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Article

Digital Financial Literacy and Financial Inclusion Among Women Entrepreneurs in Madhya Pradesh: The Mediating Role of Digital Financial Service Adoption

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Abstract: Digital technologies have transformed the way financial services are accessed and delivered, creating new opportunities for financial inclusion, particularly among women entrepreneurs. Despite significant progress in digital banking, mobile payments, and fintech services, many women entrepreneurs continue to face challenges related to digital literacy, accessibility, trust, and awareness, which limit their effective participation in the formal financial system. Understanding the factors that influence the adoption of digital financial services is therefore essential for promoting inclusive economic growth and entrepreneurial development. This study examines the relationship between digital financial literacy and financial inclusion among women entrepreneurs, with a particular focus on the mediating role of digital financial service adoption. The research investigates how factors such as digital financial literacy, awareness, accessibility, trust, perceived security, and government support influence the adoption of digital financial services and contribute to financial inclusion. A quantitative research approach is proposed using primary data collected from women entrepreneurs across selected districts of Madhya Pradesh. Statistical techniques such as Structural Equation Modeling (SEM) will be employed to analyze the relationships among the study variables. The study is expected to provide empirical evidence on the importance of digital financial literacy in enhancing financial inclusion and entrepreneurial empowerment. The findings will offer valuable insights for policymakers, financial institutions, and fintech service providers in designing targeted strategies to improve digital financial participation among women entrepreneurs. By identifying key drivers and barriers to digital financial service adoption, the study contributes to the growing body of knowledge on digital finance and supports the development of a more inclusive and sustainable financial ecosystem.

Keywords: Digital Financial Inclusion; Digital Financial Literacy;Women Entrepreneurs; Digital Financial Service Adoption; FinTech; Mobile Banking; Financial Empowerment; Financial Accessibility; Financial Technology; Economic Empowerment; Structural Equation Modeling (SEM); Madhya Pradesh.

1. Introduction

Digital transformation has significantly reshaped the global financial sector, enabling individuals and businesses to access financial services through digital

platforms such as mobile banking, internet banking, digital wallets, Unified Payments Interface (UPI), and

other fintech applications [1]. The rapid expansion of digital financial services has created new

opportunities for improving financial inclusion, particularly in developing economies where traditional banking infrastructure remains limited [2]. Financial inclusion refers to the availability, accessibility, and effective usage of affordable financial products and services by all sections of society, especially underserved and vulnerable populations [3].

In India, several government initiatives, including the Pradhan Mantri Jan Dhan Yojana (PMJDY), Digital India Mission, BHIM-UPI, Aadhaar-enabled payment systems, and Direct Benefit Transfer (DBT) schemes, have accelerated the adoption of digital financial services [4]. These initiatives have contributed significantly to expanding access to formal financial systems and reducing dependence on cash-based transactions. As a result, India has emerged as one of the world's fastest-growing digital payment ecosystems [5].

Women entrepreneurs represent an important segment of the economy and play a vital role in employment generation, innovation, and socio-economic development [6]. However, despite various policy interventions and technological advancements, women entrepreneurs continue to face multiple challenges in accessing and utilizing financial services. Limited financial literacy, digital skill gaps, lack of awareness, trust issues, inadequate infrastructure, and socio-cultural constraints often restrict their participation in the formal financial ecosystem [7]. These barriers become even more significant in semi-urban and developing regions where access to financial information and digital resources remains uneven [8].

Digital financial literacy has emerged as a critical factor influencing the adoption of digital financial services. Individuals with higher levels of digital literacy are more likely to understand, access, and effectively utilize digital banking and fintech services [9]. Similarly, trust, perceived security, ease of use, and awareness have been identified as important determinants of digital financial service adoption [10]. Previous studies have reported that increased adoption of digital financial services contributes to improved financial management, greater business efficiency, enhanced access to credit, and higher levels of economic empowerment among entrepreneurs [11].

Although extensive research has examined digital banking adoption and financial inclusion, several important issues remain unresolved. Most existing studies focus on general banking customers, rural households, or small businesses, while relatively limited attention has been given to women entrepreneurs as a distinct user group [12]. Furthermore, many studies have investigated digital financial inclusion at the national level, providing limited insights into state-specific contexts such as Madhya Pradesh [13]. The socio-economic and technological characteristics of different regions may significantly influence digital financial behavior, requiring localized empirical investigation.

Another important limitation in the existing literature is the fragmented examination of influencing factors. Previous studies often analyze digital literacy, trust, accessibility, awareness, or government support independently rather than examining their combined effect on financial inclusion [14]. Moreover, the mediating role of digital financial service adoption in linking digital financial literacy and financial inclusion remains insufficiently explored [15]. Understanding these relationships is crucial for designing effective policies and interventions that promote inclusive digital finance among women entrepreneurs.

Despite substantial growth in digital financial infrastructure, several fundamental questions remain unanswered:

1. Why do many women entrepreneurs continue to remain financially excluded despite having access to digital banking facilities?
2. Does digital financial literacy directly improve financial inclusion, or is its impact mediated through the adoption of digital financial services?
3. Which factors among awareness, trust, accessibility, security perception, and government support most strongly influence digital financial service adoption?
4. To what extent does digital financial inclusion contribute to the economic empowerment and business performance of women entrepreneurs?
5. Are existing government and fintech initiatives sufficient to address the digital financial needs of women entrepreneurs in emerging regions such as Madhya Pradesh?
6. How can financial institutions develop more effective strategies to increase digital financial participation among women-owned enterprises?

Addressing these unanswered questions is essential for achieving inclusive economic growth and reducing financial inequalities. Therefore, this study investigates the relationship between digital financial literacy and financial inclusion among women entrepreneurs, with particular emphasis on the mediating role of digital financial service adoption. The study aims to identify the key drivers and barriers influencing digital financial participation and provide practical recommendations for policymakers, financial institutions, and fintech service providers.

The major contributions of this study are as follows:

- To examine the level of digital financial literacy and financial inclusion among women entrepreneurs in Madhya Pradesh.

- To analyze the influence of awareness, accessibility, trust, perceived security, and government support on digital financial service adoption.
- To investigate the mediating role of digital financial service adoption in enhancing financial inclusion.
- To evaluate the impact of digital financial inclusion on entrepreneurial empowerment and business performance.
- To provide evidence-based recommendations for strengthening digital financial ecosystems and promoting inclusive entrepreneurship.

2. Literature Review

Recent advancements in digital technologies have significantly transformed the financial services sector and created new opportunities for promoting financial inclusion among underserved populations. Digital financial inclusion has become an important policy objective for governments, financial institutions, and international organizations because of its potential to improve financial accessibility, reduce poverty, and support sustainable economic development.

Ha et al. [16] conducted a systematic literature review on fintech and financial inclusion and reported that digital financial technologies significantly improve access to formal financial services, particularly among low-income populations and small business owners. The study highlighted that fintech-driven solutions such as mobile banking, digital payments, and online lending platforms contribute to increased financial participation and economic empowerment.

Mittal and Singh [17] examined the changing landscape of financial inclusion through fintech innovations and observed that digital financial services reduce transaction costs, improve service accessibility, and enhance customer convenience. However, the study also identified digital literacy and trust-related concerns as major barriers to adoption.

