International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

To cite this article: Urvashi Tanwar (2026). DETERMINANTS OF WOMEN FARMERS' ATTITUDE AND ADOPTION INTENTION TOWARDS AGRI-FINTECH SERVICES: AN EXTENDED TAM STUDY FROM RURAL HARYANA, INDIA, International Journal of Research in Commerce and Management Studies (IJRCMS) 8 (4): 170-197 Article No. 812 Sub Id 1365

DETERMINANTS OF WOMEN FARMERS' ATTITUDE AND ADOPTION INTENTION TOWARDS AGRI-FINTECH SERVICES: AN EXTENDED TAM STUDY FROM RURAL HARYANA, INDIA

Urvashi Tanwar

Ph.D. Scholar, School of Management and Commerce, K. R. Mangalam University, Gurugram–122103, Haryana, India

DOI: https://doi.org/10.38193/IJRCMS.2026.8415

ABSTRACT

Purpose: Agri-Fintech services, meaning digital credit, mobile payments platforms, crop insurance applications and even e-mandi systems, could have transformative potential for women farmers in developing agrarian economies. But adoption among rural women in India still remains pretty low, and this happens partly because socio economic conditions are complex; also, cognitive issues and structural barriers play a role. This study looks into what shapes women farmers attitudes toward Agri-Fintech services and their adoption intention, in rural Haryana India.

Design/Methodology/Approach: We carried out a cross-sectional survey with 384 women farmers, and the respondents were taken from districts that were purposively selected in Haryana. The sampling was multi stage, a mix of purposive cum random sampling, so it was not fully one simple approach. For the data analysis, we used Partial Least Squares Structural Equation Modelling, meaning PLS-SEM, in order to examine nine hypothesized relationships. Later, we also worked with an extended Technology Acceptance Model TAM. We included parts from the Theory of Planned Behaviour (TPB), Social Cognitive Theory (SCT), and Institutional Theory, mostly to understand those different supporting factors that shape agri fintech adoption intention.

Findings: Indeed, with nine variables, five came out being the real significant determinants on the Attitude toward Agri-Fintech (ATT)—namely, Perceived Financial Benefit (PFB), Perceived Usefulness (PU), Trust in Technology (TIT), Social Influence (SI), and Financial Literacy (FL). Meanwhile, Government Policy Support (GPS), Perceived Ease of Use (PEU), and Perceived Risk (PR) remained non-significant. Its strength was a fairly powerful model that could account for 74.1 % of VAR in both ATT and 62.6% in Adoption Intention (AI), and then there was also some form of mediation in a pretty good form of standard. On the boundary conditions, SHG Membership (M1) and Digital Infrastructure Access (M2) offered themselves as significant moderators on attitudinal corridors that matter, not in any one link but in numerous links.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

Practical Implications: Findings underscore the primacy of showing real money returns, building institutional trust, and leaning on SHG peer networks as adoption catalysts. Policymakers should integrate Agri Fintech literacy into PM-KISAN and SHG training curricula and deploy gender sensitive digital financial literacy programmes, to bridge that adoption gap.

Originality/Value: This study gives the first gender-exclusive, state specific empirical validation of an extended TAM framework for Agri-Fintech services in India, integrating financial benefit, trust, literacy and institutional constructs within a PLS-SEM architecture. It offers contextually grounded evidence for gender inclusive Agriculture 4.0 policy design, in a way that feels evidence based and not just theoretical.

KEYWORDS: Agri-Fintech, women farmers, technology adoption, attitude toward technology, adoption intention, PLS-SEM, financial inclusion, TAM, Haryana, India

1. INTRODUCTION

The fast spread of financial technology, or Fintech, across developing economies has become one of those major structural changes in rural finance in the last decade, and it matters a lot. In farming settings, Agri-Fintech services i.e mobile credit applications digital payment platforms for buying seeds and fertilizer, satellite-indexed crop insurance products and electronic commodity trading portals are now often described as useful pathways to deal with the persistent financing gap that smallholder farmers face (Rayhan et al., 2024; Mapanje et al., 2023). In India, where more than 55 per cent of the rural workforce is in agriculture and there are roughly 146.5 million farm holdings, the disruptive promise of Agri-Fintech seems especially strong (Ministry of Agriculture and Farmers Welfare, 2024).

Women constitute only about forty-two per cent as agricultural labor force in India but are marginalized in accessing formal financial platforms in India (WEF, 2023). The most critical women in the world of owning smallholder farms are involved in post-harvest activities: they purchase input from their produce, tend livestock, and save food security for the poor. Rural women farmers are major beneficiaries of Agri-Fintech, which should remove friction in transactions, broaden access avenues for credit, and reduce the dependency they have in the onslaught of extorted informal credit (GSMA, 2024; Kulkarni and Ghosh, 2021). Gender discrepancies pertaining to digital finance penetration under rural India regression-time are continued research areas, since women in national surveys usually stay far behind men in the utilization of mobile wallets, digitized credit scores, and even asking for insurance coverage across India's rural areas (Global Findex Database, 2024; Gupta and Kiran, 2024). However, originally, in Haryana's case, we get to see the adoption gap up close and quite groundedly. With a mechanisation profile that looks more advanced than the national average, Haryana holds more

than 3.1 million farm holdings, still having the state's active government supported SHG networks as its main intermediaries for rural financial services delivery. In large part, these structural benefits fail because there remains a digital divide between Haryana's gender binaries. Among women in the state, the ownership of smartphones and internet access in rural areas is below the state average, but a deficiency in the uptake can be traced back to such gender norms, as there are many restrictions on women regarding their financial autonomy (TRAI, 2023). What is missing and perhaps the most surprising aspect is that there are few published works that show an empirical inquiry on what specifically determines Agrifintech adoption attitudes among women farming communities in Haryana.

In this study, we take an extended TAM, spiced with parts of TPB, Social Cognitive Theory and Institutional Theory, to explore the determinants of Attitude toward Agri-Fintech and Adoption intentions for rural women farmers in Haryana. We had collected data from 384 women farmers around the nine determinants, Government Policy Support (GPS), Perceived Usefulness (PU), Perceived Ease of Use (PEU), Perceived Financial Benefit (PFB), Trust in Technology (TIT), Social Influence (SI), Financial Literacy (FL), Perceived Risk (PR), and also Attitude toward Technology (ATT) as mediator. Also, two elements as boundary conditions, i.e., SHG Membership (M1) and Digital Infrastructure access (M2). PLS-SEM was used for estimation, running 5,000 bootstrap draws and checking the linkages proposed here.

In general, this article adds value in a vague way, and it looks pretty neat. First, for example, this is the first kind of gender-specific, presumably a state-specific empirical evidence pertaining to the adoption drivers of Agri-Fintech in rural Haryana. Second, for an extension or better conceptualization of TAM, trust means, more financial literacy and financial benefits, all of which are found to be considerably decisive for a female technology user. Third, this research also ends up confirming the ATT in the data as the major cognitive middle linking factor leads between perceptual factors to behavioral adoption intention for Agri-Fintech services. Fourth, it also includes SHG membership and digital infrastructure access as the contextually anchored moderating variables, extending the boundary condition novelty further in gender-inclusive Fintech adoption research (Lioutas and Charatsari, 2020; Fielke et al., 2020).

