

DETERMINANTS OF GREEN BANKING BEHAVIOR IN INDIA: EXAMINING THE MEDIATING ROLE OF GREEN BANKING INTENTION AND THE INFLUENCE OF DIGITAL FINANCIAL LITERACY

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ABSTRACT

As sustainable finance becomes increasingly important and digital transformation accelerates, green banking has gained visibility as a research subject in developing economies like India. Based on the Theory of Planned Behavior (TPB), this paper aims to discover the impact of environmental attitude, perceived risk, subjective norms, and digital financial literacy on green banking. In addition, the paper examines the mediating effect of green banking intentions on actual behavior. Surveying Indian banking customers and using a well-structured questionnaire, data were collected and analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) techniques. The results reveal that environmental attitude, subjective norms, and digital financial literacy have a positive direct and indirect influence on green banking via green banking intention, which transforms pro-environmental attitudes and social influence into actual behavior. Interestingly, according to the study, digital financial literacy is the major factor influencing green banking, thus stressing the importance of digital skills in facilitating sustainable banking practices. Despite being expected to have a significant impact, perceived risk does not seem to influence the intention to indulge in green banking or green banking activities, which indicates that consumers may have started to trust digital banking systems. Furthermore, the model showcases a remarkable degree of explanatory and predictive efficacy. In addition, this research improves the existing literature further since it develops the TPB by adding the consideration of digital financial literacy in relation to green banking. The findings may help banking institutions and policymakers design strategies that promote sustainable and digitally inclusive financial practices.

Keywords: Green banking, Green banking intention, Digital financial literacy, Environmental attitude, Subjective norms and Perceived risk.

INTRODUCTION

The worldwide change in climate, decline in biodiversity, resource depletion, and ecological damage have questioned traditional economic and finance approaches. India has witnessed an unprecedented rate of economic growth, but with the consequences of increased air pollution, uneven urbanization, deforestation, and unsustainable consumption. The financial sector has typically been considered a supporter of economic growth. Recently, it has grown into a vital constituent of sustainable development. Consequently, green banking has been serving as a basic structure for integrating environmental concern into banking operations, credit products, and investment decisions (Weber & Remer, 2011). Green

banking is behavior that supports environmentally friendly banking practices. It could be renewable energy efforts, paperless banking, online banking, energy-efficient branches, and banking that promotes environmental sustainability and renewable energy (Biswas, 2011). The intention is to offset the environmental impact of banking activity and align it with sustainable finance practices. Green banking can be considered as a bridge between economic development and environmental sustainability.

The significance of green banking in a country like India is further amplified by its vulnerability to climate risks and reliance on a fossil fuel-dependent economy. India is facing increased levels of extreme weather and climate-related events, higher sea levels, and disruption of ecosystems (MoEFCC, 2020). Financial institutions have the potential to promote environmentally friendly consumer behavior. Banks can engage in the business of green financing and act as "change agents" to facilitate the evolution of a low-carbon and climate-resilient economy. A lot has to be done in the area of green banking in India, despite increasing acknowledgement of its importance. Regulatory framework support has been developing progressively. The Central Bank of India is encouraging banks to adopt responsibility and sustainability disclosures. However, reporting of green finance and lending is not subject to a mandatory framework (RBI, 2021). The absence of awareness among stakeholders, uncertainty, and the perils of green investments are some of the hurdles to the adoption of green banking.

Green banking increases the operational efficiency of banking organizations and mitigates the long-term credit risks linked with borrowers engaged in environmentally unsustainable businesses. It boosts the banks' reputation and customer loyalty by demonstrating corporate social responsibility (CSR) (Weber & Remer, 2011). Green banking ensures informed decisions and makes institutions more resilient to climate-related financial risks (UNEP FI, 2016). Customers get the benefits of green products, such as green savings accounts, low-interest loans for purchasing green homes or electric vehicles, etc. Customer sustainability demand can be linked with bank-based green innovation to promote further financial inclusion.

Considering the size of India's banking network and its role in resource mobilization, a concerted green banking effort can contribute toward the realization of Nationally Determined Contributions (NDCs). Furthermore, green banking is congruous with international conventions such as the Paris Agreement and Sustainable Development Goals (SDGs). The financial systems are being structured around climate disclosures, green bond markets, and ESG investments to ensure sustainable economic development. This paper investigated the determinants of green banking behavior among customers. The article discusses the various challenges to the uptake of green banking and extends practical suggestions for decision-makers and financial institutions on how to further encourage green banking and sustainable financial practices.