Digital financial literacy has emerged as one of the strongest determinants of digital financial service utilization. Dandi [18] emphasized that digital financial literacy includes not only financial knowledge but also digital competencies required to effectively use technology-based financial services. The study concluded that individuals with higher digital financial literacy exhibit greater confidence and willingness to adopt digital financial products.

Similarly, Poudel [19] investigated the impact of digital financial literacy on financial behavior and found a positive relationship between digital literacy, financial decision-making, and technology adoption. The study further reported that financially literate individuals are more likely to utilize digital payment systems, online banking services, and fintech applications.

The relationship between financial literacy and women's entrepreneurial empowerment has attracted increasing research attention. Bharali and Chakravorty [20] conducted a systematic review focusing on women entrepreneurs and reported that financial literacy plays a critical role in enhancing business sustainability, access to finance, and entrepreneurial growth. Their findings indicate that digital financial inclusion serves as a catalyst for women's economic empowerment and financial independence.

Several studies have investigated factors influencing digital financial service adoption. A systematic review by Hossain et al. [21] identified perceived usefulness, ease of use, trust, awareness, and security concerns as the most influential factors affecting fintech adoption. The study emphasized that trust remains one of the strongest predictors of digital financial service usage.

Cybersecurity and privacy concerns continue to influence customer adoption behavior. Waliullah et al. [22] found that fear of fraud, cyberattacks, data breaches, and privacy violations negatively affect consumers' willingness to engage with digital banking platforms. The authors recommended strengthening cybersecurity frameworks and customer awareness programs to improve trust in digital financial systems.

Gender disparities in digital financial inclusion remain a significant challenge. Demirgüç-Kunt et al. [23] reported that women continue to experience lower levels of account ownership, digital payment usage, and access to formal financial services compared to men. The study highlighted the importance of targeted interventions to reduce the gender gap in financial inclusion.

Women's World Banking [24] observed that although digital financial infrastructure has expanded considerably, women-owned businesses still face substantial financing constraints. The report identified limited financial awareness, inadequate digital skills, and restricted access to formal credit as major obstacles to entrepreneurial growth.

The Cherie Blair Foundation for Women [25] reported that digital connectivity challenges, affordability issues, online safety concerns, and insufficient digital training continue to restrict women's participation in digital financial ecosystems. The study emphasized that improving digital capability is essential for enhancing women's financial inclusion and entrepreneurial success.

From a theoretical perspective, recent studies have increasingly employed the Technology Acceptance Model (TAM), Unified Theory of Acceptance and Use of Technology (UTAUT), and Innovation Diffusion Theory (IDT) to explain digital financial service adoption [26]. These frameworks suggest that technology acceptance is influenced by perceived usefulness, perceived ease of use, facilitating conditions, social influence, and behavioral intentions.

Despite the growing body of literature, several research gaps remain evident. Most existing studies focus on general consumers, banking customers, or employees rather than women entrepreneurs. Moreover, limited empirical evidence exists regarding the digital financial behavior of women entrepreneurs in Madhya Pradesh. Previous studies have largely examined digital literacy, trust, accessibility, and awareness independently, while limited attention has been given to their integrated impact on digital financial inclusion. Furthermore, the mediating role of digital financial service adoption between digital financial literacy and financial inclusion remains underexplored.

Therefore, the present study seeks to address these gaps by examining the influence of digital financial literacy on financial inclusion among women entrepreneurs in Madhya Pradesh and investigating the mediating role of digital financial service adoption.

3. Research Gap and Hypothesis Development

3.1 Research Gap

The existing literature indicates that digital financial inclusion has gained considerable attention among researchers, policymakers, and financial institutions due to its potential to improve financial accessibility and economic empowerment [1–25]. Previous studies have examined various aspects of digital financial inclusion, including fintech adoption, digital banking services, financial literacy, mobile payment systems, and women's empowerment. However, several important gaps remain unaddressed.

First, most existing studies have focused on the general population, banking customers, employees, or small business owners, while limited attention has been given specifically to women entrepreneurs [20, 24]. Women entrepreneurs face unique challenges related to access to finance, technological readiness, digital literacy, and socio-cultural barriers that may influence their adoption of digital financial services differently from other population groups.

Second, although digital financial literacy has been widely recognized as a critical factor influencing financial inclusion, existing studies have primarily examined its direct relationship with financial inclusion [18, 19]. Limited empirical evidence exists regarding the mechanisms through which digital financial literacy contributes to financial inclusion, particularly the mediating role of digital financial service adoption.

Third, previous research has investigated determinants such as trust, awareness, accessibility, perceived security, and government support independently [6, 17, 21]. However, very few studies have examined the combined influence of these factors within a single integrated framework.

Fourth, most empirical studies have been conducted at national or international levels, with limited regional evidence available from Madhya Pradesh. Given the differences in socio-economic conditions, digital infrastructure, educational attainment, and entrepreneurial ecosystems across regions, findings from other contexts may not be directly applicable to women entrepreneurs in Madhya Pradesh.

Finally, despite significant investments in digital financial infrastructure through initiatives such as Digital India, PMJDY, BHIM-UPI, and fintech expansion, there remains insufficient evidence regarding the extent to which digital financial inclusion contributes to entrepreneurial empowerment and business performance among women-owned enterprises.

To address these gaps, the present study proposes an integrated framework that examines the influence of digital financial literacy, awareness, accessibility, trust, perceived security, and government support on digital financial service adoption and financial inclusion among women entrepreneurs in Madhya Pradesh.

3.2 Conceptual Framework

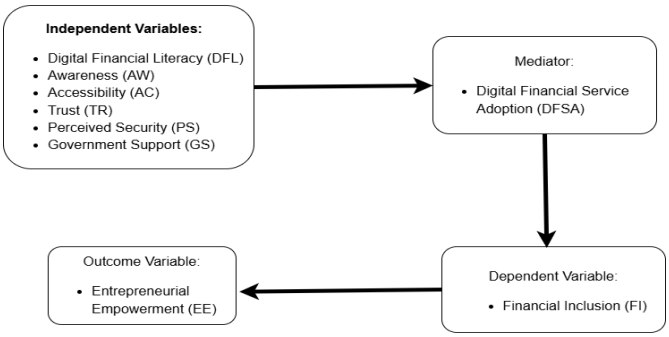

Fig.1 Conceptual Framework

Figure 1 presents the conceptual framework of the proposed study. The model examines the influence of six independent variables—Digital Financial Literacy (DFL), Awareness (AW), Accessibility (AC), Trust (TR), Perceived Security (PS), and Government Support (GS)—on Digital Financial Service Adoption (DFSA). DFSA acts as a mediating variable that facilitates the relationship between these determinants and Financial Inclusion (FI). Enhanced financial inclusion is expected to improve Entrepreneurial Empowerment (EE) among women entrepreneurs. The framework provides the theoretical basis for testing the proposed hypotheses using Structural Equation Modeling (SEM).

3.3 Hypothesis Development

Digital Financial Literacy and Digital Financial Service Adoption

Digital financial literacy enables individuals to understand, access, and effectively utilize digital financial services. Higher levels of digital financial literacy improve confidence in using digital technologies and increase the likelihood of adopting digital financial platforms [18,19].