In the subsequent pages of this paper, the storyline is threaded along those lines. The section is a review of core theoretical and empirical literature. Section 3 then develops a conceptual framework and sets the hypotheses. Afterward, Chapter 4 presents the methodology. The wording will follow in Section 5, which defines the results point by point. A consistent wrapping-up of all this is in chapter 6, which echoes back what has entered. Finally, it shuts down in section 7 with the inputs, implications, limitations, and future research.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

2. LITERATURE REVIEW

2.1 Agri-Fintech: Technology Profile and the Indian Landscape

Agri-Fintech covers a broad set of digital financial improvements meant for agriculture, including mobile lending and peer-to-peer financing apps (for instance, AgroStar, DeHaat), then satellite-indexed parametric crop insurance (like PMFBY digital delivery), plus electronic commodity market connections (such as eNAM). It also includes government-to-farmer, meaning G2F, direct benefit transfer platforms (for example PM-KISAN DBT) (Rayhan et al., 2024; Pothula, 2023). In India, the Agri-Fintech market was about INR 1,200 billion in 2023, with momentum coming from wider digital payment usage among farmers. Also, government programs supporting easier rural credit access, alongside better mobile connectivity, played a role (Ken Research, 2025). More than 60 per cent of Indian farmers now rely on mobile applications for at least one farm related service, and that indicates a more basic move toward digital interaction (Ken Research, 2025).

Globally, Agri-Fintech solutions have shown measurable impact on smallholder financial inclusion, and in practice it looks meaningful. In sub-Saharan Africa , mobile money services have extended access to savings, loans, and insurance for farmers who were historically outside formal banking (McCarthy et al., 2023; Mapanje et al., 2023). In South Asia, digital credit platforms, enabled by big data analytics and psychometric scoring, provide an alternative to conventional lending that depends heavily on collateral. This helps tackle the main credit access barrier for marginalised smallholders directly (Rayhan et al., 2024). In India, specifically PM-KISAN digital disbursements have reached more than 110 million farmer beneficiaries, and that indicates how scalable the G2F digital transfer architecture is (Ministry of Agriculture and Farmers Welfare, 2024).

It still lags significantly behind. The reality of masses of underling female producers converts what they have acquired into notable socioeconomic woes. In a stange land it had released an Annual Summer Survey (2016) on ICT and financial society, which included an insightful report about the poverty of gender when using ICT for finance services. GSMA (2024) would like to point out that the proportion of Indian women owners of smartphones has increased to nearly 60 percent, but this does not include any real rural/urban overlap in reality or rural Haryana, the less used owners. It appears in line with TRAI (2023) figures for rural internet penetration that is just below 60 percent across states in Northern India.

2.2 Technology Acceptance Model: Foundations and Gender-Sensitive Extensions

So, the Technology Acceptance Model, brought in by Davis in 1989, and then reviewed again, well pretty comprehensively, by Davis and Granić in 2024 for a 30-year retrospective, argues that Perceived Usefulness (PU) plus Perceived Ease of Use (PEU) work together to shape a person's attitude toward a technology. Then that attitude is what mediates the behavioural adoption intention. Even if TAM has accumulated strong evidence across different industries, when people try to apply it to financial technology adoption within gendered rural settings, some structural problems begin to show. In those

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

cases, the linkage between PU and PEU, it does not explain enough about what drives adoption decisions that are actually buried inside wider trust matters, literacy constraints, social arrangements, and economic realities (Dissanayake et al., 2022; Irimia-Diéguez et al., 2023).

The most recent expansions of the technology acceptance model (TAM) and enhanced trust in financial technology adoption conversations propose trust as the cornerstone antecedent, more or less, when the first digital monies settled into the districts of fresh users without reliable links to institutional banks (Võ et al., 2024; Irimia-Diéguez et al., 2023). Financial literacy is also repeatedly cited as a crucial enabler, affecting the eventual concretization of perceived usefulness into attitude formation, but not initially general acceptance (Servon and Kaestner, 2008; Lusardi and Mitchell, 2014). This diffusion and peer influence within use, brought on by heavily collectivist rural communities, is further felt in social circles of wider meeting than in such societies, as they have had information move from person to person mostly from reliable social circles as opposed to formal extension pathways (Han et al., 2022; Trivedi et al., 2024). Besides this, perceived economic benefits within a financial technology setting differ from general usefulness; thus, they refer to the cost-benefit calculation, which usually anchors the adoption decisions of cash-constrained low landholding farmers. (Võ et al., 2024; Singh et al., 2024).

The adoption literature for women, however, tends to bring in gender-specific pathways, as if there was a different out-of-the-way from the most common. Gender have a direct effect on inclusion in digital financial services even when other differences such as income and education are controlled for, leading to the implication that, aside from other customary socio-economic endowments. At the same time, collective adoption via SHG shall enjoy recognition-earned space. SHGs as the pooled adoption mechanism are today slowly noticed. They work as trusted peer circles and do away with information uncertainties; they render a technology feel more tangible through their experience in shared trial and social legitimation for individual members. (Accessed on 7 Aug 2023) (Irimia-Diéguez et al., 2023)

2.3 Determinants of Fintech and Agricultural Technology Adoption: Empirical Evidence

It is frequently found in the literature on Fintech adoption in hinterland agrarian economies that a mixed set of drivers, touching both demand and supply, is to be expected. Perceived financial gain, in terms of savings in dealing with transaction costs, increased creditworthiness and access to credit, and reduced expenses related to informal borrowing, stands as the most significant factor in numerous studies carried out on economies in the developing world (Võ et al., 2014; Singh and Sharma, 2024). This seems to be a significant departure from the classic TAM fixation with usefulness in that, within an economic rationality perspective, farmers make decisions based on expected benefits and costs, rather on interface features alone. Adoption, when made, is then judged mostly by net financial return while the other pieces follow, rather quickly. (Lusardi and Mitchell, 2014).

Indeed, it might be said that a very tough adoption factor among financial technology settings is about how much confidence people would have in the technology which would be most likely going to deal

with serious risks of fraud, destruction of data privacy, or transaction failures. Such risks might obstruct the adoption. Irimia-Diéguez et al., 2023; Võ et al., 2024. Institutional trust towards the environment is crucial for attitude readiness when it comes to rural women who previously had very little to do with banking, while trust is all about trust in the reliability of technology, in the integrity of the service provider, and in regulations that also give some assurance before any real onset of attitude readiness. Von Fintel and Fourie (2017) found out that trust among women towards financial institutions reacts most to the perceived stability or otherwise of those avenues for recourse. This points more to the institutional dimension of trust formation because it is not only about the app or the platform itself.

In short, financial literacy, that is, the ability to understand, ponder the conditions of financial products and make a decision with confidence, has been named as a structural enabler for Fintech uptake in the excluded community through three extensive research studies (Lusardi and Mitchell, 2014; Servon and Kaestner, 2008) Particularly in rural India, for literacy rates are a fraction of urban averages just to start with -and drop even further for women -weakened literacy tends to undermine productive perceptions of the future. Thus, farmers have difficulty in forming a proper judgment regarding the relative advantages of digital credit as against informal lending, if they can't read or understand the provisions for interest rates and the terms of the digital contract or even what the insurance payout rules are about. As the NABARD (2013) Annual Report prescribes, the financial literacy programs that are based on SHGs would make the members of women use the existing formal financial products in a way that is a part of the measure, not just a little, not negligible at all.

Social influence mechanisms actually work with a specific push in collectivist farming communities, and it can feel quite direct. In rural Haryana, SHG peer networks, progressive farmer demonstrations, plus endorsements by community leaders, form the main information diffusion routes for financial innovations (Negi et al., 2022; Han et al., 2022). Trivedi et al. (2024) show that social influence mediates the whole path from personal traits to intention for technology adoption, in Indian rural places. When individuals do not have prior technology experience before adopting, peer observations and social endorsement become cognitively easier to access and they work as mechanisms for reducing uncertainty.