LITERATURE REVIEW

Factors influencing green banking behavior

The factors determining the banking behavior of the young generation need to identify to devise a youth-centric policy. This will enable them to make important financial decisions and improve the standard of both people and the community as a whole (Tung, 2019). A large number of Generation Z students possessed outstanding investment skills, practical knowledge of real-life situations, and analytical understanding to make decisions, but most of the time, they were averse to applying knowledge of green banking into real-life financial participation (Pašiušienė et al., 2023). Generation Z relied on a well-structured financial plan

for investment in the capital and securities market. Individual psychology and emotional intelligence had a considerable influence on their behavior. The risk-loving people preferred 'more risk, more profit' assets for investment and vice versa (Ratnawati, 2024). Personal risk-taking behavior, environmental consciousness, and innovation shaped the person's inclination to use Green banking services. The level of financial awareness did not considerably influence green saving, but green banking was notably impacted (Merli et al., 2023). Trust in financial agents and the accuracy of information acted as a key factor for individuals to make investment decisions. Sound and well-structured financial policies and investment practices positively impacted the financial attitude and behavior of an individual (Ambreen et al., 2021).

Financial literacy and green banking behavior

Education played a crucial role in improving green banking awareness among research participants. Green banking attitude was affected by age, gender, occupation, and features of green banking services (Ellahi et al., 2021). Financial literacy, trust in information technology and a person's openness to innovation were important factors in embracing green banking by individuals. There was no significant effect of financial literacy on socially responsible investment, but it significantly influenced the acceptance of green banking (Merli et al., 2023). Financial literacy, moderated by social demography and psychological factors, determined the financial attitude and behavior of an individual (Ambreen et al., 2021). There exists a clear gender digital divide, with men typically showing a higher level of financial literacy than women. The improvement in the level of digital financial literacy aided customers in making informed decisions and avoiding financial fraud linked to digital banking services (Anyfantaki & Andreou, 2019). Financial literacy campaigns were significant and compulsory for students and other stakeholders of higher education to improve the adoption of digital banking services (Tung, 2019). Well-designed climate education policy oriented towards young adults and less educated individuals was important to resolve the issue of climate change (Kurowski et al., 2022).

Theory of Planned Behavior (TPB)

Through the Theory of Planned Behavior (Ajzen, 1991), the Theory of Reasoned Action (TRA) was extended by the introduction of the concept of perceived behavioral control. The Theory of Planned Behavior recommends that actions of an individual could be anticipated on the basis of his or her intention for particular behavior (Ashidiqi & Arundina, 2017). The intention of an individual is determined by some key factors, i.e. attitude toward behavior, perceived behavioral control and subjective norms. For investment decisions, intention to invest is a prerequisite and is shaped by personal attitude, expectation of society, and perceived constraint or opportunity faced by an individual (Alleyne & Broome, 2011).

Banks and green banking behavior

Banks providing green banking services like eco-friendly cards and mortgages were able to attract environmentally conscious customers. Government regulation to promote sustainable development prompted banks to follow green banking initiatives. Bank capacity, employee awareness of green banking initiatives, and customer satisfaction were some of the internal factors for a bank to successfully implement green banking services (Jadaun, 2018). The sustainable banking initiatives impacted the financial performance of banks in a positive way and helped them to establish themselves as leaders in promoting an eco-friendly

financial system (Kaur & Rani, 2024). The sustainable banking initiatives helped banks to reduce operational costs, improve revenue, and enhance brand image (Praveen & Harina, 2022). Green finance is an important step for promoting environmentally friendly banking and sustainable economic growth (Rout & Sahoo, 2021). Sustainable banking practices like ATM, debit and credit cards, and digital banking benefited customers for cost-effectiveness, time saving, convenience and safe transactions. Investment in low-carbon, environmentally friendly and renewable energy projects promoted sustainable development. The decrease in paper usage helped to fight deforestation. The banks needed to implement awareness initiatives for both customers and employees. Some customers had familiarity with green banking services but required information and proper access to services (Praveen & Harina, 2022).

Although green banking and sustainable finance have received academic attention in recent years, studies examining green banking behavior in emerging economies are limited. Existing research has focused on environmental attitudes or technology adoption factors separately. In particular, the role of digital financial literacy in promoting green banking behavior has not been sufficiently explored. Limited attention has been given to understanding how green banking intention helps convert environmental concern and social influence into actual banking behavior. To address these gaps, the present study has extended the Theory of Planned Behavior by including digital financial literacy and analyzing the mediating role of green banking intention in determining green banking behavior.

THEORETICAL FRAMEWORK

This paper proposes a conceptual framework of Theory of Planned Behavior (Ajzen, 1991) with two constructs (attitude and environmental concern) merged and the addition of a new construct (digital financial literacy). It will help to elucidate how people develop their intentions and behavior towards green banking initiatives. The model includes the following variables.

Digital financial literacy (DFL)

Digital financial literacy encompasses the capability to effectively understand, utilize and assess the digital banking products and services (OECD, 2018). Consumers with good digital banking knowledge are better prepared to operate on the computerized banking applications, gauge risk, and understand the benefits associated with them.