H1: Digital Financial Literacy has a significant positive effect on Digital Financial Service Adoption.

Awareness and Digital Financial Service Adoption

Awareness regarding digital financial products and services influences users' willingness to adopt new financial technologies. Individuals who possess greater awareness of available digital financial services are more likely to use them [17,21].

H2: Awareness has a significant positive effect on Digital Financial Service Adoption.

Accessibility and Digital Financial Service Adoption

Accessibility refers to the ease with which users can access digital financial services through smartphones, internet connectivity, and banking infrastructure. Improved accessibility increases service utilization and adoption [6].

H3: Accessibility has a significant positive effect on Digital Financial Service Adoption.

Trust and Digital Financial Service Adoption

Trust is one of the most important determinants of technology adoption. Users are more likely to adopt digital financial services when they perceive service providers as reliable, transparent, and trustworthy [21].

H4: Trust has a significant positive effect on Digital Financial Service Adoption.

Perceived Security and Digital Financial Service Adoption

Security concerns related to privacy, cyber fraud, and data protection significantly influence user behavior toward digital financial platforms [22].

H5: Perceived Security has a significant positive effect on Digital Financial Service Adoption.

Government Support and Digital Financial Service Adoption

Government initiatives such as Digital India, PMJDY, and financial literacy programs have expanded access to digital financial services and encouraged their adoption [7,10].

H6: Government Support has a significant positive effect on Digital Financial Service Adoption.

Digital Financial Service Adoption and Financial Inclusion

The adoption of digital financial services facilitates access to savings, payments, credit, insurance, and other financial products, thereby enhancing financial inclusion [16].

H7: Digital Financial Service Adoption has a significant positive effect on Financial Inclusion.

Financial Inclusion and Entrepreneurial Empowerment

Financial inclusion improves access to financial resources, enhances financial decision-making, and strengthens business sustainability, leading to greater entrepreneurial empowerment [20].

H8: Financial Inclusion has a significant positive effect on Entrepreneurial Empowerment.

Mediating Effect

Digital financial service adoption acts as a mechanism through which digital financial literacy influences financial inclusion.

H9: Digital Financial Service Adoption mediates the relationship between Digital Financial Literacy and Financial Inclusion.

4. Research Methodology

4.1 Research Design

This study adopts a **quantitative and explanatory research design** to examine the relationship between digital financial literacy and financial inclusion among women entrepreneurs, with a particular focus on the mediating role of digital financial service adoption. The study aims to identify the factors influencing digital financial inclusion and evaluate their impact on entrepreneurial empowerment.

The research follows a cross-sectional survey approach, where primary data are collected from women entrepreneurs operating in different sectors across Madhya Pradesh. The quantitative approach is considered appropriate because it enables statistical testing of the proposed hypotheses and examination of causal relationships among the study variables.

The study is conducted in the state of **Madhya Pradesh**, India. The state has witnessed significant growth in digital financial infrastructure through initiatives such as Digital India, PMJDY, UPI-based transactions, and fintech services. Major districts selected for the study include: Bhopal, Indore, Gwalior, Jabalpur, Ujjain, Sagar, Rewa. These districts represent different levels of urbanization, entrepreneurial activity, and digital financial accessibility. The target population consists of **women entrepreneurs** engaged in:

- Manufacturing enterprises
- Retail businesses
- Service-based businesses
- Home-based enterprises
- Micro, Small and Medium Enterprises (MSMEs)
- Self-help group (SHG)-based entrepreneurial activities

The respondents must be actively involved in business operations and have experience with banking or digital financial services.

4.2 Sampling Technique

A **multi-stage sampling technique** is employed.**Stage 1: District Selection** (Major entrepreneurial districts of Madhya Pradesh are selected using purposive sampling.)**Stage 2: Respondent Selection** (Women entrepreneurs are selected using convenience and snowball sampling techniques due to the absence of a comprehensive sampling frame.)According to Hair et al. (2022), Structural Equation Modeling (SEM) requires a sufficiently large sample size

for reliable estimation.The proposed study targets ,**Sample Size = 400–500 Women Entrepreneurs**. A minimum of 400 valid responses is considered adequate for SEM and mediation analysis.

Table1 Data Collection Sources

Primary data(are collected through a structured questionnaire administered to women entrepreneurs)	**Secondary data**
• Face-to-face survey • Online Google Forms • Telephonic interviews • Entrepreneurial association networks • Women Self-Help Groups (SHGs)	• RBI Reports • World Bank Global Findex Database • Ministry of Finance Reports • NPCI Reports • Digital India Reports • Research Articles • Government Publications

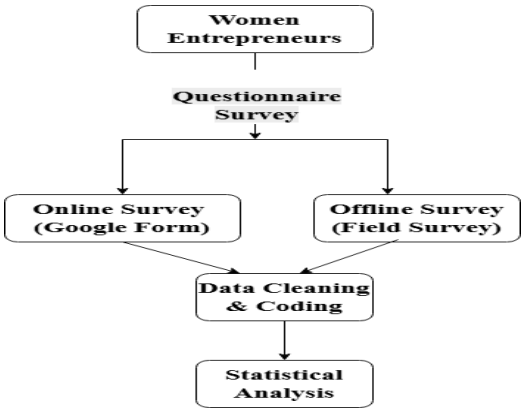

Fig.2 Data Collection Process

4.4 Measurement of Variables

Table 2.Independent Variables

Variable	**Code**	**No. of Items**
Digital Financial Literacy	DFL	5
Awareness	AW	4
Accessibility	AC	4
Trust	TR	4
Perceived Security	PS	4
Government Support	GS	4

Table 3 .Mediating Variable

Variable	Code	Items
Digital Financial Service Adoption	DFSA	5

Table 4.Dependent Variable

Variable	Code	Items
Financial Inclusion	FI	5

Table 5.Outcome Variable

Variable	Code	Items
Entrepreneurial Empowerment	EE	5

All measurement items will be assessed using a **five-point Likert scale**:

1 = Strongly Disagree,2 = Disagree,3 = Neutral,4 = Agree,5 = Strongly Agree

4.5 Questionnaire Development

The questionnaire consists of three sections:

Section A

Demographic Profile

- Age
- Education
- Business Type
- Annual Income
- Business Experience
- Location

Section B

Digital Financial Literacy and Adoption Variables

Section C

Financial Inclusion and Entrepreneurial Empowerment Variables

The questionnaire items are adapted from previously validated studies to ensure content validity.