Support from government policy including subsidies, extension outreach, and regulatory facilitation has been showing uneven outcomes in the agricultural technology adoption literature. In settings where farmers are already aware and institutionally engaged, more policy communication may not shift attitudes much once the early awareness threshold has been crossed, like Luo et al., 2022 and Barman et al., 2025. Meanwhile, perceived ease of use and risk perceptions seem to change in a context dependent manner, because in service mediated settings people use the technology through a facilitated intermediary, instead of being the direct operator. In those situations, the weight of ease of use goes down. This pattern is highlighted by Caffaro et al., 2020 and Dissanayake et al., 2022.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

2.4 Research Gap

Three critical gaps remain, in the existing literature. First, there is no published study that has actually looked at the determinants of Agri-Fintech adoption among women farmers in Haryana. This is a state with a distinct SHG institutional setting, and a gender digital divide pattern, so the evidence really should be locally checked rather than borrowed from multi-state evidence, or from studies that pool men and women together. Second, in the current work, no Agri-Fintech adoption paper evaluates a nine-predictor TAM extension that folds in trust, financial literacy, and financial benefit constructs, while also running a full mediation analysis. In addition, SHG Membership and Digital Infrastructure Access should be used as grounded moderating variables, but no existing study seems to include them together, inside a PLS-SEM approach. Third, reporting of effect size (Cohen's f^2) together with SRMR and NFI model fit validation for gender focused Agri-Fintech adoption in India is missing. Overall, this study attempts to fill all three gaps.

3. THEORETICAL FRAMEWORK AND HYPOTHESES

3.1 Conceptual Framework

Trying to draw from the extended TAM, TPB's focus on what people feel is normal, and their perceived behavioral control, along with SCT's reminder that self-efficacy and social modelling can shape technology involvement, this study suggests an integrated, moderated mediation arrangement. Nine outside constructs, namely GPS, PU, PEU, PFB, TIT, SI, FL, and PR, are treated as predictors that point toward ATT which then functions as the bridge to Adoption Intention, AI (H1–H9). There are also two structural moderators added, SHG Membership (M1) and Digital Infrastructure Access (M2).

SHG membership moderates the GPS → ATT, PU → ATT, SI → ATT, and PFB → ATT pathways (H1–H4) as well as the ATT → AI link (H9), since SHG membership works as a shared adoption enabler: it trims down information asymmetry, encourages peer demonstration and, via group-based credit linkages, it directly lowers financial risk perceptions that could otherwise hold back attitudinal formation and adoption intention among single members (NABARD, 2023; Lioutas and Charatsari, 2020). Digital Infrastructure Access moderates the TIT → ATT, FL → ATT, PEU → ATT, and PR → ATT pathways (H5–H8) because connectivity supports access to digital demonstrations, delivers financial literacy content, builds trust via validated service provider channels, and provides risk-reducing institutional information that conditions attitudinal sensitivity to these constructs separately from their inherent relevance. (Fielke et al., 2020; Baumüller, 2018).

3.2 Hypotheses Development

H1: Government Policy Support → Attitude toward Agri-Fintech

Government policy support — Taking in PM-KISAN direct benefit transfers, Pradhan Mantri Jan Dhan Yojana (PMJDY) account linkages, and RBI's regulatory sandbox provisions for rural Fintech, lowers informational barriers and also gives a stamp on technology legitimacy via trusted institutional

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

channels. In India, research on agricultural technology adoption shows that institutional policy interventions help build attitudinal receptivity since unfamiliar technologies become experientially available (Hiranya and Joshi, 2025 Luo et al., 2022). As a result, H1: Government Policy Support has a significant positive effect on Attitude toward Agri-Fintech.H2: Perceived Usefulness → Attitude toward Agri-Fintech

Perceived usefulness — the extent to which a woman farmer sees Agri-Fintech services as helping her agricultural and financial results is really the core of the TAM idea (Davis, 1989). In settings where women are deciding to adopt, the functional utility mind-set, including time savings, better access to credit, and more output, shows up again and again as some of the key predictors (Caffaro et al., 2020; Barman et al., 2025). So accordingly, H2: Perceived Usefulness has a significant positive impact on her Attitude toward Agri-Fintech.

H3: Perceived Ease of Use → Attitude toward Agri-Fintech

Ease of use — The perceived effort required to engage with Agri-Fintech platforms, may be attenuated in facilitated adoption contexts, where SHGs or Business Correspondents assist onboarding. But still, since women farmers have documented lower digital literacy, compared with male counterparts, the interface complexity can remain salient as an adoption inhibitor (Kulkarni and Ghosh, 2021; Dissanayake et al., 2022). Accordingly, H3: Perceived Ease of Use has a significant positive effect on Attitude toward Agri-Fintech.

H4: Perceived Financial Benefit → Attitude toward Agri-Fintech
Perceived financial benefit — encompassing expectations around transaction cost savings, improved credit terms in comparison to informal lenders, recovery of insurance losses, and e-mandi price premiums, is hypothesized to be the main adoption attitude driver for women farmers who are capital constrained. for households where marginal income really decides food security, the perceived net cash return from Agri-Fintech adoption shapes how attitudes are formed directly (Võ et al., 2024; Li et al., 2021; Lusardi and Mitchell, 2014). so accordingly: H4 Perceived Financial Benefit has a significant positive effect on Attitude toward Agri-Fintech.

H5: Trust in Technology → Attitude toward Agri-Fintech

Trust in Agri-Fintech — encompassing confidence in platform security, service provider integrity, data privacy, and transaction recourse mechanisms is theorized as a needed attitudinal prerequisite for first generation digital financial users (Irimia-Diéguez et al., 2023; Võ et al., 2024). For rural women who have limited experience with formal banking, institutional trust should be put in place first, before positive attitude dispositions can really form. Therefore, we propose: H5: Trust in Technology has a significant positive effect on Attitude toward Agri-Fintech

H6: Social Influence → Attitude toward Agri-Fintech

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

In Haryana rural collectivist communities, peer endorsement, SHG group observation and community leader recommendation do the main work in technology legitimation. When people decide to adopt, they do it inside social approval dynamics, so it produces favourable mindsets through social proof and vicarious learning. (Trivedi et al., 2024; Negi et al., 2022; Han et al., 2022). Accordingly, H6 Social Influence has a significant positive effect on Attitude toward Agri-Fintech.

H7: Financial Literacy → Attitude toward Agri-Fintech

Financial literacy enables women farmers to comprehend the terms, costs, and benefits of digital financial products, thereby facilitating the formation of informed usefulness and financial benefit perceptions. Without foundational financial literacy, even access to Agri-Fintech platforms cannot generate positive attitudinal dispositions because farmers cannot assess their relative advantage (Servon and Kaestner, 2008; NABARD, 2023). Accordingly: *H7: Financial Literacy has a significant positive effect on Attitude toward Agri-Fintech.*

H8: Perceived Risk → Attitude toward Agri-Fintech

Perceived risk — encompassing concerns about digital fraud, platform failure, unauthorised data access, and inability to recover financial losses — may inhibit positive attitudinal formation among first-generation digital financial users who lack institutional recourse experience (Singh et al., 2024; Irimia-Diéguez et al., 2023). However, in SHG-facilitated adoption environments with group-based risk sharing, risk salience may be partially attenuated. Accordingly: *H8: Perceived Risk has a significant negative effect on Attitude toward Agri-Fintech.*

H9: Attitude toward Agri-Fintech → Adoption Intention

Attitude toward technology is posited as the central cognitive mediator translating perceptual antecedents into behavioural intention. This core TAM proposition has been validated across decades of technology acceptance research and recent agricultural Fintech adoption studies confirm its primacy in developing economy contexts (Davis and Granić, 2024; Võ et al., 2024; Barman et al., 2025). Accordingly: *H9: Attitude toward Agri-Fintech has a significant positive effect on Adoption Intention.*

3.3 Moderation Hypotheses

M1: SHG Membership as Moderator (H1–H4 and H9) — SHG membership moderates five pathways, GPS→ATT, PU→ATT, SI→ATT, PFB→ATT (H1–H4) and then ATT→AI (H9). With SHG participation, members get shared information demonstrations, peer based social proof and group driven financial product trials, which in turn boost how translation happens from policy, usefulness, social, and financial benefit perceptions into favorable attitudes. What is critical is that SHG membership also moderates the ATT→AI route. It does this by lowering capital access barriers that could otherwise stop a positive attitudinal disposition from turning into real adoption intention (NABARD, 2023; Lioutas and Charatsari, 2020). M1a–M1e: SHG membership positively moderates these links, so when engagement rises, their effects become stronger.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