Environmental attitude (EA)

(Diamantopoulos et al., 2003; Schultz, 2001) treats environmental concern and attitude as separate variables. But here these variables are combined to improve the theoretical foundation of the study. The favorable environmental attitude is often reflected in pro-environmental behavior, such as choosing paperless statements, mobile banking, and green financial products. As per the Theory of Planned Behavior, attitude toward a behavior significantly impacts the individual's green banking intention toward performing the behavior.

Perceived risk of digital banking (PRISK)

In the case of digital banking, perceived risks consist of threats related to data security, transaction errors, fraud, and technology failures (M. C. Lee, 2009). In the TPB framework, perceived behavioral control shapes intention and behavior. A high perceived risk can lead to negative behavioral intentions by reducing perceived control and trust in the

system. Hence, perceived behavioral control is merged with perceived risk to consolidate the model.

Subjective norms (SN)

Subjective norms refer to realized social compulsion of folks, partners, companions, peers, or society to follow a particular behavior pattern (Ajzen, 1991). The people who believe their social circle will expect them to be engaged in environmentally friendly banking have stronger green banking intention to honor those expectations.

Green banking intention (GBI) as a mediator

The intention, as a key construct in TPB, is indicative of an individual's motivation or readiness to perform behavior or action. The study posits green banking intention to be a direct precursor to behavior and influenced by digital financial literacy, environmental attitude, subjective norm and perceived control.

Green banking behavior (GBB)

Green banking behavior is the use of environmentally friendly banking practices, such as going for green financial products, paperless statements, digital banking, and avoiding in-branch visits.

Table 1. Latent variables and statements

Construct/ Latent variables	No. of items	Sample items/ Statements/ Observed variables	Source
Environmental attitude (EA)	3	“I believe protecting the environment is my personal responsibility.” (Original) “I believe protecting the environment is my personal responsibility.” (Used)	(Dunlap et al., 2000)
Perceived risk (PRISK)	4	“I worry about the security of digital banking transactions.” (Original) “I fear that technical errors or failures could result in financial loss during digital transactions.” (Used)	(M. C. Lee, 2009)
Subjective norms (SN)	2	“People important to me think I should use green banking services.” (Original) “People whose opinions I value think I should use Green Banking Services.” (Used)	(Ajzen, 1991).
Green banking intention (GBI)	4	“I intend to use green banking services in the near future.” (Original) I intend to use green banking services whenever possible.	(Ajzen, 1991).
Green banking behavior (GBB)	4	“I use paperless statements to reduce my environmental impact.” (Original) I regularly use digital banking services instead of paper-based options.” (Used)	(Tan & Teo, 2000)
Digital financial literacy (DFL)	4	“I am confident in using mobile and internet banking apps.” (Original) I am confident in managing my finances through digital banking platforms.” (Used)	(OECD, 2018)

The basic framework of this research extends the Theory of Planned Behavior (Ajzen, 1991) to include perceived risk of digital banking and digital financial literacy as context-specific constructs influencing the adoption of green banking in India. The model posits that Digital financial literacy, environmental attitude, subjective norms, and perceived risk influence green banking intention towards green banking behavior. Apart from the direct

effect, green banking intention is supposed to be the mediator between the exogenous variables and the endogenous variable, i.e. green banking behavior.