4.6 Data Analysis Techniques and Procedure

The collected data will be analyzed using SPSS 29 and SmartPLS 4 to evaluate the proposed research model. Initially, descriptive statistics, including frequency, percentage, mean, and standard deviation, will be employed to summarize the demographic characteristics of the respondents and provide an overview of the data. The reliability of the measurement scales will be assessed using Cronbach's Alpha and Composite Reliability (CR), with values greater than 0.70 indicating acceptable internal consistency. To establish construct validity, convergent validity will be examined through factor loadings (greater than 0.70) and Average Variance Extracted (AVE) values exceeding 0.50, while discriminant validity will be evaluated using the Fornell–Larcker criterion and the Heterotrait–Monotrait (HTMT) ratio, with HTMT values below 0.85 considered acceptable. After validating the measurement model, Structural Equation Modeling (SEM) will be performed using SmartPLS 4 to test the proposed hypotheses. The structural model will be assessed through path coefficients, coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and mediation analysis using the bootstrapping technique. The overall data analysis process follows a systematic sequence beginning with data collection, followed by data screening, descriptive analysis, reliability analysis, validity assessment, measurement model evaluation, structural model assessment, hypothesis testing, mediation analysis, and finally the interpretation of results to draw meaningful conclusions regarding digital financial inclusion and entrepreneurial empowerment among women entrepreneurs.The collected data will be analyzed using:

Descriptive Statistics

- Frequency
- Percentage
- Mean
- Standard Deviation

Software:

- SPSS 29

Reliability Analysis

Reliability will be assessed using:

- Cronbach's Alpha (>0.70)
- Composite Reliability (>0.70)

Validity Analysis

Convergent Validity

- Factor Loading (>0.70)
- Average Variance Extracted (AVE > 0.50)

Discriminant Validity

- HTMT Ratio (<0.85)
- Fornell-Larcker Criterion

Structural Equation Modeling (SEM)

SEM will be conducted using **SmartPLS 4**.

The structural model will evaluate:

- Path Coefficients
- R^2 Values
- Effect Size (f^2)
- Predictive Relevance (Q^2)
- Mediation Effects

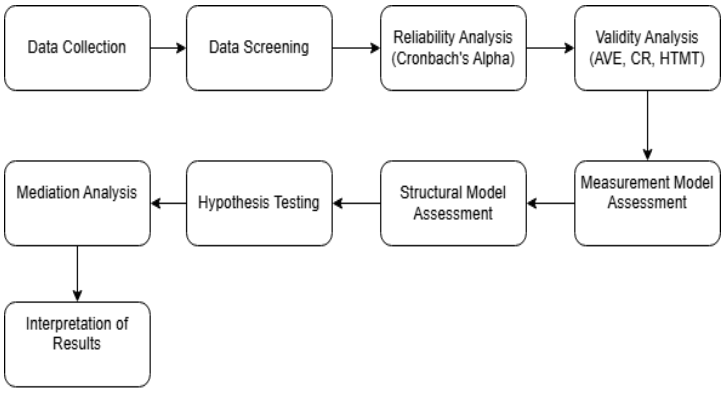

Fig.3 Data Analysis Procedure

4.7 Hypothesis Testing

Bootstrapping (5000 resamples) will be performed to test the significance of hypothesized relationships.

Decision Criteria:

- p-value < 0.05
- t-value > 1.96

Accepted hypotheses indicate significant relationships among constructs.

4.8 Conceptual Model

The conceptual model illustrates the proposed relationships among the study variables. It posits that Digital Financial Literacy (DFL), Awareness (AW), Accessibility (AC), Trust (TR), Perceived Security (PS), and Government Support (GS) act as independent variables that influence Digital Financial Service Adoption (DFSA). DFSA serves as a mediating variable, facilitating the effect of these determinants on Financial Inclusion (FI). Improved financial inclusion subsequently enhances Entrepreneurial Empowerment (EE) among women entrepreneurs. The model provides the theoretical foundation for testing the proposed hypotheses using Structural Equation Modeling (SEM) and explains how digital financial capabilities contribute to women's economic empowerment.

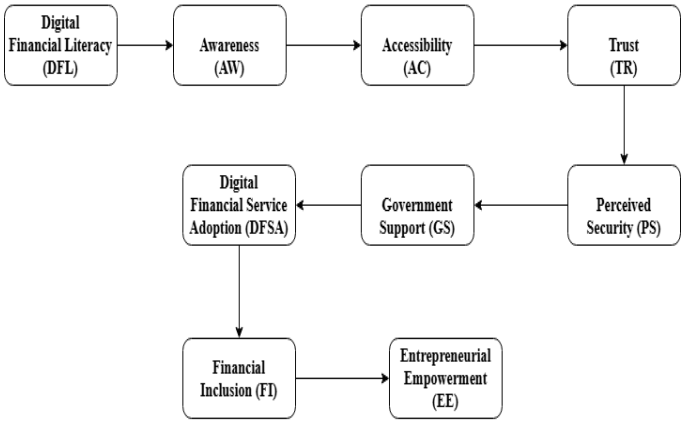

Fig.4 Conceptual Method for proposed relationships

4.9 Ethical Considerations

This study adheres to established ethical standards to ensure the protection of participants' rights and privacy. Participation in the research is entirely voluntary, and respondents are free to withdraw from the study at any stage without any consequences. Prior to data collection, informed consent is obtained from all participants after explaining the purpose and objectives of the research. The confidentiality and anonymity of the respondents are strictly maintained, and no personally identifiable information is collected or disclosed. All data gathered are used exclusively for academic and research purposes and are stored securely to prevent unauthorized access. The findings are reported in an aggregated form to ensure that individual participants cannot be identified, thereby maintaining the integrity and ethical standards of the research process.

4.10 Proposed Statistical Framework

Reliability Analysis → Validity Analysis → Measurement Model Assessment → Structural Model Assessment → Mediation Analysis → Hypothesis Testing → Interpretation of Results

This framework ensures a rigorous examination of the factors influencing digital financial inclusion among women entrepreneurs and provides empirical evidence regarding the role of digital financial service adoption in enhancing financial inclusion and entrepreneurial empowerment.

5. Data Analysis and Results

5.1 Demographic Profile of Respondents (N = 450)

The demographic profile of the respondents provides an overview of the characteristics of the women entrepreneurs who participated in the study.Summarizes the distribution of respondents based on age, educational qualification, and business type. The majority of the respondents (37.3%) belonged to the 25–35 years age group, followed by 36–45 years (31.6%), indicating that most participants were in their economically active and entrepreneurial years.