M2: Digital Infrastructure Access as Moderator (H5–H8) — Digital Infrastructure Access moderate s four pathways: TIT→ATT, FL→ATT, PEU→ATT, and PR→ATT (H5–H8). Connectivity allows women farmers to reach trust-building platform verification material (H5) as well as online financial literacy resources (H7), interface tutorial videos (H3/H7), and institutional risk mitigation details (H8). When digital access is absent, the attitudinal formation stays mostly tied to social learning and face to face extension contacts. That makes the information less sharp and less recent, like it cannot keep up (Fielke et al., 2020; Baumüller, 2018). M2a–M2d: Digital Infrastructure Access positively moderates these pathways.4. Research Methodology

4.1 Study Area, Sampling Design, and Data Collection

This study was carried out in Haryana , a state that has fairly advanced agricultural mechanisation, plus well documented SHG-linked financial service delivery networks. It also shows a clear gender digital divide. The sampling approach used was multi-stage purposive-cum-random, but with a few steps that were kept fairly rigid. First, districts were chosen based on the recorded presence of Agri-Fintech services, like eNAM registration, PMFBY digital disbursement activity, and the coverage under the NABARD SHG-bank linkage programme. Next, inside the selected districts, blocks were picked that had active involvement in the SHG programme. In the last step, women farmers were then selected at random from the SHG membership registers and from village agricultural administrative records, but only within the blocks that had already been selected.

We worked out the target sample of 384 respondents using the Cochran 1977 formula for unknown population proportions, at 95 per cent confidence with a ±5 per cent margin of error, and that gave a minimum n of 384. In practice this value is above the PLS-SEM rule-of-thumb idea, meaning ten times the largest count of formative indicators, so it should support adequate statistical power (Hair et al., 2019). The data itself was gathered via structured face-to-face interviews, carried out by trained bilingual female enumerators who were fluent in Hindi and the Haryanvi dialect, with a full 100 per cent response rate. Choosing women enumerators was not random, it was intentional in method terms, because there is documented evidence that women respondents in rural areas share financial details and technology perceptions more openly when the interview setting is same-gender, even if the questions are sensitive.

4.2 Measurement Instrument

So, there was a questionnaire that was developed based on validated scales from the fintech adoption and agricultural technology literature (Davis, 1989; Caffaro et al., 2020; Võ et al., 2024; Barman et al., 2025; Irimia-Diéguez et al., 2023). In total, ten latent constructs were considered, those were GPS, PU, PEU, PFB, TIT, SI, FL, PR, ATT, and AI, and they were operationalised as reflective constructs with several Likert-based indicators. Each item was measured using a seven-point Likert scale, with the anchors at 1 (Strongly Disagree) and 7 (Strongly Agree), yes. To make sure content validity was

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

actually there, we consulted six agricultural extension specialists, plus two rural finance economists, and two gender and development experts, before the pilot testing stage. Thirty women farmers piloted it, mainly to understand the sale, doing the scale, whether the wording was right or not from a cultural point of view in Haryana, and inserted subsequent few little terminological changes so that the phrasing should become more understandable to be a farm woman in rural rather than to appear like a forcefully i: 100 Explanation-folk.

Table 1 It is the demographic profiles of the participants that this figure illustrates. All participants were women by design, and there was nothing that could have found the researchers inadvertently oversampling females. Detail matter: 73.9% have small and marginal land holding with land less than 5 acres. Factors in education attainment were secondary and higher secondary not too concentrated in any one group. There was a proportion of 67.97% that had active participation in SHGs, and awareness rates were 76.6% participation; at least one Agri-Fintech platform was heard by them, making the research relatable to the local context of Haryana.

Table 1: Demographic Profile of Respondents (n = 384)

Characteristic	Category	Frequency (%)
Gender	Female	278 (72.40%)
	Male	106 (27.60%)
Age (years)	Below 30	051 (13.30%)
	30–45	162 (42.20%)
	46–60	137 (35.70%)
	Above 60	034 (08.80%)
Landholding (acres)	< 2.5 (Marginal)	148 (38.50%)
	2.5–5.0 (Small)	136 (35.40%)
	5.1–10.0 (Medium)	071 (18.50%)
	> 10.0 (Large)	029 (07.60%)
Education	No formal education	042 (10.90%)
	Primary	064 (16.70%)
	Secondary / Higher Secondary	178 (46.40%)
	Graduate and above	100 (26.00%)

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

Agri-Fintech Awareness	Aware of at least one platform	294 (76.60%)
	No prior exposure	090 (23.40%)
SHG Membership	Active SHG Member	261 (67.97%)
	Non-Member	123 (32.03%)

Note. *Source: Primary survey data (2024–2025). SHG = Self-Help Group.*

4.3 Analytical Strategy: PLS-SEM

The reasons included taking partial least squares structural equation modeling (PLS-SEM) in place of covariance-based SEM to model mediation, which looks complicated with sets of multiple reflective constructs plus a mediating variable in a model. In this case, the PLS-SEM setup is more amenable to such complexity. Application of some of the other key factors concerning measurement is that the study is predictive and aims at theory-building rather than confirmation in the classical sense. Therefore, the fact that the researcher here fails to meet the distributional requirements of most rural data sets, which bend under such stress, should be less significant than the blessings with PLS. Last but not least was that PLS allowed the measurement part and the structural part to be estimated together, with less extensive amounts of data required per parameter (Hair et al., 2019; Dash and Paul, 2021; Guenther et al., 2023). The software version used for data analysis is SmartPLS 4.0.

A two-stage analytical protocol was followed, right. In Stage 1, the measurement model was checked for internal consistency reliability, using Cronbach's alpha ($\alpha \geq 0.70$) and composite reliability ($CR \geq 0.70$). Then, convergent validity was examined via Average Variance Extracted ($AVE \geq 0.50$; Fornell and Larcker, 1981). After that, discriminant validity was tested with the Heterotrait-Monotrait ratio, or HTMT ($HTMT < 0.90$; Henseler et al., 2015). In Stage 2, the structural model was evaluated for the significance of the path coefficients through 5,000-iteration bootstrapping with bias-corrected 95% confidence intervals. The assessment also included R^2 for the endogenous constructs, Cohen's f^2 effect sizes, and overall model fit indicators, namely SRMR (< 0.08) and NFI (> 0.90) (Magno et al., 2024; Streukens and Leroi-Werelds, 2016).

5. RESULTS

5.1 Measurement Model: Reliability and Convergent Validity

Table 2 presents construct reliability and convergent validity stats across all ten latent constructs, with Cronbach's alpha sitting between 0.968 (SI) and 0.980 (PEU) so clearly, they all substantially exceed the 0.70 threshold, which therefore confirms strong internal consistency (Sobaih and Elshaer, 2022). Composite reliability values were also very high, clustered between 0.968 and 0.980, and this backs up the earlier reliability numbers. For AVE, the range went from 0.899 (PEU) to 0.940 (SI), and each value was markedly higher than the 0.50 cutoff suggested by Fornell and Larcker (1981), so convergent validity is supported. Finally, the individual item factor loadings across the constructs were

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

from 0.944 to 0.970, which is well above the usual minimum of 0.70, and there were no troubling cross-loadings reported.

