to know what to do when a mistake is made, capacities that are only of interest once the person transacts. Not a lack of knowledge, but rather the lack of experience of acting is the binding constraint for a non-user, and knowledge does not dispel it. The slightly negative, non-significant non-user coefficient is consistent with a further possibility worthy of testing directly, that increasing financial knowledge with non-adopters may lead to more cautious deliberation, which if anything, slows conversion.

This does not contradict financial education; it argues that the way it's currently done is the wrong order. Literacy benefits the yield of an attitude and an experience that already exist – in-application guidance, such as on fees, or recognition of fraud now of a suspicious request, has the highest yield – rather than abstract instruction prior to any use.

Experience as a boundary condition

The individual results do not each individually state the same conclusion. Much adoption research has implied that users and non-users are at two extremes of a continuum, and that a model fit to users applies, albeit at a lower level of strength, to those who are not users. This isn't supported by the evidence here. Eleven of sixteen paths were significantly different, but measurement invariance was demonstrated prior to comparison; thus, the difference could be attributed to differences in relationship, rather than in the meaning of the measures. More revealing, however, is that four of the constructs which shape users' attitudes do not significantly affect non-users' attitudes at all, and the moderator which functions quite heavily among the users becomes non-existent.

Divergence is orderly and can be expressed as one principle: beliefs that do not need an experiential base to form, such as media, report and general reasoning transfer across the experience boundary, while those that do need such a base do not. Security risk, legal risk, performance risk, time risk, economic benefit, seamless transactions and enjoyment come under the first class and exhibit small group differences, or lack of differences. Financial risk, social risk, convenience, ease of use and relative advantage/compatibility are in the second and all these factors vary considerably. This is a more parsimonious explanation of the findings than one of varying levels of involvement and can be directly tested in other settings and technologies.

For users, then, attitude is assembled through a consistent, stable set of evaluable experiences and a model constructed from these experiences does a good job of capturing attitude; for non-users, it is assembled from fragmentary information, a significant portion of which is controlled by

constructs not included in the risk–benefit specification. This is not a fault of the model itself, but a fact about the phenomenon, and suggests that user-focused adoption models may not apply to non-users and that the constructs of risk–benefit set, institutional trust, perceived behavioral control, digital self-efficacy and social influence are needed to account for non-adoption.

Implications

Theoretical implications

Four contributions follow. The study introduces the decomposed evaluative belief base, consisting of 7 risk dimensions and 7 benefit dimensions, as an extension of the Theory of Reasoned Action, since the combined risk-benefit construct would have obscured those differences that have practical implications. It identifies the limits of the Technology Acceptance Model (TAM) because ease of use is manifest among users but not among non-users and hence TAM must be complemented by risk perceptions when it is applied to the prospective adopters. It demonstrates that risk and benefit are not symmetrical opposites but differ in kind and wax and wane with experience. And it moves financial literacy from antecedent to moderator, stating a mechanism which has been left implicit in the literature. The common denominator among all four is the demonstration in a measurement-invariant model that users and non-users have differently structured decision processes.

Implications for providers

The two groups need different approaches, and these approaches are identified in the results. Among users, the levers with the highest coefficients for retention are one-click and recurring payments, biometric authentication, saved beneficiaries and interfaces compatible with the applications that customers already use, and the reduction of psychological risk including transaction confirmation and undo facilities, plain language error messages, and reachable support (where the consequences of an action are made legible before it is taken).

Results for acquisition show a perception–experience gap, not hostility: convenience, ease of use, and relative advantage three of the most powerful drivers for users are much less important or not important at all to the non-transactors. These beliefs cannot be formed vicariously, so won't be closed with a message – only low-commitment experience will do demonstration or sandbox modes that complete a realistic transaction without actual money, supervised onboarding at the retail outlet and community centers, and first-transaction guarantees. The messages that can be communicated to non-users are those that are based on the transferable benefits: cost saving over branch banking and demonstrated reliability.