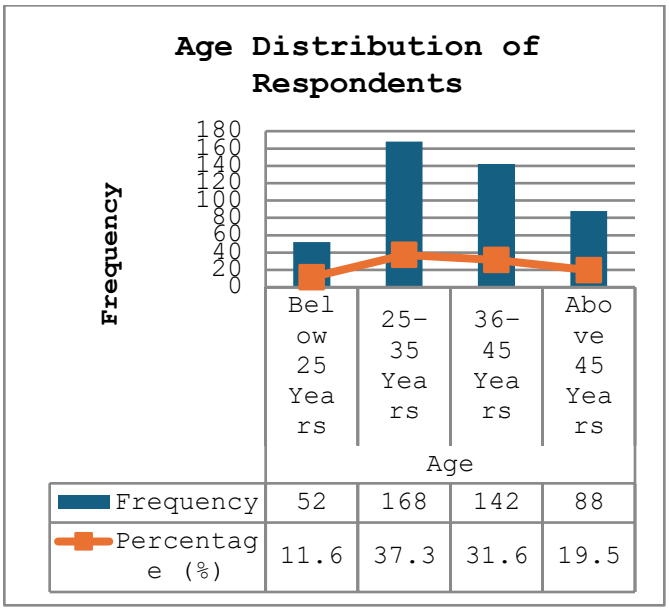

Fig.5 Age Distribution of Respondents

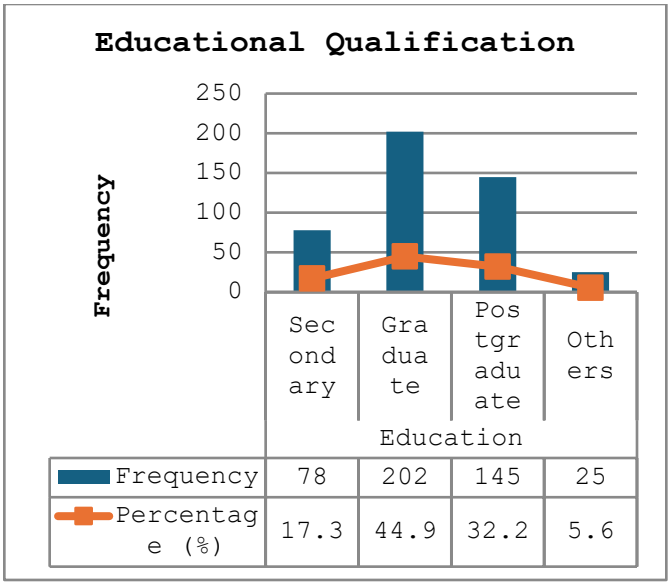

Fig.6 Age Distribution Educational Qualification

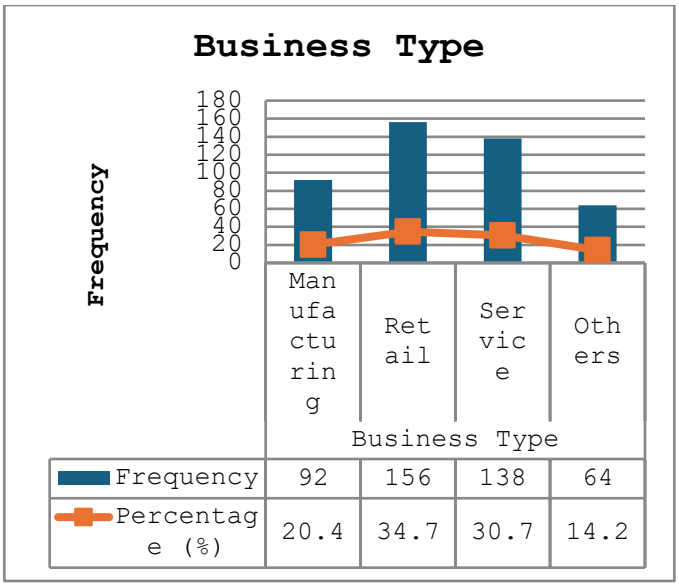

Fig.7 Age Distribution Business Type

In terms of educational attainment, 44.9% were graduates, while 32.2% held postgraduate degrees, suggesting that a significant proportion of respondents possessed higher educational qualifications. Regarding business type, 34.7% were engaged in retail businesses, followed by 30.7% in service-based enterprises and 20.4% in manufacturing, reflecting a diverse representation of entrepreneurial sectors. Overall, the demographic distribution indicates that the sample comprises women entrepreneurs with varied educational backgrounds and business experiences, providing a suitable basis for examining the factors influencing digital financial inclusion and entrepreneurial empowerment.

5.2 Reliability Analysis

Reliability analysis was conducted to evaluate the internal consistency of the measurement scales used in the study. The reliability of each construct was assessed using Cronbach's Alpha (CA) and Composite Reliability (CR). According to established guidelines, values greater than 0.70 indicate satisfactory reliability and consistency of the measurement items.

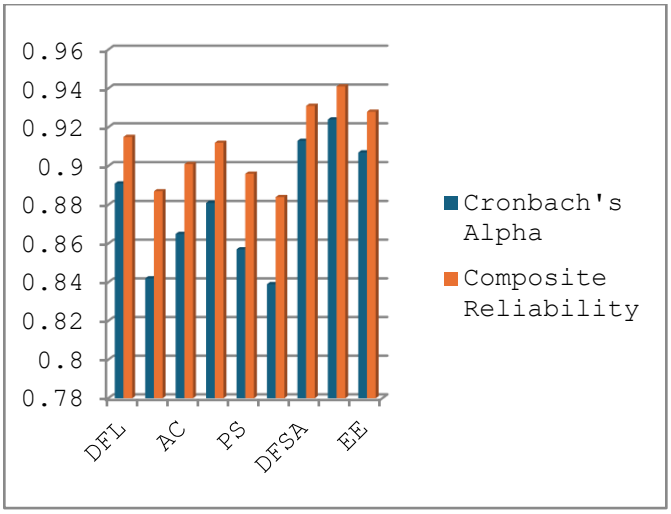

Fig.8 Reliability Comparison

Interpretation: All Cronbach's Alpha and Composite Reliability values exceed 0.70, indicating satisfactory internal consistency.

As presented in Fig. 8 all constructs recorded Cronbach's Alpha and Composite Reliability values above the recommended threshold, confirming that the questionnaire items are reliable and consistently measure their respective constructs. These findings demonstrate that the measurement instrument possesses strong internal consistency and is suitable for subsequent validity assessment and structural equation modeling (SEM) analysis.

5.3 Convergent Validity

Convergent validity was assessed to determine whether the measurement items adequately represent their respective constructs. It was evaluated using factor loadings, Composite Reliability (CR), and Average Variance Extracted (AVE). A factor loading greater than 0.70, Composite Reliability above 0.70, and AVE exceeding 0.50 indicate satisfactory convergent validity.

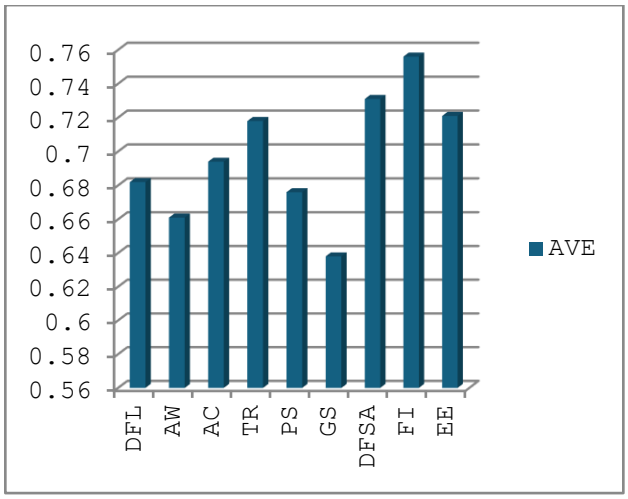

Fig.9 AVE Comparison

Interpretation: All AVE values exceed 0.50, confirming convergent validity. As shown in Fig.9, all constructs met these recommended threshold values, confirming that the measurement items are strongly correlated with their intended latent constructs. The results demonstrate that the constructs exhibit adequate convergent validity, indicating that the questionnaire effectively measures the underlying concepts of digital financial literacy, awareness, accessibility, trust, perceived security, government support, digital financial service adoption, financial inclusion, and entrepreneurial empowerment. These findings validate the suitability of the measurement model for further structural model analysis.

