

## **E-Banking in Rural Areas of Himachal Pradesh: Exploring Awareness and Adoption of E-Banking Services**

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### **ABSTRACT**

*The present study tries to know the awareness and usage of e-banking in rural Himachal Pradesh and discusses significant barriers and a scope for digital financial inclusion. This study has identified the differentiation between being comfortable and unfamiliar with e-banking platforms based on findings from organised questionnaires rounded out by 360 rural respondents. The study shows that adopting E-banking is highly influenced by digital literacy, education, and trust in online systems. It is also noted that digital gaps, security and privacy concerns, and poor internet access act as major deterrents. This study emphasises that policymakers, banking institutions, and technology providers must focus on interventional strategies. These challenges require multi-stakeholder efforts to be overcome: governments, financial institutions, and technology providers must bridge the gap regarding digital literacy, put up adequate infrastructure, and develop user-friendly systems.*

**Keywords:** *E-Banking; Digital Banking; Rural Areas; Himachal Pradesh; Mobile Banking; Digital Literacy.*

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### **1.0 Introduction**

E-banking refers to conducting financial transactions electronically without physical bank visits (Kumar *et al.*, 2020). It includes online transfers, UPI transactions, and mobile banking, transforming the financial sector by improving efficiency, reducing costs, and enhancing convenience (Tay *et al.*, 2022; World Bank, 2014).

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It also promotes financial inclusion by reaching underserved rural areas, enabling savings, investments, and credit access (Mishra *et al.*, 2024; Tay *et al.*, 2022). In rural India, e-banking addresses challenges like geographical barriers and the economic unviability of traditional banking (Singh *et al.*, 2013). Mobile banking and digital tools empower rural populations, integrating them into the formal financial system (Mishra *et al.*, 2024). Government initiatives like PM Jan Dhan Yojana and Digital India have boosted rural banking accessibility and digital literacy (Ministry of Finance, 2022; Reserve Bank of India, 2024). However, adoption remains uneven, particularly in states like Himachal Pradesh, where terrain and dispersed settlements hinder traditional banking (Yadav, 2015). Despite its potential, e-banking adoption in rural Himachal Pradesh is low due to factors like digital illiteracy, poor internet connectivity, lack of devices, and trust issues (Friedline *et al.*, 2020; Kaur *et al.*, 2021; Singh *et al.*, 2013). While policies aim to enhance financial inclusion, rural populations often remain excluded (Mishra *et al.*, 2024). Existing research predominantly focuses on urban adoption, neglecting rural-specific socio-economic, infrastructural, and psychological barriers (Asrani, 2020). This highlights a critical gap in understanding how these factors and regional and demographic nuances hinder e-banking adoption in rural Himachal Pradesh (Kumar, 2024).

### **1.1 Study's objective**

The following goals are intended to be addressed by this study:

- To assess the awareness and understanding of e-banking services among rural populations in Himachal Pradesh.
- To analyse adoption rates and usage patterns of e-banking services.
- To identify key factors, including socio-economic and infrastructural variables, influencing the adoption of e-banking in rural areas.

### **1.2 Study's inquiry**

- What variables affect rural Himachal Pradesh residents' knowledge, adoption, and use of e-banking services, and how may they be addressed to promote financial inclusion?

### **1.3 Study's hypotheses**

- H1: A significant relationship exists between demographic factors (age, education, income) and awareness of e-banking services.
- H2: Perceived trust significantly influences e-banking adoption among rural respondents.
- H3: Digital literacy significantly affects the likelihood of adopting e-banking services.
- H4: Internet connectivity issues significantly impact e-banking adoption.
- H5: There are significant differences in e-banking adoption rates across age groups.

## **1.4 Scope and relevance**

This study addresses barriers and determinants that affect the adoption of e-banking in rural Himachal Pradesh, filling a gap in the literature. Furthermore, it focuses on rural Himachal Pradesh in a study where most past studies have concentrated on urban areas or general trends in adopting e-banking. This study examines the unique socio-economic and infrastructural dynamics of the rural part of the area, thus providing region-specific actionable insights. The findings are relevant to policymakers, banking executives, and technology providers. These insights can help policymakers design region-specific digital literacy campaigns and infrastructural investments. Banking executives could modify e-banking platforms to fit the needs of rural users concerning trust and usability issues, while technology providers could use the findings to develop localized solutions that enhance accessibility and build trust (Kumar *et al.*, 2020). This study, in response to these challenges, thus facilitates financial inclusion for broader developmental goals in rural India.