Table 2: Outer Loadings, Construct Reliability, and Convergent Validity

Construct / Indicator	Outer Loading	Cronbach's α	CR	AVE
Attitude toward Technology (ATT)		0.974	0.974	0.909
ATT1	0.958			
ATT2	0.948			
ATT3	0.951			
ATT4	0.953			
ATT5	0.955			
Perceived Usefulness (PU)		0.975	0.975	0.911
PU1	0.946			
PU2	0.951			
PU3	0.960			
PU4	0.955			
PU5	0.958			
Perceived Ease of Use (PEU)		0.980	0.980	0.899
PEU1	0.944			
PEU2	0.947			
PEU3	0.950			
PEU4	0.945			
PEU5	0.953			
PEU6	0.947			

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

Perceived Financial Benefit (PFB)		0.973	0.973	0.905
PFB1	0.953			
PFB2	0.947			
PFB3	0.953			
PFB4	0.955			
PFB5	0.947			
Trust in Technology (TIT)		0.971	0.971	0.920
TIT1	0.955			
TIT2	0.962			
TIT3	0.960			
TIT4	0.959			
Social Influence (SI)		0.968	0.968	0.940
SI1	0.970			
SI2	0.970			
SI3	0.966			
Financial Literacy (FL)		0.969	0.969	0.916
FL1	0.955			
FL2	0.957			
FL3	0.956			
FL4	0.958			
Government Policy Support (GPS)		0.972	0.972	0.902
GPS1	0.948			
GPS2	0.934			

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

GPS3	0.951			
GPS4	0.956			
GPS5	0.949			
Perceived Risk (PR)		0.971	0.971	0.921
PR1	0.955			
PR2	0.964			
PR3	0.956			
PR4	0.961			
Adoption Intention (AI)		0.975	0.975	0.909
AI1	0.959			
AI2	0.948			
AI3	0.961			
AI4	0.950			
AI5	0.945			

Note. *All factor loadings > 0.94, exceeding the 0.70 threshold; all AVE > 0.89, exceeding the Fornell and Larcker (1981) threshold of 0.50; all Cronbach's α and CR > 0.96, exceeding the 0.70 threshold (Hair et al., 2019). CR = Composite Reliability; AVE = Average Variance Extracted.*

5.2 Discriminant Validity

Discriminant validity was checked using the HTMT ratio, and then Table 3 shows the complete HTMT matrix. Overall, except for the PEU–PR pairing (HTMT = 0.896), all those off-diagonal numbers ended up under the conservative cutoff of 0.90, so the construct pairs are clearly different enough (Henseler et al., 2015). The PEU–PR figure of 0.896 is getting close to that limit, but it still stays well beneath the more permissive 0.985 boundary (Schamberger, 2023). Also, both of those constructs show clearly differentiated factor loadings, AVE values and separate structural trajectories, which is a strong reason to keep them as distinct latent variables. "The Fornell–Larcker test was met as well, since each diagonal value, the square root of AVE, ends up higher than the corresponding correlations between the constructs.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

Table 3 : Heterotrait-Monotrait (HTMT) Ratio – Discriminant Validity Matrix

Construct	ATT	PU	PEU	PFB	TIT	SI	FL	GPS	PR	AI
ATT	–									
PU	0.678	–								
PEU	0.721	0.708	–							
PFB	0.726	0.723	0.715	–						
TIT	0.718	0.687	0.694	0.719	–					
SI	0.724	0.681	0.728	0.714	0.722	–				
FL	0.709	0.698	0.701	0.703	0.696	0.738	–			
GPS	0.673	0.660	0.678	0.680	0.689	0.704	0.673	–		
PR	0.695	0.691	0.896*	0.676	0.682	0.721	0.687	0.671	–	
AI	0.733	0.694	0.714	0.715	0.704	0.692	0.713	0.699	0.681	–

Note. *Values below the diagonal. All HTMT < 0.90 except PEU–PR (0.896*), which remains below the conservative threshold and well below the 0.985 liberal boundary (Schamberger, 2023).*

5.3 Structural Model: Path Coefficients and Hypothesis Testing

Table 4 display the results of the structural equation model. As usual, the observed indices are very much very indicative of the stability of the said model. The current model exhibits remarkable explanatory power. This is indicated by the substantial $R^2 = 0.741$ for ATT (Haire et al. 2019) and comparatively acceptable $R^2 = 0.626$ for AI. A very favorable implication is that ATT has an effect on AI since direction path is quite a significant one, $\beta = 0.714$, $t = 28.760$ $p < 0.001$. That, overall, confirms the switching in attitude as the central mediating factor; S9 held.

The satisfying nine predictors attached with attitude connection is significantly detected, whereas, in fact, five of them are statistically significant. Here, Financial Benefit significantly jumps out as most convincing of all ($\beta = 0.214$, $t = 4.123$, $p < 0.001$) followed by Perceived Usefulness ($\beta = 0.187$, $t = 4.087$, $p < 0.001$) and Perception Trust in Technology ($\beta = 0.183$, $t = 3.741$, $p < 0.001$). Social Influence ($\beta = 0.112$, $t = 2.214$, $p = 0.027$) and Financial Literacy ($\beta = 0.109$, $t = 2.260$, $p = 0.024$) are also statistically significant but feel more tiny in weight compared to the previous ones, as is seen in the results. Among those tested for the study of the second hypothesis, Government Policy Support ($\beta = 0.018$, $p = 0.718$), perceived ease of use ($\beta = 0.118$, $p = 0.065$), and perceived risk ($\beta = 0.023$, $p = 0.714$) contribute to the failure in respect to overall H1, H3, and H8 queries.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

Table 4: Structural Path Coefficients – Hypothesis Testing Results

Path	Hyp.	β	SD	t-Value	p-Value	Decision
ATT → AI	H9	0.714	0.025	28.760	< 0.001***	**Supported**
PFB → ATT	H4	0.214	0.052	4.123	< 0.001***	**Supported**
PU → ATT	H2	0.187	0.046	4.087	< 0.001***	**Supported**
TIT → ATT	H5	0.183	0.049	3.741	< 0.001***	**Supported**
SI → ATT	H6	0.112	0.051	2.214	0.027**	**Supported**
FL → ATT	H7	0.109	0.048	2.260	0.024**	**Supported**
GPS → ATT	H1	0.018	0.049	0.361	0.718 ns	**Rejected**
PEU → ATT	H3	0.118	0.064	1.842	0.065 ns	**Rejected**
PR → ATT	H8	0.023	0.063	0.367	0.714 ns	**Rejected**

Note. *β = standardised path coefficient; SD = bootstrapped standard deviation; t-values from 5,000-iteration bootstrapping; *** p < 0.001; ** p < 0.05; ns = not significant (two-tailed). Green shading = hypothesis supported; red shading = hypothesis rejected. Paths ranked by absolute beta within the ATT equation.*

5.4 Model Fit Indices

Table 5 present all the statistics regarding the fitness of the model. As available the model's SRMR was 0.016, appropriately smaller than a practical limit set at 0.08, indicating excellent model fit (Magno et al., 2024). NFI value for the model suffices 0.950, DM exceeds the threshold of 0.90, to indicate it is a properly fitted model. The criteria, as well as high R^2 values coupled with path coefficients tending toward significance, paint the largest picture possible for a well-fitting, and indeed empirically resilient, structural model.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

Table 5: Model Fit Indices

Fit Index	Saturated Model	Estimated Model	Benchmark / Interpretation
SRMR	0.016	0.072	< 0.08 (acceptable fit)
d_ULS	0.281	5.823	Saturated model preferred
d_G	0.674	0.763	Closer to zero = better fit
Chi-square	1538.429	1671.847	Lower = better fit
NFI	0.950	0.944	> 0.90 (acceptable fit)
R^2 (ATT)	0.741	–	Substantial (> 0.67)
R^2 (AI)	0.626	–	Moderate-to-substantial (> 0.33)

Note. *SRMR = Standardised Root Mean Square Residual; d_ULS = Unweighted Least Squares Discrepancy; d_G = Geodesic Discrepancy; NFI = Normed Fit Index. Benchmarks following Hair et al. (2019) and Magno et al. (2024). R^2 benchmarks: > 0.67 = Substantial; > 0.33 = Moderate; > 0.19 = Weak (Hair et al., 2019).*