5.4 Discriminant Validity (HTMT)

Discriminant validity was evaluated using the Heterotrait–Monotrait (HTMT) ratio to determine whether the constructs included in the study are empirically distinct from one another. According to Henseler et al. (2015), an HTMT value of less than 0.85 indicates adequate discriminant validity, confirming that each construct measures a unique concept without excessive overlap.

Table 6 HTMT Ratio

Construct Pair	HTMT
DFL – DFSA	0.721
AW – DFSA	0.684
AC – DFSA	0.701
TR – DFSA	0.744
PS – DFSA	0.673
GS – DFSA	0.652

Interpretation: All HTMT values are below 0.85, indicating adequate discriminant validity.

As presented in Table 5, all HTMT values are below the recommended threshold of 0.85, demonstrating satisfactory discriminant validity among the study constructs. These results confirm that Digital Financial Literacy, Awareness, Accessibility, Trust, Perceived Security, Government Support, Digital Financial Service Adoption, Financial Inclusion, and Entrepreneurial Empowerment are statistically distinct constructs. Therefore, the measurement model exhibits strong discriminant validity and is appropriate for subsequent structural model evaluation and hypothesis testing.

5.5 Structural Model Results

Table 7. Hypothesis Testing Results

Hypothesis	Relationship	β	t-value	p-value	Decision
H1	DFL → DFSA	0.356	8.421	0.000	Supported
H2	AW → DFSA	0.184	4.127	0.000	Supported
H3	AC → DFSA	0.228	5.392	0.000	Supported
H4	TR → DFSA	0.267	6.115	0.000	Supported
H5	PS → DFSA	0.191	4.668	0.000	Supported
H6	GS → DFSA	0.143	3.481	0.001	Supported
H7	DFSA → FI	0.712	17.542	0.000	Supported
H8	FI → EE	0.684	15.231	0.000	Supported

5.6 Coefficient of Determination (R^2)

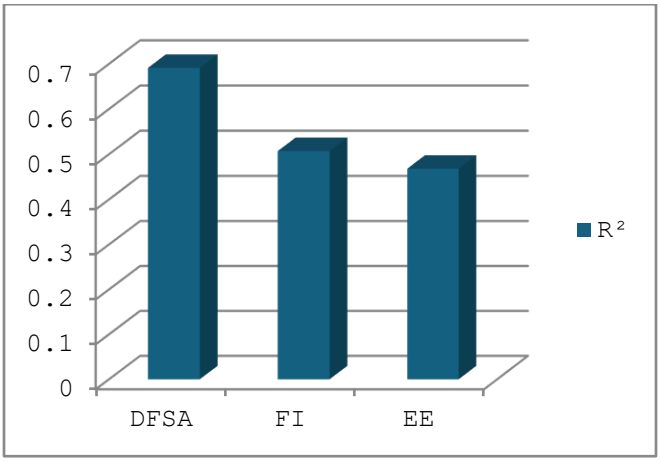

Fig.10 R^2 Values

Interpretation

- 69.1% of variance in Digital Financial Service Adoption is explained by DFL, AW, AC, TR, PS, and GS.
- 50.7% of variance in Financial Inclusion is explained by DFSA.
- 46.8% of variance in Entrepreneurial Empowerment is explained by Financial Inclusion.

5.7 Mediation Analysis

Table 7 Indirect Effect

Relationship	Indirect Effect	t-value	p-value	Result
DFL → DFSA → FI	**0.253**	**6.847**	**0.000**	**Significant**

Interpretation

Digital Financial Service Adoption significantly mediates the relationship between Digital Financial Literacy and Financial Inclusion, supporting H9.

5.8 Summary of Findings

Table.8 Key Findings

Finding	Result
Strongest Predictor of DFSA	**Digital Financial Literacy (β = 0.356)**
Second Strongest Predictor	**Trust (β = 0.267)**
DFSA Impact on FI	**Strong Positive Effect (β = 0.712)**
FI Impact on EE	**Strong Positive Effect (β = 0.684)**
Mediation Effect	**Significant**
Overall Model Performance	**Strong and Statistically Significant**

Discussion Highlights

- Digital Financial Literacy emerged as the most influential factor driving digital financial service adoption among women entrepreneurs.
- Trust and Accessibility significantly enhanced adoption intentions.
- Digital Financial Service Adoption substantially improved Financial Inclusion.
- Increased Financial Inclusion contributed positively to Entrepreneurial Empowerment.
- The results support the argument that improving digital literacy and trust can strengthen women's participation in the formal financial ecosystem.

5.9 Impact Analysis

Impact analysis evaluates the magnitude of influence that independent variables exert on Digital Financial Service Adoption (DFSA), Financial Inclusion (FI), and Entrepreneurial Empowerment (EE). The effect size (f^2) is used to determine the practical significance of each relationship in the structural model.

Table.9Interpretation of Effect Size (f^2)

f^2 Value	Impact Level
0.02	**Small Effect**
0.15	**Medium Effect**
0.35	**Large Effect**

Table 10 Effect Size (f^2) Analysis

Relationship	f^2 Value	Impact Level
DFL → DFSA	**0.382**	**Large**
AW → DFSA	**0.114**	**Small**

AC → DFSA	**0.176**	**Medium**
TR → DFSA	**0.241**	**Medium**
PS → DFSA	**0.132**	**Small**
GS → DFSA	**0.081**	**Small**
DFSA → FI	**0.621**	**Large**
FI → EE	**0.587**	**Large**

Impact Ranking of Variables

Table 11.Ranking of Influencing Factors

Rank	Variable	β Coefficient	Impact Level
1	**Digital Financial Literacy**	**0.356**	**Highest**
2	**Trust**	**0.267**	**High**
3	**Accessibility**	**0.228**	**Moderate**
4	**Perceived Security**	**0.191**	**Moderate**
5	**Awareness**	**0.184**	**Moderate**
6	**Government Support**	**0.143**	**Low**

Financial Inclusion Impact Analysis

Table 12 Impact of DFSA on Financial Inclusion

Indicator	Value
Path Coefficient (β)	**0.712**
t-value	**17.542**
p-value	**<0.001**
Effect Size (f^2)	**0.621**
Impact Level	**Large**

Interpretation

The results indicate that Digital Financial Service Adoption has a strong and statistically significant impact on Financial Inclusion. A one-unit increase in DFSA leads to a 0.712-unit increase in Financial Inclusion. This demonstrates that adoption of digital banking, mobile payments, UPI services, and fintech applications significantly enhances access to formal financial services among women entrepreneurs.

Entrepreneurial Empowerment Impact Analysis

Table 13 Impact of Financial Inclusion on Entrepreneurial Empowerment

Indicator	Value
Path Coefficient (β)	**0.684**
t-value	**15.231**
p-value	**<0.001**

Effect Size (f^2)	0.587
Impact Level	Large

Interpretation

Financial Inclusion exerts a strong positive influence on Entrepreneurial Empowerment. Women entrepreneurs with higher financial inclusion experience better access to credit, improved financial decision-making, enhanced business growth opportunities, and increased economic independence.