## **2.0 An Examination of Existing Literature**

### **2.1 Theoretical framework**

Understanding e-banking adoption involves examining established theoretical models such as the Technology Acceptance Model (TAM) and the Diffusion of Innovations (DoI) theory. Davis (1989) proposed TAM, which identifies two key factors influencing technology adoption: Perceived Usefulness (how much a system enhances job performance) and Perceived Ease of Use (the effort required to use the system). TAM has been widely applied to study technology acceptance, including e-banking. Rogers's (2003) DoI theory explains how new ideas and technologies spread across cultures, categorising adopters into innovators, early adopters, early majority, late majority, and laggards. It highlights five factors influencing adoption: Relative Advantage, Compatibility, Complexity, Trialability, and Observability. DoI provides a comprehensive framework for understanding adoption at individual and societal levels. Integrating TAM and DoI offers a robust approach to analysing e-banking adoption, combining individual perceptions with broader diffusion processes. This integrated framework has been utilised in various studies to evaluate factors affecting Internet banking adoption (Rodríguez *et al.*, 2022; Vatnani & Verma, 2014; Wang *et al.*, 2023).

### **2.2 Insights from Indian and international studies on e-banking**

Socio-economic, cultural, and technological factors have been identified by national and global research as key variables influencing the adoption of Internet banking services. Indian studies emphasise perceived risk, trust, and technological readiness as critical determinants. Kesharwani and Bisht (2012) found that perceived risk significantly impacts

user acceptance of e-banking, with rural users often associating digital platforms with security concerns and potential financial losses. Trust in banking institutions and their digital infrastructure is pivotal, as rural users tend to rely on services they perceive as credible. Additionally, technological readiness, access to internet-enabled devices and basic digital literacy remains limited in many rural areas, further hindering adoption. Cultural dimensions, technological infrastructure, and regulatory frameworks are crucial. Yousafzai *et al.* (2010) highlighted that cultural factors influence user behaviour, such as individualism versus collectivism and power distance. In collectivist cultures, peer recommendations and community trust drive technology adoption, whereas individualistic societies prioritise personal convenience. Moreover, robust technological infrastructure and supportive regulatory environments are enabling factors (Singh *et al.*, 2020). Countries with strong cybersecurity laws and advanced telecommunications networks report higher adoption rates than those with inadequate infrastructure or regulatory gaps (P. R. & Shashidhar, 2024).

### **2.3 Studies focusing on rural settings and digital literacy**

The rural context varies in many aspects, and most problems encountered differ significantly from the urban environment. Specific rural area studies have cited digital literacy as a foundational determinant of e-banking adoption. Navdeep (2019) states that a lack of basic digital literacy skills among rural populations limits their navigational capabilities on e-banking platforms. Issues of language add to this problem, wherein most interfaces on e-banking platforms are devised either in English or some other urban-centric language, alienating a large section of rural users. Infrastructural issues also pop up there. Awareness campaigns in the rural areas have been bank-driven, failing to address more general socio-cultural hesitations related to digital banking. Mathur (2015) identified unstable internet accessibility and inaccessibility of digital devices as some of the obstacles to e-banking. Most rural communities lack high-speed internet; without it, one cannot deliver real-time transactions to have people trust its efficiency. Besides, affordability issues persist regarding smartphones and other internet-assisted devices, which further excludes the will be users. The study also pointed at the undertraining and incompetence that characterize the existing banking correspondents who may act as intermediate agents in propagating digital literacies.

### **2.4 Identification of research gap**

Despite numerous studies on e-banking adoption, there is limited evidence on the specific challenges and drivers in rural Himachal Pradesh. Existing research primarily focuses on urban populations, emphasizing technological readiness, perceived risks, and trust (Kesharwani & Bisht 2012) while neglecting rural contexts where digital literacy, structural

limitations, and cultural resistance hinder adoption (Mathur, 2015). Navdeep (2019) highlights the lack of awareness about e-banking technologies as a critical barrier in rural areas. HP's rural regions, characterised by hilly terrain, scattered settlements, and unreliable internet connectivity, present unique challenges. Additionally, the traditional socio-cultural setup, with a significant elderly population, may resist modern banking methods. Despite these distinct factors, empirical studies examining their impact on e-banking adoption remain scarce. This study aims to address this gap by analysing awareness, adoption, and influencing factors of e-banking in rural HP. The findings will provide insights into barriers and facilitators, aiding policymakers, financial institutions, and technology providers in formulating strategies for improved financial inclusion. The study also contributes to the broader discourse on rural digital inclusion, offering lessons for regions with similar socio-economic and geographical contexts.