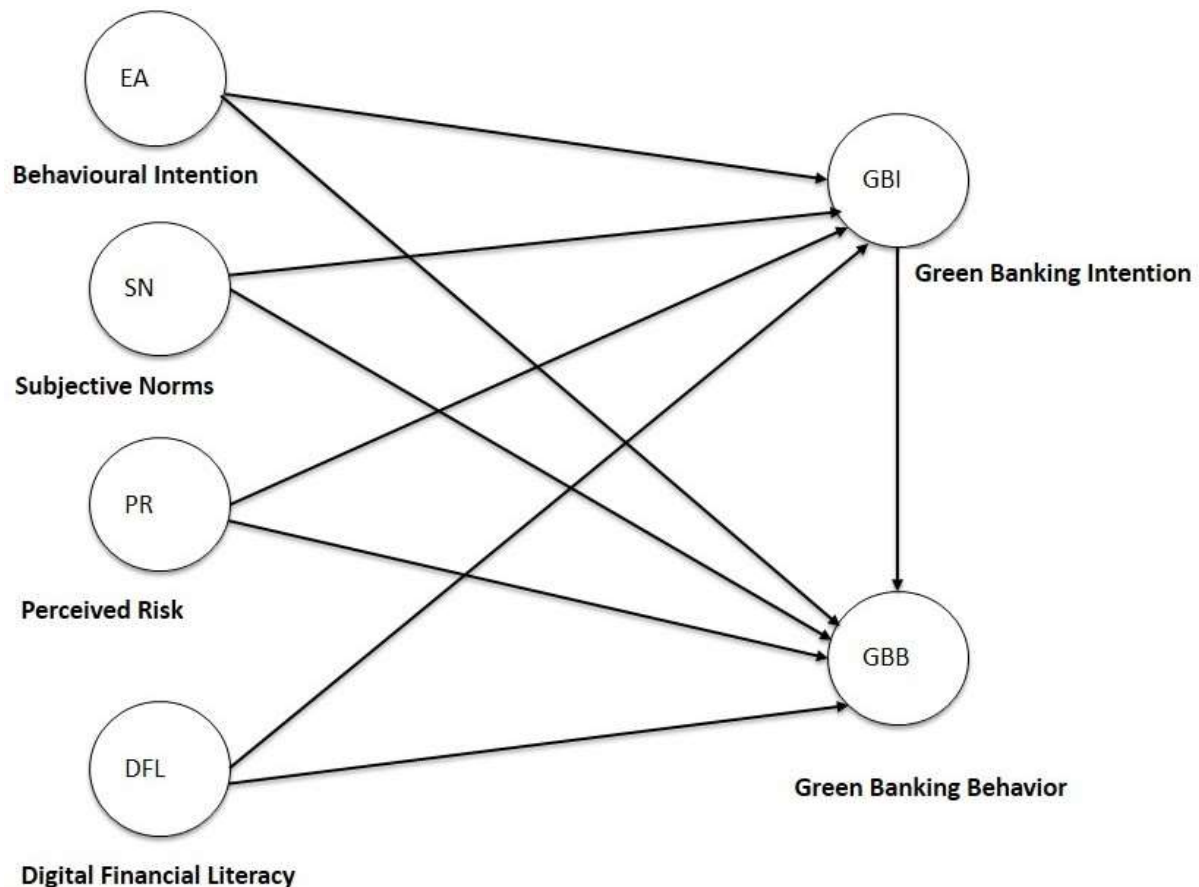


FIGURE 1
GREEN BANKING BEHAVIOR

Hypothesis

H₁: Digital financial literacy facilitates green banking behavior.

H₂: Environmental attitude demonstrates a favorable influence on green banking behavior.

H₃: Perceived risk linked with digital banking shows an adverse effect on green banking behavior.

H₄: Subjective norms contribute positively to green banking behavior.

H₅: Green banking intention enhances green banking behavior.

H₆: Green banking intention mediates the relationship between DFL, EA, PRISK, SN, and GBB.

H_{6A}: Green banking intention links digital financial literacy with green banking behavior.

H_{6B}: Green banking intention transmits the effect of environmental attitude on green banking behavior.

H_{6C}: Green banking intention channels the influence of perceived risk of digital banking toward green banking behavior.

H_{6D}: Green banking intention connects the subjective norms with green banking behavior.

RESEARCH METHODOLOGY

Research design

The study is based on a quantitative research model analyzed by Partial Least Squares Structural Equation Modelling (PLS-SEM) to examine structural relationships of digital financial literacy, environmental attitude, perceived risk of digital banking, and subjective norms with green banking intention and green banking behavior. PLS-SEM is an appropriate and robust technique for complicated models that comprises mediating variables, smaller sample sizes with large variances, and multivariate non-normality (Hair et al., 2019).

Population and sample

The potential participants for this research were individuals who are banking customers and have access to digital banking services. The targeted respondents were chosen by using a non-probability purposive sampling method. The sample size was established with the help of the 10 times rule for PLS-SEM, which states that the sample size must be a minimum of 10 times the maximum number of inner (or outer) model paths pointing at any latent construct (Chin, 1998; Hair et al., 2011; Thompson et al., 1995).

Data collection

Data were collected using a structured questionnaire with two segments, i.e., a demographic information section and a measurement of constructs section. All constructs were assessed using five-point Likert scales. The questionnaire was prepared using google forms and disseminated through email, WhatsApp and social media sites.

Data analysis

The computational analysis for PLS-SEM was performed using SmartPLS software. The constructs' reliability and validity were evaluated by Items with loadings > 0.7; Cronbach's alpha > 0.7; Composite Reliability (CR) > 0.7; Average Variance Extracted (AVE) > 0.5; Fornell-Larcker criterion (Hair et al., 2014) and HTMT ratio < 0.85 (Henseler et al., 2015). The Path Coefficients (β values) and p-values were analyzed for structural relationships; Coefficient of Determination (R^2) for explanatory power of exogenous constructs; the Effect Sizes (f^2), Predictive Relevance (Q^2) (Hair et al., 2014), and Bootstrapping (5000 samples) (Hair et al., 2011) for statistical significance of the model. For the mediation analysis, the indirect effects of DFL, EA, PRISK, and SN on GBB through GBI were tested.