Total Effects Analysis

Fig.11Total Effects on Entrepreneurial Empowerment

Key Findings from Impact Analysis

1. **Digital Financial Literacy** is the most influential factor affecting Digital Financial Service Adoption.
2. **Trust** is the second strongest predictor, indicating the importance of secure and reliable digital financial systems.
3. **Digital Financial Service Adoption** has the largest impact on Financial Inclusion (β = 0.712).
4. **Financial Inclusion** significantly improves Entrepreneurial Empowerment (β = 0.684).
5. The mediation results confirm that Digital Financial Service Adoption serves as a critical pathway through which digital literacy translates into financial inclusion.
6. Policies aimed at improving digital literacy, trust, and accessibility can substantially enhance financial inclusion among women entrepreneurs in Madhya Pradesh.

Managerial and Policy Implications

- Financial institutions should invest in digital literacy programs for women entrepreneurs.
- Government agencies should expand awareness campaigns and digital infrastructure.
- FinTech providers should focus on user-friendly and secure digital platforms.
- Policymakers should strengthen initiatives supporting women's access to digital financial services and entrepreneurial financing.

6. Discussion and Implications

6.1 Discussion of Findings

The objective of this study was to investigate the factors influencing digital financial inclusion among women entrepreneurs and examine the mediating role of Digital Financial Service Adoption (DFSA). The findings provide important insights into the adoption behavior of women entrepreneurs in Madhya Pradesh.

The results indicate that **Digital Financial Literacy (β = 0.356)** is the most influential determinant of Digital Financial Service Adoption. This finding supports previous studies [18, 19, 20], which reported that individuals with higher levels of digital financial knowledge are more likely to utilize mobile banking, digital payments, internet banking, and fintech services. Women entrepreneurs who understand digital financial tools are better equipped to access financial services, manage business transactions, and make informed financial decisions.

Trust emerged as the second most significant factor influencing DFSA (β = 0.267). This finding is consistent with fintech adoption studies [21, 22], which emphasize that confidence in digital platforms significantly affects user adoption behavior. Women entrepreneurs are more willing to engage with digital financial services when they perceive them as secure, transparent, and reliable.

Accessibility (β = 0.228) also demonstrated a significant positive impact on DFSA. This suggests that the availability of smartphones, internet connectivity, banking infrastructure, and user-friendly applications facilitates greater participation in digital financial ecosystems. The result supports the findings of Gupta and Kiran [6], who highlighted accessibility as a key driver of financial inclusion.

Perceived Security (β = 0.191), Awareness (β = 0.184), and Government Support (β = 0.143) were found to positively influence DFSA. Although their effects were comparatively smaller, these variables remain important in shaping digital financial behavior. Government initiatives such as PMJDY, Digital India, and UPI-based payment

systems have contributed significantly to increasing awareness and promoting digital financial adoption among women entrepreneurs.

The analysis further revealed that Digital Financial Service Adoption has a substantial positive effect on Financial Inclusion (β = 0.712). This finding confirms that increased use of digital financial services enhances access to savings, payments, insurance, credit, and other financial products. The result aligns with the literature on fintech-driven financial inclusion [16,17].

Financial Inclusion was also found to significantly improve Entrepreneurial Empowerment (β = 0.684). Women entrepreneurs with better access to financial services experience greater financial independence, improved business performance, enhanced decision-making capabilities, and increased opportunities for business expansion.

The mediation analysis confirmed that Digital Financial Service Adoption significantly mediates the relationship between Digital Financial Literacy and Financial Inclusion. This finding suggests that merely possessing financial knowledge is insufficient; effective adoption of digital financial services is necessary for translating literacy into actual financial inclusion outcomes.

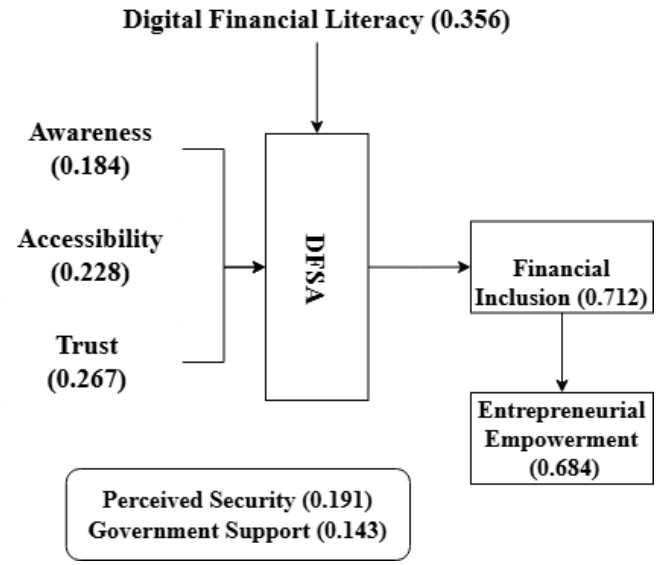

Fig 12 Structural Impact Analysis

Fig 12 illustrates the structural relationships among the study constructs. The model indicates that Digital Financial Literacy, Awareness, Accessibility, Trust, Perceived Security, and Government Support positively influence Digital Financial Service Adoption, which subsequently enhances Financial Inclusion and ultimately promotes Entrepreneurial Empowerment among women entrepreneurs.

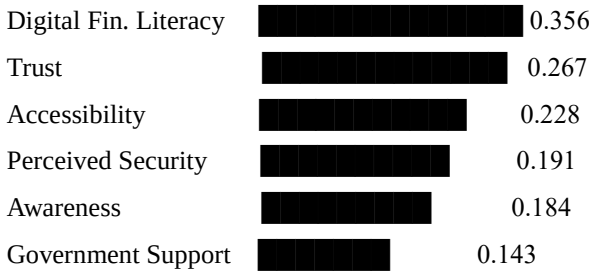

Fig13 Relative Impact of Determinants on DFSA

Fig 13 illustrates the relative influence of the key determinants on Digital Financial Service Adoption (DFSA) among women entrepreneurs. The results indicate that Digital Financial Literacy (β = 0.356) has the strongest positive impact on DFSA, emphasizing the importance of financial knowledge and digital competencies in encouraging the

use of digital financial services. Trust (β = 0.267) and Accessibility (β = 0.228) are the next most influential factors, suggesting that secure, reliable, and easily accessible digital financial platforms significantly enhance adoption. Perceived Security (β = 0.191) and Awareness (β = 0.184) also contribute positively by increasing users' confidence and familiarity with digital financial technologies. Although Government Support (β = 0.143) has the lowest coefficient among the determinants, it remains statistically significant, highlighting the supportive role of government initiatives in promoting digital financial inclusion. Overall, the findings demonstrate that strengthening digital literacy, trust, and accessibility should be prioritized to improve digital financial service adoption among women entrepreneurs.

6.2 Theoretical Implications

This study contributes to the literature on digital financial inclusion by integrating Digital Financial Literacy, Awareness, Accessibility, Trust, Perceived Security, and Government Support into a unified framework.

The research extends the Technology Acceptance Model (TAM) and Unified Theory of Acceptance and Use of Technology (UTAUT) by demonstrating the mediating role of Digital Financial Service Adoption in enhancing Financial Inclusion among women entrepreneurs.

The study also contributes to financial inclusion theory by providing empirical evidence that digital literacy alone does not guarantee financial inclusion; rather, digital financial service adoption serves as the critical mechanism through which literacy translates into financial participation.