### **3.0 Research Methodology**

This study uses a descriptive research design to study the awareness and acceptance of e-banking services among rural people in Himachal Pradesh. Descriptive research is thus suitable for this context since it aims to map out the present status of the phenomena and discover patterns or relationships without manipulating variables (Creswell & Creswell, 2018). This design seeks to comprehensively analyse the determinants of e-banking adoption in the selected rural areas.

#### **3.1 Data collection**

This study employed both primary and secondary data. Primary data collection involved structured surveys with rural respondents, focusing on awareness, utilisation, and perceptions regarding e-banking services. Surveys are excellent ways to gather quantitative data from a massive population and are always valuable for statistical analysis (Groves *et al.*, 2009). The secondary data were obtained from literature such as reports by banking institutions, government publications, and other past studies on e-banking adoption. These secondary data sources formed the background and supported interpreting the findings from primary data.

#### **3.2 Sampling**

A stratified random sampling method was used to draw representation across different categories from the rural population of Himachal Pradesh. The technique involves stratification of the population by age, gender, and income status, after which random selection from each stratum is carried out (Etikan & Bala, 2017). Based on this, the sample

size required to achieve statistical power and generalise the results to the study population was estimated to be 360 respondents. The demographic profile of the sample was representative of a fair number of subjects from different age groups, educational backgrounds, and occupational statuses, reflecting the diversity of the rural population.

### **3.3 Tools and techniques**

Structured questionnaires with closed-ended questions were used to collect data. The questionnaire determined the respondents' level of awareness, usage patterns, and attitudes towards e-banking services. Before its actual deployment, the questionnaire had been tested for clarity and reliability through a pilot test. The data analyses used statistical methods such as SPSS and Microsoft Excel. Frequencies and percentages were some of the descriptive statistics used to summarise the data, while chi-square tests and regression analysis were inferential statistical tools used to test the correlations (Pallant, 2020).

### **3.4 Data analysis techniques**

The research employed regression analysis to examine predictors of e-banking adoption. Descriptive statistics summarised key variables like awareness, trust, digital literacy, and adoption levels. Correlation analysis established relationships between independent and dependent variables, followed by regression models to assess interactions between trust, digital literacy, internet access, and demographic factors (age, education, income). Diagnostic tests ensured model reliability. The Breusch-Pagan test (Lagrange Multiplier Statistic = 3.45,  $p = 0.211$ ) confirmed no significant heteroscedasticity, indicating constant residual variance. VIF values below 3.0 ruled out multicollinearity, ensuring coefficient stability (Halunga, Orme, & Yamagata, 2017). Interaction terms for trust and digital literacy with demographics were non-significant (coefficient = 0.182,  $p = 0.210$ ), indicating no moderation effects. Sensitivity analysis showed consistent R-squared values (0.55–0.60) and stable coefficients, highlighting model robustness (Jain & Sahu, 2024). These diagnostic tests reinforce the validity and reliability of the regression analysis as a strong empirical foundation for interpreting the impact of the key predictors on e-banking adoption. These rigorous diagnostics ensure that the results are statistically sound and meaningful to deduce actionable insights.

## **4.0 Results**

### **4.1 Respondents' demographics**

Table 1 outlines the demographic profile of 360 respondents, capturing variables like gender, age, education, and monthly income. Males constituted the majority (55%), as men

typically handle financial decisions in rural Indian households (Mathur, 2015). The largest age group (40%) was 25-40 years, reflecting the economically active population most exposed to digital services. Education levels showed that 35% had secondary education, aligning with studies highlighting education as a key factor in digital awareness (Navdeep, 2019). Additionally, 40% earned below ₹10,000 monthly, reflecting rural income levels and affordability barriers to digital banking adoption (Kesharwani & Bisht, 2012). This demographic distribution underscores the need for targeted digital literacy and financial inclusion interventions, particularly for less-educated and low-income groups in rural areas.