RESULTS AND FINDINGS

Table No. 2 represents the respondents' demographic profile. Most respondents were young (18–25 years) and middle-aged (36–45 years) adults with a proportion of 31.3% and 24.0%, respectively. It was followed by the 26–35 years (20.7%), 45–60 years (20.0%), and the 60 years and above (4.0%) category. Hence, the sample represents financially active and decision-making individuals. The gender distribution showed a greater participation of males (60.7%); still, female representation was enough (39.3%) to support a gender-based outlook. The sample consisted of educated persons with postgraduate (52%), accompanied by

graduates (26.0%), up to 12th (13.3%), doctorate (7.3%), and others (1.3%). Therefore, the sample reflects the opinion of people with a good academic and analytical profile. Occupation-wise, the largest proportion of respondents were employees (48.7%), followed by students (32.7%), self-employed (7.4%), retired (4.6%), others (4.6%), and homemakers (2%). indicating participation from both working professionals and learners. Smaller proportions were of self-employed, retired, homemakers, or engaged in other occupations. The diverse distribution boosts the representativeness of the data. Income distribution has revealed that 40.7% of participants earned above ₹1, 00,000, while 33.3% fell in the income bracket of ₹50,001–1,00,000. This distribution may influence perception-based responses. Overall, the demographic profile indicates a young, educated, professional, and financially stable sample.

TABLE 2 DEMOGRAPHIC CHARACTERISTICS		
Respondent characteristics	Frequency	%age
<i>Age</i>		
18-25	47	31.3
26-35	31	20.7
36-45	36	24.0
45-60	30	20.0
60+	06	04.0
Total	150	100
<i>Gender</i>		
Male	91	60.7
Female	59	39.3
Total	150	100
<i>Education</i>		
Upto 12 th	20	13.4
Graduate	39	26.0
Postgraduate	78	52.0
Doctorate	11	07.3
Other	2	01.3
Total	150	100
<i>Occupation</i>		
Student	49	32.7
Self-employed	11	07.4
Employee	73	48.7
Homemaker	3	02.0
Retired	7	04.6
Other	7	04.6
Total	150	100
<i>Monthly Income</i>		
Less than ₹25,000	21	14.0
₹25,001–50,000	18	12.0
₹50,001–1,00,000	50	33.3
Above ₹1,00,000	61	40.7
Total	150	

Most of the variables (EA, GBI, GBB, and DFL) had high mean values (above 4.0) on a five-point scale, indicating a positive perception among participants (Table No. 3). Median values of 4 and 5 further confirm the consistency of favorable responses. The most of Standard deviation values were below 1, reflecting low variability and homogeneous responses. The majority of variables exhibited negative skewness, an indication of clustering

of the responses towards the higher end of the scale. This implies a tendency among respondents to express positive opinions across constructs. The value of kurtosis for many variables was more than 0, showing a leptokurtic distribution, and the values were concentrated and peaked around the mean. This suggests concurrence of similar opinions among respondents for specific indicator items. The p-values for all variables were 0.000, meaning that there is no standard normal distribution. Hence, the use of non-parametric or PLS-SEM techniques is appropriate for further analysis. The descriptive statistics indicate that the dataset is robust, reliable, and perfectly suitable for advanced multivariate analysis.

TABLE 3 DESCRIPTIVE ANALYSIS								
Name	Mean	Median	Observed Min	Observed Max	Standard deviation	Excess kurtosis	Skewness	P value
DFL1	4.060	4.000	2.000	5.000	0.835	0.343	-0.809	0.000
DFL2	4.067	4.000	2.000	5.000	0.822	0.329	-0.780	0.000
DFL3	4.160	4.000	2.000	5.000	0.731	0.047	-0.570	0.000
DFL4	4.027	4.000	1.000	5.000	0.864	0.190	-0.679	0.000
EA1	4.560	5.000	1.000	5.000	0.844	5.955	-2.371	0.000
EA2	4.440	5.000	1.000	5.000	0.707	3.249	-1.443	0.000
EA3	4.667	5.000	2.000	5.000	0.618	2.937	-1.856	0.000
PR1	3.640	4.000	1.000	5.000	1.047	-0.414	-0.535	0.000
PR2	3.460	4.000	1.000	5.000	1.129	-0.831	-0.307	0.000
PR3	3.613	4.000	1.000	5.000	1.112	-0.533	-0.509	0.000
PR4	3.433	4.000	1.000	5.000	1.146	-0.840	-0.292	0.000
SN2	4.093	4.000	2.000	5.000	0.827	-0.063	-0.676	0.000
SN3	4.100	4.000	1.000	5.000	0.893	1.134	-1.051	0.000
GBI1	4.253	4.000	1.000	5.000	0.842	1.972	-1.255	0.000
GBI2	4.227	4.000	2.000	5.000	0.784	0.009	-0.761	0.000
GBI3	4.147	4.000	1.000	5.000	0.882	0.995	-0.999	0.000
GBI4	4.047	4.000	2.000	5.000	0.874	-0.929	-0.394	0.000
GBB1	4.300	5.000	1.000	5.000	0.893	1.562	-1.313	0.000
GBB2	4.347	5.000	1.000	5.000	0.848	1.531	-1.329	0.000
GBB3	4.247	4.000	1.000	5.000	0.816	0.983	-1.006	0.000
GBB4	4.007	4.000	1.000	5.000	0.990	-0.352	-0.638	0.000