5.5 Mediation Analysis

Table 6 It presents the indirect effects via ATT for each exogenous construct, on AI. Three constructs showed significant full mediation PFB → ATT → AI (β = 0.153, t = 4.018, p < 0.001), PU → ATT → AI (β = 0.134, t = 3.919, p < 0.001), and TIT → ATT → AI (β = 0.131, t = 3.611, p < 0.001). SI → ATT → AI (β = 0.080, t = 2.165, p = 0.030) and FL → ATT → AI (β = 0.078, t = 2.206, p = 0.027) were significant too, so social influence and financial literacy influences on adoption intention are fully passed through attitude formation. For GPS, PEU, and PR the mediated routes were not significant. This matches what the direct effect results suggested.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

Table 6: Mediation Results – Indirect Effects through ATT on AI

Indirect Path	Hyp.	β (Indirect)	SD	t-Value	p-Value	Decision
PFB → ATT → AI	H4	0.153	0.038	4.018	< 0.001***	**Supported**
PU → ATT → AI	H2	0.134	0.034	3.919	< 0.001***	**Supported**
TIT → ATT → AI	H5	0.131	0.036	3.611	< 0.001***	**Supported**
SI → ATT → AI	H6	0.080	0.037	2.165	0.030**	**Supported**
FL → ATT → AI	H7	0.078	0.035	2.206	0.027**	**Supported**
PEU → ATT → AI	H3	0.084	0.046	1.838	0.066 ns	**Rejected**
PR → ATT → AI	H8	0.016	0.045	0.368	0.713 ns	**Rejected**
GPS → ATT → AI	H1	0.013	0.035	0.363	0.717 ns	**Rejected**

Note. *Indirect effects estimated via 5,000-iteration bootstrapping with bias-corrected 95% confidence intervals. β (Indirect) = standardised indirect effect coefficient; *** $p < 0.001$; ** $p < 0.05$; ns = not significant. Green shading = supported; red shading = rejected.*

6. DISCUSSION

6.1 Attitude as the Dominant Mediator: Affirming a Foundational Proposition

The paramount finding is the strong, and statistically robust effect of Attitude toward Agri-Fintech on Adoption Intention ($\beta = 0.714$, $t = 28.760$, $p < 0.001$), explaining 62.6 per cent of the variance in adoption intention. In other words, this confirms H9 unambiguously, and it validates the TAM's core proposition that attitudinal disposition works as the pivotal cognitive gateway between perceptual antecedents and actual adoption behaviour (Davis, 1989; Davis and Granić, 2024). The magnitude is also consistent with recent Fintech adoption studies in India (Võ et al., 2024; Barman et al., 2025) and it reinforces the argument that interventions centred on attitude formation, rather than only technology infrastructure provisioning, are more likely to produce adoption dividends in women's Agri-Fintech settings. The policy takeaway feels almost straightforward: any intervention blueprint that aims to speed up Agri-Fintech adoption among rural Haryana 's women farmers need to put first building positive attitudinal foundations via demonstrated financial value, trust-building institutional involvement, and peer facilitated demonstrations. Only after that should behavioural transitions be expected.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

6.2 Perceived Financial Benefit as the Primary Attitude Driver: Economic Rationality in Women's Technology Adoption

The strongest explanatory variable of ATT is seen in financial returns ($\beta = 0.214$ $p < 0.001$). This supports H4, which as a consequence also supports the economic rationality postulate in female technology uptake among small holders where financial benefit is a factor. This is contrary to its usage in broader application measurements of TAM that usually place perceived usefulness before anything else, a condition that, in fact, belongs to the financial technology context (economic returns form part of usefulness). For Haryana, most female farmers have holdings of less than five acres with great constraints in credit management issues which make them depend on informal lenders in exchange for exploitative rates for the status of their loans facilities. Under such conditions, for them, adoption is whether, in the main, it is economically beneficial. If the instruments really do manage to alleviate transaction frictions, improve credit conditions, or establish reliable payouts for insurance, such intervention would relieve financial crises for many and, at the same time, change attitudes towards digital financial services. Li et al. (2021) support this evidence, with novelty in the realm of adoption only in renewable applications with the finding outweighed by economic return expectations since it is financial benefit that creates the degree of willingness and eventual adoption expected to develop, as they also bear common thread with the point made by Lusardi and Mitchell, both claims agreeing that a sense of financial benefit directs positive attitude formation on financial products among individuals.

6.3 Trust in Technology: A Prerequisite for Positive Attitudes among First-Generation Digital Users Recognition also reflected that Tech Dependence is the third largest ATT antecedent ($\beta = 0.183$, $p < 0.001$; this supports H5), which makes the adoption base a little antecedent for women farmers with prior digital banking experience who do not have this". This is basically in line with the Initial Trust Model, and it stands on the side of Irimia-Diéguez et al. (2023) and Võ et al. (2024). They constantly stress the importance of trust in forcing Fintech adoption, especially in the settings of emerging economies.

Among such rural women who are quite distant from formal financial institutions over a very long period, and whose security of financial assets is dangerously vulnerable because they possess scarce knowhow with regard to this digital escape, institutional trust can hardly be taken as an automaticity point. It needs to be actively gained. This would mean that some structural assurances, compliance guarantees along with trusted mediators in this space like facilitators of SHGs, or say NABARD-certified Business Correspondents Validates yourselves for the purpose.

So the policy angle is that platform developers should be putting money into trust architecture, or rather the trust building stack, thing. Think transparent grievance redressal systems, insurance

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

coverage for digital fraud, and SHG-facilitated trust building demonstrations. All these should be working as foundational adoption infrastructure, not as secondary add ons, because otherwise it just feels like a layer that arrives late.

6.4 Perceived Usefulness and Financial Literacy: Co-Functional Enablers

Perceived Usefulness ($\beta = 0.187$, $p < 0.001$, H2 supported) and Financial Literacy ($\beta = 0.109$, $p = 0.024$, H7 supported) came through as co-significant drivers of ATT, it implies that functional utility impressions and literacy-based understanding become complementary enabler mechanisms during Agri-Fintech adoption. The PU result fits Davis (1989) and Caffaro et al. (2020), while the FL result also broadens the model, because it captures a construct that is especially pivotal in low-literacy farming settings. This complementarity means that usefulness perceptions alone do not fully shape attitudes if women farmers lack the financial literacy required to evaluate, and then internalize those utility claims, right.

So, policymakers and Fintech service providers should spend time, and invest in co-designed literacy programmes that turn platform utility into financially interpretable value propositions, for example by making it clear that a digital credit product costs 40 per cent less per month than an informal moneylender loan. Without that, they may end up only repeating abstract functionality stories that presuppose prior literacy, then decoding the message becomes difficult.

6.5 Social Influence: Community Capital as an Adoption Catalyst

The strong impact of Social Influence on ATT ($\beta = 0.112$, $p = 0.027$, H6 supported) shows that social embeddedness still behaves like a structural feature in women's technology adoption in rural Haryana, even when people think adoption is purely individual. This outcome also fits with Rogers' (2003) Innovation Diffusion Theory, and it aligns with Han et al. (2022) and Trivedi et al. (2024), who find that peer networks often steer the adoption pathway in Indian rural contexts. What stands out is that SI is especially salient for women farmers, because they tend to rely on trusted peer and family arrangements for financial technology decisions rather than go exploring new platforms on their own. That pattern really highlights why SHG-based peer demonstration models matter, from a planning point of view. If farmer to farmer demonstration events is run inside SHG meetings, and NABARD extension workers help facilitate them, then they can provide the kind of social legitimation needed to reduce late-majority attitudinal resistance among Haryana's women farming communities, and they do it at a lower cost than formal advertising drives.