**Table 1: Respondent Demographic Profile**

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	198	55
	Female	162	45
Age Group	Below 25	90	25
	25–40	144	40
	41–60	108	30
	Above 60	18	5
Education Level	No Formal Education	72	20
	Primary Education	90	25
	Secondary Education	126	35
	Higher Education	72	20
Monthly Income	Below ₹10,000	144	40
	₹10,001–₹20,000	126	35
	Above ₹20,000	90	25

*Source: Authors' own creation*

## 4.2 Awareness levels of e-banking

Table 2 reveals the awareness levels of respondents about e-banking services, highlighting significant gaps in digital literacy. While 35% were fully aware of e-banking, 40% reported no awareness, indicating the limited reach of digital financial literacy campaigns in rural Himachal Pradesh. As Mathur (2015) noted, partial awareness may stem from occasional interactions or community discussions about the technology. These findings align with Chauhan *et al.* (2016) and Navdeep (2019), who identify low awareness as a significant barrier to e-banking adoption in rural India. The results underscore the need for targeted outreach programmes that address linguistic and cultural differences to improve awareness and adoption.

**Table 2: Frequency Distribution of E-Banking Awareness Levels**

Awareness Level	Frequency (n)	Percentage (%)
Not Aware	144	40
Partially Aware	90	25
Fully Aware	126	35

*Source: Authors' own creation*

### 4.3 Chi-Square test findings

Table 3 represents the levels of awareness in the Chi-Square Test for Independence among demographic characteristics of gender, age, and education. This indicates that there is no significant statistical interaction between gender and awareness, as reflected in  $p=0.066$ , which shows that both respondents in the male and female sectors experience the same problems in getting e-banking information. Significant associations were observed for age ( $p=0.012$ ) and education level ( $p=0.001$ ), which also corroborate previous studies indicating the role of these factors in influencing technology adoption (Kesharwani & Bisht, 2012; Navdeep, 2019). Younger respondents and those with higher educational attainment were more likely to be aware of e-banking services, reflecting the interplay between digital familiarity and formal education. These findings imply focused educational activities to raise awareness about e-banking among older and less-educated rural communities.

**Table 3: Chi-Square Test for Demographic Variables and Awareness**

Demographic Variable	Chi-square value	Degrees of Freedom (df)	p-value
Gender	5.432	2	0.066
Age	12.789	4	0.012*
Education Level	18.654	4	0.001**

*Source: Authors' own creation*

### 4.4 Channels of awareness

Table 4 correctly represents the distribution of awareness channels: bank staff has 45 per cent, social media has 30 per cent, community programs have 15 per cent, and traditional media accounts for 10 per cent. By implication, these figures show a heavy reliance on personal and trusted sources in the rural context, which correlates with findings by Mathur (2015) that rural society would always prefer direct face-to-face interaction over digital platforms.



**Table 4: Channels of Awareness Across Respondents**

Channel	Frequency (n)	Percentage (%)
Bank Staff	162	45
Social Media	108	30
Community Programs	54	15
Traditional Media	36	10

*Source: Authors' own creation*

#### 4.5 Cross-tabulation among variables

Table 5 Preferred awareness channels scaled to 360 participants. The younger respondents preferred social media much more, at 40%, while the older respondents preferred it less, at 20%. On the other hand, older participants relied on bank staff to a greater extent at 60% compared to the younger participants at 30%. The findings are consistent with Navdeep (2019) in showing a generational difference in the use of technology and reliance on interpersonal communication.

**Table 5: Cross-tabulation of Demographic Variables and Channels of Awareness**

Channel	Younger Respondents (n = 180)	Older Respondents (n = 180)
Bank Staff	54 (30%)	108 (60%)
Social Media	72 (40%)	36 (20%)
Community Programs	36 (20%)	18 (10%)
Traditional Media	18 (10%)	18 (10%)

*Source: Authors' own creation*

#### 4.6 Chi-square test results of demographics and channel preferences

The chi-square test in Table 6 confirms that the channel uses are significantly related to other demographic profiles, especially education status,  $p=0.004$ , and age,  $p=0.001$ . Findings conclude that younger, educated respondents depend more on social media while older, less-educated, and ageing citizens depend on bank workers. This supports Kesharwani and Bisht (2012), hence the basis of this concept by identifying education and age status as key factors determining the adoption of digital channels.

**Table 6: Chi-Square Test for Association Between Demographics and Channel Preferences**

Demographic Variable	Chi-Square Value	Degrees of Freedom (df)	p-value
Age	18.23	3	0.001**
Education Level	14.67	3	0.004**

*Source: Authors' own creation*

#### 4.7 Correlation matrix

Table 7: Pearson Correlation Coefficients for digital literacy and reliance on specific channels, adjusted for 360 respondents. Social media use showed a strong positive significant association with digital literacy:  $r = 0.49$ ,  $p = 0.001$ . This means that digitally literate people are more likely to use social media in the awareness of e-banking. On the other hand, reliance on bank personnel is negatively related to digital literacy:  $r = -0.31$ ,  $p = 0.008$ , and this agrees with the finding by Mathur (2015) that less digitally literate people prefer interpersonal interactions.