Policy implications

Legal risk is important for both groups at almost the same level and is not based on use, but on public information. Consumer protection, not promotion, is the only barrier marketing cannot reach onto which the binding constraint policy can act codified liability rules for unauthorized transactions, the mandatory time limits for dispute resolution, an easily accessible ombudsman,

and public communication of existing protections. The investment in mobile broadband and reliable electricity tackles the performance and time risks that sit in infrastructure and not in the services.

Finance education has a clear implication. Literacy is based on attitude to intention, and attitude requires actions so teaching abstract financial principles and concepts is unlikely to shift non-adopters. Instead, programmed should be based on supervised practical activities in test environments, such as install, register an application, run a transfer, read a statement, report a fraudulent transaction, etc., where new users are mentored by other users to reduce the psychological barrier to entering the system for the first time. The return of the national literacy campaigns thus will greatly rely on whether they include practice or only knowledge.

There are five limitations which have a bearing on these results, and the probable direction of the bias can be indicated in each case.

The design is cross sectional and single source (constructs all measured with one instrument on one occasion by one respondent). Common method variance cannot, therefore, be ruled out; if it existed, it would have tended to overestimate rather than underestimate the coefficients and the actual effects are thus more likely to be smaller than indicated. Future designs should be temporal in nature so that predictors and outcomes can be separated in time; or mixed methods must be used to supplement self-report data and data from behavior logs (e.g., application logs).

Sample is not representative. Online recruitment only reaches those who have some degree of digital skill and connectivity, and the sample is 74.6 per cent male, and more than 84 per cent have a bachelor's degree or above. The findings are strong for the digitally connected segment and cannot be extrapolated with confidence to the rural population or to women and/or less educated people, where the barriers are likely to be greatest. The coefficients for ease of use and psychological risk are likely understated because of the lower barriers to such respondents.

The term non-user also has a more restricted definition than it would normally define. The study does not focus on financial inclusion in general here, rather on the digitization of existing banking relationships: the non-users here are holders of bank accounts, and the study as a whole will have reduced, but not increased, the differences between the groups, which are therefore plausible lower bounds in Section 4.6. The next step is to expand the population to the unbanked.

Financial literacy was assessed using self-reported items; these items reflect self-perceived, not actual, financial literacy. The moderation result is driving, so this is material: Measuring error in an interaction term would lead to underestimation of the effect, and the true effect among users could be larger than 0.234. This could be tested through replication, using an objective instrument (adapted OECD/INFE or PISA assessment) which differentiates between general and digital financial literacy.

Finally, it is only financial literacy which is explored as a moderator and not digital literacy (literacy in using digital technologies) and institutional trust and infrastructural quality, which may be considered as plausible boundary conditions; and the single-country context requires

cross-national replication to determine what findings can be generalized. The most direct test of the central claim would be a longitudinal cohort of non-users waiting for them to become users; this would reveal the transitions where the paths from non-use to usage were no longer non-significant.

Conclusion

This study examined the perceived risks and benefits that influence attitudes towards digital finance in Pakistan, their differential effects on users and non-users of digital finance, and if financial literacy is a determinant of attitude-to-behavior and intention. Estimating seven dimensions of risk and seven dimensions of benefits together, it finds that attitude is a sum of many small parts and not one big part; that psychological risk is the strongest deterrent among users, and convenience is the strongest driver among users; that attitude then has a tremendous impact on intention amongst users and a much more limited impact amongst non-users; and that financial literacy contributes to the yield of a favorable attitude, but only amongst those who transact.

The important, bigger conclusion is about the way the adoption decision is constructed, not about any one coefficient. Beliefs can be formed at a distance — security, legality, cost and reliability — are beliefs that both users and non-users of a system have. Beliefs that require a point of comparison in experience — convenience, effort, comparative advantage, financial exposure and social visibility — are beliefs only those with a point of comparison for them can have. Experience does not just amplify perception, but it also creates perceptions that can be evaluated in their perceptual form. Users and non-users are thus two populations, and not two points along the same path that present differently structured decision processes.

In a land where the infrastructure and price obstacles have largely been eliminated and 25% of adults engage in digital finance, the message is simple: what cannot be communicated must be delivered. It is that first experience, and not the argument, which places the appropriate beliefs, so should acquisition strategy and financial education alike be organized around that first experience of transacting, which should be safe and supervised.

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