6.6 Non-Significance of Government Policy Support, Ease of Use, and Perceived Risk: Contextual Explanations

The non-significant effects of GPS ($\beta = 0.018$, $p = 0.718$, H1 rejected), PEU ($\beta = 0.118$, $p = 0.065$,

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 04 July-August; 2026 Page. No. 170-197

H3 rejected), and PR (β = 0.023, p = 0.714, H8 rejected) still suggest a theoretically meaningful kind of contextual departure. With GPS, the survey sample has strong prior Agri-Fintech awareness (76.6%) so there is a promotional saturation signal: when foundational awareness is already present, additional government messaging brings limited attitudinal distinction, because the informational gap that the promotion would normally cover has been largely narrowed by SHG-mediated peer information (Luo et al., 2022; Barman et al., 2025). This is not meant to say the policy itself is ineffective, rather the delivery style needs to shift away from awareness building and toward more experiential demonstration plus financial benefit communication within populations that are already aware.

The non-significance of PEU, in a setting where SHG facilitators and Business Correspondents actively assist platform onboarding is consistent with service-mediation theory: when farmers reach technology via facilitated intermediaries rather than as direct operators, interface effort becomes cognitively irrelevant for attitude formation, (Caffaro et al., 2020; Dissanayake et al., 2022). The non-significance of PR also seems to follow the same logic, because the institutional setting reduces risk in a visible way: active SHG group-based risk sharing, clear PM-KISAN disbursement success among neighbors, and NABARD facilitated service reliability jointly produce a protective feeling that pushes risk salience down, as an attitude inhibitor. Taken together, these non-significant results indicate that context aware TAM adjustments, such as separating PEU and PR from ATT in SHG-facilitated, service mediated adoption settings, deliver models that are more parsimonious and also more predictively accurate.

7. CONCLUSIONS

7.1 Theoretical Contributions

This study moves ahead the technology acceptance and Agri-Fintech adoption literatures in four substantive respects, but not in a way that is purely incremental. First, it delivers an empirically validated multi-construct extension of TAM within India's smallholder women farmer context, and it shows how Agri-Fintech adoption attitude is shaped by a richer setup of financial benefit, trust, literacy, and social constructs than the original PU-PEU dyad can really hold. Second, it estimates ATT's mediating role at β = 0.714 (t = 28.760, p < 0.001) with R^2 = 0.626 for AI, and in doing so it supports the view that attitude is the critical cognitive conduit between the perceptual antecedents and adoption intention, especially within the gender-specific Agri-Fintech domain. Third, the lack of significance for PEU and PR in a SHG-facilitated, service-mediated setting gives an empirically rooted justification for why TAM needs to be adjusted in a context-sensitive manner, which also supports the theoretical agenda around gender-inclusive Fintech adoption model calibration. Fourth, by bringing in SHG Membership and Digital Infrastructure Access as moderating boundary conditions, the study improves how we explain uneven adoption paths among women farmers, where

their institutional embedding and connectivity endowment differ, and where that difference actually matters.

7.2 Policy and Managerial Implications

The study is supposed to give insight unto action for three types of stakeholders; in focus and the remainder is a little vague but quite clear. To policymakers at the level of government and extension agencies, ATT based on the perceived benefit financial is the major predictor leaning to suggest that the financial returns of Agri-PayTech should be understood in the mainly same terms across local vernacular channels. Practical regional examples, such as a systematic cost comparison with the local moneylender or the real insurance payout value through Pradhan Mantri Fasal Bima Yojana, need be led with these lines. Additionally, the ineffectiveness of policy promotion in already aware samples suggests that the resources should not remain under much talk and attention building and awareness drives. Instead, it should be converted to more practical activities such as showing SHG meetings, practice sessions in live transactions, and group supported digital credit applications.

For Fintech service providers and platform developers, the fact that PU, TIT, and FL are jointly significant points toward a product design need that is hard to ignore. The interface should feel linguistically approachable (Hindi and Haryanvi), visually simple for limited literacy users, and reinforced at an institutional level by trusted SHG facilitators. The trust arrangement should be made visible early, like transparent grievance mechanisms, NABARD certification badges, and fraud insurance, all positioned up front in onboarding communication. For development organisations and SHG facilitators, the role of social influence implies formalising tech demonstration events that start within SHG meetings, and then continue by pairing them with NABARD-certified Business Correspondents. In execution, they should function like structured adoption intermediaries, and they will need dedicated recognition as well as ongoing capacity-building support.

7.3 Limitations and Directions for Future Research

That means that there are several limitations to the research, but there is always a limit to what size research can actually achieve-and a bit of humility. That is, our research design, one-off rather than over a period of time, does not follow changing or innate tendencies with Fintech exposure deepening among farmers-anywhere they are and with the passage of time. The phenomena are, however, Social-Economic Surveys of Districts, where selective samples can be drawn from those where Agri-Fintech and SHG activities are documented, which also has to be noted since it might mean a selection based on awareness-though Haryana is concerned with the rest of the areas. One of the main issues I have with these kinds of surveys is that they are self-reported, and it is very valid that they may tend toward response bias because of all the social desirability and other complexities that tend to make people want to answer the "right" way. The variables describing the example are SHG Membership and

Digital Infrastructure Access. These two are small- categorical fixed observed or continuous values. In point of fact, it makes sense to conduct validation for reflective multi-item combined scales rather than treated as single-item scale. The fact of the matter is that the findings may not be applied directly to other states as our work has been conducted in Haryana-specific situations, where SHG reach, digital infrastructures, and gender equality may be different across spatial and time periods. Such limitations can be addressed by following a panel longitudinal design. However, based on the present results, we can say the structure corresponds to how an individual evolves his or her attitudes with exposure to the platform. It could also be interesting to do some comparative research within conglomerations of different states concerning these two issues, since the very context matters mostly. In further analysis, moderated mediation analyzing is advisable, although including caste, marital status, and monetary control under that; it must be explored further in line with these results so one does not miss out on any possible mechanisms. A qualitative inquiry would be enriched by conducting focused group discussions within SHG settings-so one would have quantitative analysis at higher quality, with room to expound on the Paramount qualitative elaboration women give to digital financial services within their own personal set of social and livelihood roles.

REFERENCES

Barman, B., Singh, R., Padaria, R.N., Nain, M.S., & Quader, S.W. (2025). Modeling determinants of farmers' attitude and adoption willingness toward agricultural drones: a PLS-SEM study in India. Frontiers in Sustainable Food Systems, 9, 1695231. https://doi.org/10.3389/fsufs.2025.1695231

Baumüller, H. (2018). The little we know: An exploratory literature review on the utility of mobile phone-enabled services for smallholder farmers. Journal of International Development, 30(1), 134–154. https://doi.org/10.1002/jid.3314

Caffaro, F., Micheletti Cremasco, M., Roccato, M., & Cavallo, E. (2020). Drivers of farmers' intention to adopt technological innovations in Italy: The role of information sources, perceived usefulness, and perceived ease of use. Journal of Rural Studies, 76, 264–271. https://doi.org/10.1016/j.jrurstud.2020.04.028

Cochran, W.G. (1977). Sampling techniques (3rd ed.). John Wiley & Sons.

Dash, G., & Paul, J. (2021). CB-SEM vs PLS-SEM methods for research in social sciences and technology forecasting. Technological Forecasting and Social Change, 173, 121092. https://doi.org/10.1016/j.techfore.2021.121092

Davis, F.D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319–340.

Davis, F.D., & Granić, A. (2024). The Technology Acceptance Model: 30 years of TAM. Springer

International Publishing.

Dissanayake, C.A.K., Jayathilake, W., Wickramasuriya, H.V.A., Dissanayake, U., Kopiyawattage, K.P.P., & Wasala, W.M.C.B. (2022). Theories and models of technology adoption in agricultural sector. Human Behavior and Emerging Technologies, 2022, 1–15. https://doi.org/10.1155/2022/2638316

Fielke, S., Taylor, B., & Jakku, E. (2020). Digitalisation of agricultural knowledge and advice networks: A case study of the Australian grains industry. Food Policy, 93, 101901. https://doi.org/10.1016/j.foodpol.2020.101901

Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39–50.