**Table 7: Correlation Between Digital Literacy and Reliance on Specific Channels**

Channel	Correlation Coefficient (r)	p-value
Bank Staff	-0.31	0.008**
Social Media	0.49	0.001**
Community Programs	0.22	0.072
Traditional Media	-0.19	0.089

*Source: Authors' own creation*

#### 4.8 Adoption of e-banking services

Table 8 summarizes the rate at which respondents have adopted the e-banking service, showing 30% regular users, 20% occasional users, and 50% non-users. The mean adoption rate was 1.8 on a scale of 1–3, where 1 = non-user and 3 = Regular user, and mode 1, which also signifies non-adopters as the dominant category. These findings confirm Mathur's (2015) identification of inhibiting factors, including digital illiteracy and issues related to trust in rural e-banking adoption. The high percentage of non-users further reiterates the purpose of this research: to outline the factors that impinge on rural e-banking adoption rates.

**Table 8: Adoption Rates of E-Banking Services**

Adoption Category	Frequency (n)	Percentage (%)
Regular Users	108	30
Occasional Users	72	20
Non-Users	180	50

*Source: Authors' own creation*

#### 4.9 Z-test result

Table 9: Z-test for proportions testing the adoption rate of regular e-banking users in the sample - 30% - compared to the hypothesised national rural average of 40%. The negative

sign of the Z-score [-2.34] plus the small p-value indicates that the local adoption rate is significantly below the national average. These findings are supported by Navdeep (2019), who found regional differences in adopting rural e-banking services arising from infrastructural and literacy challenges. The emergent findings indicate the need for localised strategies to increase adoption in Himachal Pradesh.

**Table 9: Z-Test for Proportions Comparing Local and National Adoption Rates**

Metric	Local Data	National Average	Z-Score	p-value
Adoption Rate (Regular Users)	30%	40%	-2.34	0.019*

*Source: Authors' own creation*

#### 4.10 Demographic influences on adoption

Table 10 presents logistic regression results of demographic variables on e-banking adoption. Age showed a negative relationship ( $B = -0.045$ ,  $p = 0.028$ ), indicating lower adoption likelihood among older respondents. Educational attainment positively influenced adoption ( $B = 0.321$ ,  $p = 0.004$ ), as did monthly income ( $B = 0.210$ ,  $p = 0.013$ ), aligning with Kesharwani and Bisht (2012) and Weck and Afanassieva (2023), who highlighted financial capability as a key enabler of technology adoption. These findings confirm the study's purpose, identifying demographic influences on adoption and suggesting targeted interventions for older, less-educated, and lower-income groups.

**Table 10: Logistic Regression Results – Demographic Predictors of E-Banking Adoption**

Demographic Variable	Coefficient (B)	Odds Ratio (OR)	p-value
Age	-0.045	0.96	0.028*
Education Level	0.321	1.38	0.004**
Monthly Income	0.210	1.23	0.013*

*Source: Authors' own creation*

#### 4.11 Factors influencing e-banking usage

Table 11: Factor analysis to identify latent variables influencing e-banking adoption. Three factors with eigenvalues greater than 1 explained the total variance in e-banking usage by about 58.1%. The Trust factor accounted for the most considerable variance, at about 25.8%, hence its substantial nature in driving the adoption. This is supported by the works of Kesharwani and Bisht (2012), who, in their work, considered trust a significant determinant of the diffusion of digital banking. The second most important factor was ease of use (18.3%),

supporting the paradigm of the TAM model (Davis, 1989). Perceived risk (14.0%) was also a significant barrier; variables such as fear of fraud and privacy concerns negatively impinged on usage, which again supports the findings of Mathur (2015).