Measurement model results

Findings of reliability and convergent validity are shown in Table No. 4. Indicator reliability assesses how strongly each observed item represents its underlying latent construct. All measurement items except SN1 had values above the threshold of 0.70, hence demonstrating adequate to strong indicator reliability. The item SN1 had an outer loading of less than 0.70, it had an adverse impact on value of Cronbach's alpha and composite reliability. Hence item SN1 was removed from database for further analysis. Construct reliability evaluates the internal consistency of indicators and is measured by Cronbach's alpha, Composite reliability (pa and pc). The figure of Cronbach's alpha spanned from 0.758 (SN) to 0.886 (GBI), and Composite reliability ranged from 0.758 to 0.921, indicating strong internal consistency and reliability. The convergent validity determines the degree of a construct to which it explains the variance in its indicators. Here value of AVE for all constructs was more than the threshold value of 0.50, meaning that each construct demonstrates more than half of the variance of its indicators.

TABLE 4
RELIABILITY AND CONVERGENT VALIDITY TESTING

Variables	Items	Outer loading	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
Digital financial literacy	DFL1	0.792	0.850	0.852	0.899	0.690
	DFL2	0.870				
	DFL3	0.828				
	DFL4	0.831				
Environmental attitude	EA1	0.807	0.793	0.824	0.878	0.707
	EA2	0.902				
	EA3	0.809				
Perceived risk	PR1	0.825	0.831	0.900	0.884	0.658
	PR2	0.840				
	PR3	0.865				
	PR4	0.704				
Subjective norms	SN2	0.898	0.758	0.758	0.892	0.805
	SN3	0.896				
Green banking intention	GBI1	0.881	0.886	0.886	0.921	0.744
	GBI2	0.867				
	GBI3	0.855				
	GBI4	0.847				
Green banking behavior	GBB1	0.813	0.850	0.858	0.899	0.691
	GBB2	0.821				
	GBB3	0.909				
	GBB4	0.775				

Discriminant validity establishes that a particular construct is conceptually specific and empirically distinguished from other constructs. It is evaluated using the Fornell–Larcker criterion, cross-loadings, and the Heterotrait–Monotrait ratio. Table No. 5 represents the figure of the Fornell–Larcker criterion. For every construct, the diagonal values were higher than all corresponding off-diagonal correlations. Although relatively high correlations were observed between GBI and GBB (0.748), GBI and SN (0.610), and GBB and SN (0.606). But the values of these correlations were lower than the square root of the average variance of the respective constructs. Every indicator had the highest loading for its respective latent constructs (Table No. 6). HTMT values (Table No. 7) ranged from 0.125 to 0.852, which were lower than the critical threshold of 0.90. This indicates satisfactory discriminant validity (Henseler et al., 2015). The highest HTMT value was observed between green banking intention and green banking behavior (0.852). This value is acceptable and theoretically justified, as intention and behavior are closely related but conceptually distinct constructs. From observation of results, it can be concluded that all constructs are logically unique and suitable for structural model analysis.

TABLE 5
FORNELL LARCKER CRITERIA

	Digital financial literacy	Environmental attitude	Perceived risk	Subjective norms	Green banking intention	Green banking behavior
Digital financial literacy	0.831					
Environmental attitude	0.282	0.841				
Perceived risk	0.036	0.133	0.811			
Subjective norms	0.433	0.428	0.286	0.897		
Green banking intention	0.580	0.520	0.220	0.610	0.863	
Green banking behavior	0.599	0.538	0.186	0.606	0.748	0.831

TABLE 6
CROSS LOADINGS

	Digital financial literacy	Environmental attitude	Perceived risk	Subjective norms	Green banking intention	Green banking behavior
DFL1	0.792	0.255	0.048	0.307	0.455	0.519
DFL2	0.870	0.261	0.026	0.375	0.524	0.523
DFL3	0.828	0.279	0.032	0.388	0.443	0.490
DFL4	0.831	0.131	0.012	0.371	0.506	0.451
EA1	0.194	0.807	0.132	0.315	0.375	0.440
EA2	0.325	0.902	0.119	0.386	0.519	0.521
EA3	0.167	0.809	0.087	0.374	0.398	0.386
PR1	0.112	0.136	0.825	0.304	0.199	0.253
PR2	-0.008	0.081	0.840	0.230	0.110	0.107
PR3	0.060	0.114	0.865	0.248	0.232	0.141
PR4	-0.150	0.082	0.704	0.087	0.107	0.038
SN2	0.407	0.368	0.202	0.898	0.550	0.503
SN3	0.370	0.400	0.313	0.896	0.545	0.584
GBI1	0.450	0.469	0.220	0.511	0.881	0.641
GBI2	0.476	0.444	0.162	0.466	0.867	0.623
GBI3	0.562	0.445	0.204	0.566	0.855	0.678
GBI4	0.507	0.436	0.170	0.557	0.847	0.636
GBB1	0.559	0.406	0.086	0.493	0.662	0.813
GBB2	0.502	0.396	0.074	0.426	0.493	0.821
GBB3	0.468	0.529	0.223	0.590	0.709	0.909
GBB4	0.463	0.449	0.226	0.487	0.594	0.775