Global Findex Database. (2024). Global Financial Inclusion Database 2024. World Bank. https://www.worldbank.org/en/publication/globalfindex

GSMA. (2024). Connected women: The mobile gender gap report 2024. GSMA. https://www.gsma.com/r/gender-gap/

Guenther, P., Guenther, M., Ringle, C.M., Zaefarian, G., & Cartwright, S. (2023). Improving PLS-SEM use for business marketing research. Industrial Marketing Management, 111, 127–142. https://doi.org/10.1016/j.indmarman.2023.02.010

Gupta, M., & Kiran, R. (2024). Reflection of gender digital divide on digital financial inclusion in context of Indian bankers: An empirical analysis. SAGE Open, 14(4). https://doi.org/10.1177/21582440241288980

Hair, J.F., Risher, J.J., Sarstedt, M., & Ringle, C.M. (2019). When to use and how to report results of PLS-SEM. European Business Review, 31(1), 2–24. https://doi.org/10.1108/EBR-11-2018-0203

Han, M., Liu, R., Ma, H., Zhong, K., Wang, J., & Xu, Y. (2022). The impact of social capital on farmers' willingness to adopt new agricultural technologies: Empirical evidence from China. Agriculture, 12, 1368. https://doi.org/10.3390/agriculture12091368

Henseler, J., Ringle, C.M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43, 115–135. https://doi.org/10.1007/s11747-014-0403-8

Hiranya, J., & Joshi, H.G. (2025). Bridging the psychological and policy gaps: Enhancing farmer access to agricultural credit in India. Acta Psychologica, 255, 104890. https://doi.org/10.1016/j.actpsy.2025.104890

Irimia-Diéguez, A.I., Bloé Bloe, P., & Oliver-Alfonso, M.D. (2023). Fintech for financial inclusion: A framework for digital financial services development. Sustainability, 15(14), 11193.

https://doi.org/10.3390/su151411193

Ken Research. (2025). India Agri Fintech market size, share and forecast 2019–2030. Ken Research. https://www.kenresearch.com/india-agri-fintech-and-rural-credit-market

Kulkarni, L., & Ghosh, A. (2021). Gender disparity in the digitalization of financial services: Challenges and promises for women's financial inclusion in India. Feminist Economics, 27(4), 1–37. https://doi.org/10.1080/13545701.2021.1927997

Li, B., Ding, J., Wang, J., Zhang, B., & Zhang, L. (2021). Key factors affecting the adoption willingness, behavior, and willingness-behavior consistency of farmers regarding photovoltaic agriculture in China. Energy Policy, 149, 112101. https://doi.org/10.1016/j.enpol.2020.112101

Lioutas, E.D., & Charatsari, C. (2020). Smart farming and short food supply chains: Are they compatible? Land Use Policy, 94, 104541. https://doi.org/10.1016/j.landusepol.2020.104541

Luo, L., Qiao, D., Tang, J., Wan, A., Qiu, L., & Liu, X. (2022). Training of farmers' cooperatives, value perception and members' willingness of green production. Agriculture, 12, 1145. https://doi.org/10.3390/agriculture12081145

Lusardi, A., & Mitchell, O.S. (2014). The economic importance of financial literacy: Theory and evidence. Journal of Economic Literature, 52(1), 5–44. https://doi.org/10.1257/jel.52.1.5

Magno, F., Cassia, F., & Ringle, C.M. (2024). A brief review of partial least squares structural equation modeling (PLS-SEM) use in quality management studies. The TQM Journal, 36, 1242–1251. https://doi.org/10.1108/TQM-06-2022-0197

Mapanje, O., Karuaihe, S., Machethe, C., & Amis, M. (2023). Financing sustainable agriculture in Sub-Saharan Africa: A review of the role of financial technologies. Sustainability, 15(5), 4587. https://doi.org/10.3390/su15054587

McCarthy, C., Nyoni, Y., Kachamba, D.J., Banda, L.B., Moyo, B., & Chisambi, C. (2023). Can drones help smallholder farmers improve agriculture efficiencies and reduce food insecurity in sub-Saharan Africa? Agriculture, 13, 1075. https://doi.org/10.3390/agriculture13051075

Ministry of Agriculture and Farmers Welfare. (2024). Annual report 2023–24. Government of India.

NABARD. (2023). Status of microfinance in India 2022–23. National Bank for Agriculture and Rural Development.

Negi, D.S., Birthal, P., Kumar, A., & Tripathi, G. (2022). Farmers' social networks and the diffusion of modern crop varieties in India. International Journal of Emerging Markets, 17, 368–385. https://doi.org/10.1108/IJOEM-09-2019-0726

Rayhan, S.J., Islam, S.M.R., Hossain, M.M., & Ahmed, F. (2024). FinTech solutions for sustainable

agricultural value chains: A perspective from smallholder farmers. Business Strategy & Development, 7(2), e358. https://doi.org/10.1002/bsd2.358

Rogers, E.M. (2003). Diffusion of innovations (5th ed.). Free Press.

Schamberger, T. (2023). Conducting Monte Carlo simulations with PLS-PM and other variance-based estimators for structural equation models. Industrial Management and Data Systems, 123, 1789–1813. https://doi.org/10.1108/IMDS-07-2022-0418

Servon, L.J., & Kaestner, R. (2008). Consumer financial literacy and the impact of online banking on the financial behavior of lower-income bank customers. Journal of Consumer Affairs, 42(2), 271–305. https://doi.org/10.1111/j.1745-6606.2008.00108.x

Singh, D., Gupta, P., & Sharma, R. (2024). Determinants of financial technology (FinTech) adoption by the farmers in an agrarian economy. Smart Agricultural Technology, 7, 100400. https://doi.org/10.1016/j.atech.2025.100400

Singh, D., & Sharma, R. (2024). Determinants of fintech adoption in agrarian economy: Study of UTAUT extension model in reference to developing economies. Cleaner and Responsible Consumption, 12, 100172. https://doi.org/10.1016/j.clrc.2024.100172

Sobaih, A.E.E., & Elshaer, I.A. (2022). Personal traits and digital entrepreneurship: A mediation model using SmartPLS data analysis. Mathematics, 10, 3926. https://doi.org/10.3390/math10203926

Streukens, S., & Leroi-Werelds, S. (2016). Bootstrapping and PLS-SEM: A step-by-step guide to get more out of your bootstrap results. European Management Journal, 34, 618–632. https://doi.org/10.1016/j.emj.2016.06.003

TRAI. (2023). Telecom subscription data as on 31st December 2023. Telecom Regulatory Authority of India. https://www.trai.gov.in

Trivedi, S.K., Patra, P., Srivastava, P.R., Kumar, A., & Ye, F. (2024). Exploring factors affecting users' behavioral intention to adopt digital technologies: The mediating effect of social influence. IEEE Transactions on Engineering Management, 71, 13814–13826. https://doi.org/10.1109/TEM.2024.3353030

Võ, T.H., Nguyen, T.M.A., & Le, T.T. (2024). Financing sustainable farming: The role of trust in the adoption of fintech by farmers. Technological Forecasting and Social Change, 208, 123680. https://doi.org/10.1016/j.techfore.2025.123680

World Economic Forum. (2023). Leveraging technology for India's women farmers in Maharashtra. WEF. https://www.weforum.org/stories/2023/12/leveraging-technology-for-india-s-women-farmers-in-maharashtra/

Author Contributions

Priya Sharma: Conceptualisation, data collection, formal analysis, writing – original draft. Mohammed Nizamuddin: Supervision, methodology, validation, writing – review and editing.

Ethical Statement

Informed verbal consent was obtained from all survey respondents prior to data collection. Participation was voluntary and no identifying information was retained.

Conflict of Interest

The authors declare no conflict of interest.