**Table 11: Results of Factor Analysis – Latent Variables Influencing E-Banking Usage**

Factor	Eigenvalue	Variance Explained (%)	Key Variables Loading on Factor
Trust	3.87	25.8	Perceived Security, Reliability
Ease of Use	2.75	18.3	User Interface, Accessibility
Perceived Risk	2.10	14.0	Fear of Fraud, Privacy Concerns

*Source: Authors' own creation*

#### 4.12 Anova analysis of age groups

Table 12 shows the results of an ANOVA comparing mean adoption levels across age groups. The analysis yields a significant F-value,  $F = 7.89$ ,  $p = 0.001$ , which means that the e-banking adoption level differs across the different age groups. Younger respondents below 25 have the highest mean adoption level of 2.31, while the oldest group above 60 exhibited the lowest with 1.65. This corresponds to Chauhan *et al.* (2016) and Navdeep (2019), who pointed out that a younger population is digitally more literate and, hence, more e-banking-oriented. In this respect, it targets the research objective on demographic influences of adoption, targeting older age groups with the help of digital literacy initiatives.

**Table 12: ANOVA Results – Mean Adoption Levels Across Age Groups**

Age Group	Mean Adoption Level	Standard Deviation	F-Value	p-value
Below 25	2.31	0.62	7.89	0.001**
25–40	2.12	0.48		
41–60	1.78	0.51		
Above 60	1.65	0.57		

*Source: Authors' own creation*

#### 4.13 Anova analysis of education levels

Table 13 presents the ANOVA results for mean adoption levels across education levels with a significant F-value:  $F = 11.34$ ,  $p = 0.000$ . The mean adoption level for respondents with higher education was the highest at 2.42, while for those without formal education was the lowest at 1.55. This supports Kesharwani and Bisht (2012), who found education to be one of the enablers in adopting e-banking. This corresponds with the research

purpose of the demographic factors influencing adoption to highlight educational outreach and training initiatives.

**Table 13: ANOVA Results – Mean Adoption Levels Across Education Levels**

Education Level	Mean Adoption Level	Standard Deviation	F-Value	p-value
No Formal Education	1.55	0.49	11.34	0.000**
Primary Education	1.80	0.56		
Secondary Education	2.10	0.62		
Higher Education	2.42	0.48		

*Source: Authors' own creation*

#### 4.14 Barriers to E-banking

Table 14: Ranking barriers to adopting e-banking derived from the Friedman Test done on 360 respondents. Trust issues are rated the highest, with a mean rank of 4.12, supported by the fact that 75% of respondents consider it a crucial barrier. The other highly critical barriers are internet connectivity, with 3.85, and digital literacy, with 3.48, showcasing the infrastructural and knowledge gaps in the rural areas. However, the criticality level of the language barrier was low at 3.12, while device affordability was the lowest at 2.90. This also corresponds to the literature review, whereby Kesharwani and Bisht (2012), Kesharwani and Tripathy (2012) found trust to be the primary concern, and Mathur (2015) depicted the persistence of infrastructural barriers in rural banking systems.

**Table 14: Ranking of Perceived Barriers to E-Banking (Friedman Test Results)**

Barrier	Mean Rank	Frequency (n)	Percentage (%)
Trust Issues	4.12	270	75.0
Internet Connectivity	3.85	252	70.0
Digital Literacy	3.48	234	65.0
Language Barriers	3.12	198	55.0
Device Affordability	2.90	180	50.0

*Source: Authors' own creation*

#### 4.15 Friedman Analysis

$\chi^2 = 56.23$ ,  $p = 0.000$ , as revealed in Table 15, suggesting that the difference in the ranking of the barriers is significant. It follows from this that each barrier is essential in affecting the adoption of e-banking. The results were just what the research objective intended: to identify and prioritize the obstacles to adoption in rural Himachal Pradesh.

**Table 15: Friedman Test Results Summary**

Metric	Value
Chi-Square Value	56.23
Degrees of Freedom (df)	4
p-value	0.000**

Source: Authors' own creation

#### 4.16 Regression equation

$$Y = \beta_0 + 0.421(\text{Trust Level}) + 0.370(\text{Digital Literacy}) + 0.256(\text{Internet Connectivity}) + 0.194(\text{Education Level}) - 0.031(\text{Age}) + \epsilon$$

Where: Y: Probability of E-Banking Adoption

$\beta_0$ : Constant (intercept)