TABLE 7
HETEROTRAIT-MONOTRAIT (HTMT) RATIO

	Digital financial literacy	Environmental attitude	Perceived risk	Subjective norms	Green banking intention	Green banking behavior
Digital financial literacy						
Environmental attitude	0.327					
Perceived risk	0.125	0.158				
Subjective norms	0.540	0.550	0.336			
Green banking intention	0.667	0.611	0.231	0.743		
Green banking behavior	0.703	0.647	0.219	0.749	0.852	

Structural model assessment

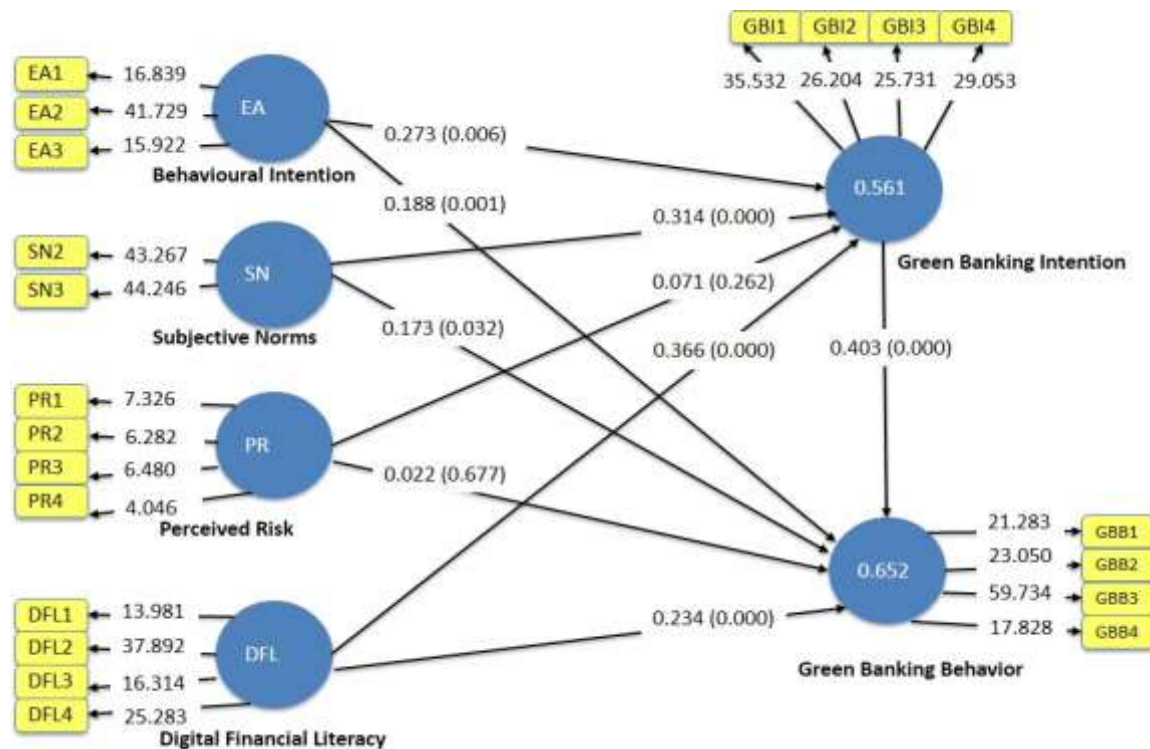


FIGURE 2
STRUCTURAL MODEL ASSESSMENT

The structural model is evaluated by examining collinearity, path coefficients, coefficient of determination (R^2), effect sizes (f^2), predictive relevance (Q^2), model fit, and mediation effects. Collinearity was assessed using VIF values. All indicators had VIF values (Table No. 8) in the range of 1.519 to 3.342 (Hair et al., 2011). Although the VIF value of GBB3 (3.342) is relatively high, it remained within an acceptable limit of 5. All indicators showed significant outer weights ($p < 0.05$) except PR2 and PR4; however, they were retained due to strong theoretical relevance and acceptable loadings. No multicollinearity issues exist in either the measurement or structural model.