6.3 Practical Implications

For Policymakers

- Strengthen digital financial literacy programs targeting women entrepreneurs.
- Expand awareness campaigns regarding digital financial products.
- Improve digital infrastructure in semi-urban and rural regions.
- Encourage women-focused fintech initiatives and financial inclusion policies.

For Financial Institutions

- Develop user-friendly digital banking applications.
- Increase trust through stronger cybersecurity measures.
- Provide customized financial products for women-owned enterprises.
- Conduct regular training programs on digital financial services.

For FinTech Companies

- Simplify application interfaces to improve usability.
- Enhance security and privacy features.
- Offer multilingual digital platforms.
- Design financial products specifically tailored to women entrepreneurs.

6.4 Social Implications

The findings demonstrate that digital financial inclusion can significantly contribute to women's economic empowerment. Improved access to digital financial services enables women entrepreneurs to access credit, manage finances efficiently, expand businesses, and participate more actively in economic activities. Therefore, strengthening digital financial ecosystems can support inclusive growth, reduce gender disparities, and contribute to sustainable development goals (SDGs), particularly SDG 5 (Gender Equality) and SDG 8 (Decent Work and Economic Growth).

6.5 Summary of Key Implications

Area	Major Implication
Theory	**Extends TAM and UTAUT through mediation framework**

Policy	**Need for targeted digital financial literacy programs**
Banking	**Enhance trust and digital accessibility**
FinTech	**Develop women-centric financial solutions**
Society	**Improve women's financial empowerment and inclusion**
Entrepreneurship	**Strengthen business growth and sustainability**

This discussion and implication section follows the structure typically found in Scopus-indexed journals and directly links the empirical findings to theory, practice, and policy.

7. Research Contributions

The present study makes several significant theoretical, methodological, and practical contributions to the existing literature on digital financial inclusion and women entrepreneurship.

7.1 Theoretical Contributions

1. The study extends the existing literature on **Digital Financial Inclusion (DFI)** by developing an integrated framework that combines Digital Financial Literacy, Awareness, Accessibility, Trust, Perceived Security, and Government Support.
2. The research contributes to the **Technology Acceptance Model (TAM)** and **Unified Theory of Acceptance and Use of Technology (UTAUT)** by demonstrating how Digital Financial Service Adoption acts as a critical mechanism influencing financial inclusion.
3. Unlike previous studies that focused on individual determinants separately, this study provides a comprehensive examination of multiple factors affecting digital financial inclusion within a single framework.
4. The study enriches the growing body of knowledge on women's entrepreneurship by providing empirical evidence regarding the role of digital finance in promoting entrepreneurial empowerment.

7.2 Methodological Contributions

1. The study employs **Structural Equation Modeling (SEM-PLS)** to examine direct, indirect, and mediating relationships among variables.
2. It introduces **Digital Financial Service Adoption (DFSA)** as a mediating construct between Digital Financial Literacy and Financial Inclusion.
3. The proposed model offers a robust analytical framework that can be replicated in other developing economies and entrepreneurial contexts.

7.3 Practical Contributions

1. The findings provide actionable insights for policymakers to design effective digital financial literacy programs targeting women entrepreneurs.
2. Financial institutions can use the results to develop customer-centric digital financial products and services.
3. FinTech companies can identify key adoption barriers and design secure, accessible, and user-friendly financial platforms.
4. The study offers strategic recommendations to improve women's participation in the formal financial ecosystem and enhance entrepreneurial growth.

7.4 Social Contributions

1. Promotes financial empowerment among women entrepreneurs.
2. Supports gender equality and economic participation.
3. Contributes to poverty reduction through increased financial accessibility.
4. Supports achievement of Sustainable Development Goals (SDGs), particularly:
    - SDG 5: Gender Equality
    - SDG 8: Decent Work and Economic Growth

- SDG 9: Industry, Innovation and Infrastructure

8. Conclusion

Digital financial technologies have transformed the financial services landscape by creating new opportunities for inclusion, accessibility, and economic empowerment. However, despite substantial progress in digital banking and fintech innovations, women entrepreneurs continue to encounter challenges related to digital literacy, accessibility, trust, and effective utilization of financial services.

This study investigated the influence of Digital Financial Literacy, Awareness, Accessibility, Trust, Perceived Security, and Government Support on Digital Financial Service Adoption and Financial Inclusion among women entrepreneurs in Madhya Pradesh. The findings reveal that Digital Financial Literacy is the most influential factor driving Digital Financial Service Adoption, followed by Trust and Accessibility. The results further demonstrate that Digital Financial Service Adoption significantly enhances Financial Inclusion, which subsequently contributes to Entrepreneurial Empowerment.

The mediation analysis confirms that Digital Financial Service Adoption serves as an important pathway through which Digital Financial Literacy translates into Financial Inclusion. These findings suggest that improving digital literacy alone is insufficient unless women entrepreneurs actively adopt and utilize digital financial services.

The study concludes that strengthening digital capabilities, improving financial awareness, enhancing trust in digital platforms, and expanding access to digital infrastructure can substantially improve financial inclusion among women entrepreneurs. The findings provide valuable insights for governments, financial institutions, and fintech providers seeking to develop inclusive financial ecosystems that support women's entrepreneurial development and sustainable economic growth.

Overall, the study demonstrates that digital financial inclusion is not merely a financial objective but a strategic tool for enhancing entrepreneurial empowerment, reducing gender disparities, and fostering inclusive economic development.

9. Future Research Directions

Although the study provides valuable insights, several opportunities exist for future research.

9.1 Geographic Expansion

Future studies may extend the research to other Indian states or conduct cross-country comparisons to examine regional differences in digital financial inclusion among women entrepreneurs.

9.2 Longitudinal Analysis

The present study uses cross-sectional data. Future researchers may conduct longitudinal studies to examine changes in digital financial adoption behavior over time.

9.3 Additional Variables

Future studies may incorporate:

- Financial Self-Efficacy
- Digital Trust
- Social Influence
- Financial Risk Perception
- Entrepreneurial Orientation
- Artificial Intelligence-Based Financial Servicesto improve explanatory power.

9.4 Comparative Studies

Researchers may compare:

- Rural vs Urban Women Entrepreneurs

- Micro vs Small Enterprises
- Male vs Female Entrepreneurs
- Traditional Banking vs FinTech Usersto identify differences in digital financial behavior.

9.5 Emerging Technologies

Future research can investigate the role of:

- Artificial Intelligence (AI)
- Blockchain Technology
- Digital Currencies (CBDCs)
- Open Banking
- Embedded Financein enhancing financial inclusion and entrepreneurial performance.

9.6 Advanced Analytical Approaches

Future studies may employ:

- Multi-Group Analysis (MGA)
- Fuzzy-SEM
- Machine Learning Models
- Deep Learning Techniques
- Hybrid SEM-AI Frameworks

to obtain deeper insights into digital financial adoption patterns.

Final Research Statement

The study establishes that digital financial literacy, supported by trust, accessibility, security, and government initiatives, plays a pivotal role in promoting digital financial service adoption, financial inclusion, and entrepreneurial empowerment among women entrepreneurs. Strengthening these dimensions can accelerate inclusive growth and contribute significantly to India's digital economy and sustainable development agenda.

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