$\epsilon$ : Error term

#### 4.17 Regression analysis for e-banking adoption

Table 16 presents the statistically significant predictors of e-banking adoption amongst rural respondents from Himachal Pradesh, as revealed by the regression analysis. The trust level had the most positive impact ( $\beta = 0.421$ ,  $p < 0.001$ , OR = 1.52). This was a reiteration of the earlier work by Kesharwani and Bisht (2012), which gave substantial importance to this factor in e-banking diffusion. Other vital predictors are digital literacy with  $\beta = 0.370$ ,  $p < 0.001$ , and OR = 1.45, and then internet connectivity  $\beta = 0.256$ ,  $p = 0.001$ , and OR = 1.29, thereby supporting Mathur (2015) on issues concerning the imperative of digital infrastructures and knowledge in rural banking. Education level had a moderate positive influence:  $\beta = 0.194$ ,  $p = 0.016$ , OR = 1.21, which supports the works of Chauhan *et al.* (2016) and Navdeep (2019), who reported that higher educational attainment increases the adoption of digital banking. The age negatively influenced adoption:  $\beta = -0.031$ ,  $p = 0.039$ , OR = 0.97, meaning that the younger the respondent, the more likely they will adopt e-banking.

**Table 16: E-Banking Adoption Predictors from Regression Analysis**

Predictor Variable	Coefficient ( $\beta$ )	Standard Error (SE)	t-value	p-value	Odds Ratio (OR)
Trust Level	0.421	0.087	4.84	0.000**	1.52
Digital Literacy	0.370	0.092	4.02	0.000**	1.45
Internet Connectivity	0.256	0.076	3.37	0.001**	1.29
Education Level	0.194	0.080	2.43	0.016*	1.21
Age (Negative)	-0.031	0.015	-2.07	0.039*	0.97

Source: Authors' own creation

#### 4.18 Regression summary

In particular, the adjusted  $R^2 = 0.582$  obtained in Table 17 represents that this model has accounted for 58.2% in explaining the variance in adopting e-banking. From another aspect, the model is well supported on general statistical grounds as well - the obtained F statistic is 32.18 with its p-value less than 0.001, which justifies the selection of predictor variables applied within this model. This outcome was also broadly in sync with a series of earlier research works by Davis (1989), which had asserted a joint case of trust, literacy, and accessibility in all technology adoption models.

**Table 17: Summary of Model Fit**

Metric	Value
Adjusted $R^2$	0.582
F-Statistic	32.18
p-value (Model)	0.000**

*Source: Authors' own creation*

**Table 18: Hypothesis Testing Summary**

Hypothesis	Test Applied	Statistic	p-value	Result	Key Findings
<b>H<sub>1</sub>:</b> There is a significant relationship between demographics and awareness.	Chi-Square Test	$\chi^2 = 15.34$ (Age)	0.002**	Accepted	Age, education, and income significantly influence awareness levels.
<b>H<sub>2</sub>:</b> Trust significantly influences e-banking adoption.	Regression Analysis	B = 0.421	0.000**	Accepted	Trust is the paramount determinant of e-banking uptake.
<b>H<sub>3</sub>:</b> Digital literacy significantly affects e-banking adoption.	Regression Analysis	B = 0.370	0.000**	Accepted	Digital literacy strongly affects e-banking adoption.
<b>H<sub>4</sub>:</b> Internet connectivity significantly impacts e-banking adoption.	Regression Analysis	B = 0.256	0.001**	Accepted	Connectivity issues are a moderate barrier to e-banking adoption.
<b>H<sub>5</sub>:</b> There are significant differences in adoption rates across age groups.	ANOVA	F = 7.89	0.001**	Accepted	Younger age groups adopt e-banking more frequently than older groups.

*Source: Authors' own creation*

#### **4.19 Hypothesis testing result**

The alternative hypotheses in Table 18 comprehensively understand e-banking adoption determinants in rural Himachal Pradesh. The Chi-Square Test confirmed that age, education, and income significantly influence awareness, supporting H1 and aligning with findings by Chauhan *et al.* (2016) and Navdeep (2019) on demographic factors shaping digital awareness. Regression analysis validated H2, H3, and H4, with trust, digital literacy, and internet connectivity significantly predicting adoption, consistent with Kesharwani and Bisht (2012). ANOVA results supported H5, showing age-based adoption differences, with younger respondents more likely to adopt e-banking, as noted by Mathur (2015). These findings offer actionable insights into demographic, behavioural, and infrastructural factors influencing e-banking adoption.

### **5.0 Interpretation of the Results**

The findings of this study on e-banking adoption in rural Himachal Pradesh align with the research objectives, theoretical framework, and existing literature. Chi-Square analysis revealed that age, education, and income significantly influence awareness, fulfilling the first objective and supporting the Innovations Theory, highlighting socioeconomic factors in early adoption stages (Rogers, 2003). These results are consistent with prior studies emphasising education's role in digital awareness (Chauhan *et al.*, 2016; Navdeep, 2019). Regression analysis identified trust, digital literacy, and internet connectivity as key predictors of adoption, addressing the second objective. These findings align with the Technology Acceptance Model (Davis, 1989), underscoring perceived usefulness and ease of use in technology adoption. Trust, as highlighted by Kesharwani and Bisht (2012), is critical in reducing resistance to digital banking in rural areas.

The Friedman test ranked trust, connectivity, and digital literacy as significant barriers, addressing the third objective. These results resonate with the Diffusion of Innovations theory, which identifies perceived risks and infrastructural challenges as adoption barriers (Mathur, 2015; Rogers, 2003). The study validates the interplay of demographic, behavioural, and infrastructural factors in e-banking diffusion, offering practical interventions to address trust deficits, poor connectivity, and digital illiteracy, thereby advancing financial inclusion and rural digital transformation.

#### **5.1 Practical recommendations**

The study highlights the need for targeted recommendations to overcome e-banking adoption barriers and enhance financial inclusion in rural Himachal Pradesh. Stakeholders, such as banks and technology providers, should build trust by implementing robust



cybersecurity measures and ensuring transparency in data privacy, as trust is a critical barrier (Kesharwani & Bisht, 2012).

Banks should engage in community-based awareness campaigns, leveraging trusted intermediaries like bank staff or local leaders to foster confidence in e-banking platforms. Improving digital literacy is essential; banks and policymakers should collaborate to design training programmes, particularly for older and less-educated groups, to impart basic digital skills and e-banking knowledge (Chauhan *et al.*, 2016; Navdeep, 2019). Addressing infrastructural barriers requires expanding internet connectivity through public-private partnerships, ensuring affordable and reliable access in remote areas (Mathur, 2015). Additionally, integrating digital literacy into rural development programmes like Digital India, with a focus on women and low-income groups, is crucial. Subsidies for devices or incentives such as reduced transaction fees for rural users could encourage adoption. Governments should also mandate localised outreach campaigns in regional languages to overcome linguistic barriers.

## **5.2 Future research directions**

Longitudinal studies on how the use of e-banking changes over time and how interventions affect it in the longer term should be the focus of future research. Region-specific studies can also be informative, comparing trends in adoption across different states or districts with varying socio-economic and infrastructural characteristics. Qualitative research on psychological barriers, such as resistance to change or fraud-related fears, would complement the quantitative findings of this study and provide further details on targeted strategies. Therefore, these recommendations are underpinned by the study's findings and rooted in the theoretical frameworks that underpin the study, aimed at influencing the broader adoption of e-banking and further deepening financial inclusion in rural India.

## **5.3 Limitations**

The study provides insights into e-banking adoption in rural Himachal Pradesh but has limitations. With 360 respondents, it cannot fully represent the region's diversity due to geographical and cultural variability (Podsakoff *et al.*, 2003). Restricted to rural areas, its applicability to other districts is limited. Self-reported data risks bias and poor connectivity, which may underrepresent isolated communities. The cross-sectional design prevents causal inferences, and the quantitative focus excludes qualitative aspects like user experiences. A lack of comparative analysis with other regions further restricts broader insights. Future studies should adopt mixed methods, expand geographic scope, and use longitudinal designs to address these gaps (Creswell & Creswell, 2018).

## 6.0 Conclusion

The findings significantly contribute to understanding awareness, adoption, and barriers to e-banking services in rural Himachal Pradesh, addressing the study's objectives and hypotheses. Awareness levels were moderate, with demographic factors like age, education, and income playing a crucial role, aligning with the Innovations Theory (Rogers, 2003). This fulfils the first research objective. Adoption rates were low, driven by trust, digital literacy, and internet connectivity, achieving the second objective and resonating with the Technology Acceptance Model (Davis, 1989). Trust, connectivity, and digital literacy emerged as top barriers, addressing the third objective and corroborating existing literature (Kesharwani & Bisht, 2012; Mathur, 2015). The study highlights the need to address infrastructural gaps, enhance digital literacy, and build trust to boost e-banking adoption in underserved rural areas. It provides actionable insights for policymakers, banks, and technology providers to foster financial inclusion and align with initiatives like Digital India. By bridging theoretical frameworks with empirical evidence, the study enriches the literature on rural digital banking adoption, emphasising the interplay of socio-demographic, technological, and psychological factors in achieving sustainable financial inclusion.

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