TABLE 8 COLLINEARITY STATISTICS-OUTER MODEL			
	Outer weights	VIF	P values
DFL1	0.300	1.649	0.000
DFL2	0.322	2.291	0.000
DFL3	0.287	1.953	0.000
DFL4	0.294	2.125	0.000
EA1	0.366	1.654	0.000
EA2	0.466	1.989	0.000
EA3	0.351	1.593	0.000
PR1	0.455	1.805	0.019
PR2	0.221	2.435	0.194
PR3	0.381	2.091	0.011
PR4	0.151	1.519	0.463
SN2	0.538	1.593	0.000
SN3	0.576	1.593	0.000

GBI1	0.285	2.816	0.000
GBI2	0.276	2.675	0.000
GBI3	0.308	2.168	0.000
GBI4	0.291	2.118	0.000
GBB1	0.314	1.952	0.000
GBB2	0.260	2.241	0.000
GBB3	0.336	3.342	0.000
GBB4	0.291	2.178	0.000

TABLE 9 COLLINEARITY STATISTICS-INNER MODEL	
Hypothesized relationships	VIF
Digital financial literacy -> Green banking behavior - H1	1.563
Environmental attitude -> Green banking behavior - H2	1.410
Perceived risk -> Green banking behavior - H3	1.120
Subjective norms -> Green banking behavior - H4	1.755
Green banking intention -> Green banking behavior - H5	2.280

Table No. 10 shows the results of path coefficient analysis for testing hypothesized relationships. The relationship between green banking intention and green banking behavior (H5) was strongest with a path coefficient of 0.403 and a p-value of less than 0.001. There is a strong and positive effect of GBI on GBB. Succeeding GBI, digital financial literacy had the strongest positive effect on green banking behavior (H1), with a path coefficient of 0.234 and a p-value less than the significance level of 0.05. If DFL changes by point 1, then there is a change of 0.23 in GBB. The path coefficient for the impact of environmental attitude on green banking behavior (H2) was 0.188, with a p-value of less than 0.001. Hence, environmental attitude significantly affects the green banking behavior of customers. The subjective norms had a considerable and positive relationship with green banking behavior (H4), having a path coefficient of 0.173 and a p-value of less than 0.001. The perceived risk had the smallest and non-significant impact on green banking behavior (H3) with a path coefficient of 0.022 and a p-value (0.677) higher than the mark of significance. The bias-corrected confidence interval for perceived risk included zero between values, which confirms its non-significant impact on green banking behavior. The absence of zero in DFL, EA, and SN confirms the result of the path coefficient analysis.

TABLE 10 PATH COEFFICIENT-CONFIDENCE INTERVAL BIAS CORRECTED					
Hypothesized relationships	Path coefficient	P values	Bias	2.5%	97.5%
Digital financial literacy -> Green banking behavior - H ₁	0.234	0.000	-0.002	0.112	0.361
Environmental attitude -> Green banking behavior- H ₂	0.188	0.001	0.004	0.058	0.287
Perceived risk -> Green banking behavior - H ₃	0.022	0.677	0.003	-0.090	0.117
Subjective norms -> Green banking behavior- H ₄	0.173	0.032	-0.001	0.016	0.331
Green banking intention -> Green banking behavior - H ₅	0.403	0.000	-0.003	0.211	0.581

The explanatory strength of the model is assessed by the value of R² (Hair et al., 2014). The outer model explained 56.1% of the variance in green banking intention and 65.2% of the variance in green banking behavior (Table No. 11), displaying strong predictive

capability (Chin, 2010; Hair et al., 2011; Henseler et al., 2009). The f^2 value is used to determine whether an exogenous variable has a substantive impact on the endogenous variable. Table No. 12 represents the result of the effect size (f^2). The green banking intention has a medium-sized impact on green banking behavior. The DFL, EA, and SN have a small impact on green banking behavior as per the guidelines of (Cohen, 1988). The Q^2 value is used to establish the predictive relevance of the model (Geisser, 1974; Stone, 1974). The green banking intention had a Q^2 value of 0.510, and green banking behavior had 0.547 (Table No. 13), which indicates a strong predictive relevance (Hair et al., 2012). Model fit data (Table No. 14) showed an SRMR value of 0.071, which was below the threshold of 0.08, and the value of Normed Fit Index (NFI) was 0.749, which is acceptable for PLS-SEM. Hence, the structural model exhibits acceptable overall fit. Mediation analysis results (Table No. 15) indicate that green banking intention partially mediated the effects of DFL, EA, and SN on green banking behavior with VAF values of 38.85%, 36.91% and 42.33%, respectively. The mediation effect of perceived risk on green banking behavior was statistically weak due to a non-significant path.

TABLE 11
COEFFICIENT OF DETERMINATION (R²)

	R-square	R-square adjusted
Green banking intention	0.561	0.549
Green banking behavior	0.652	0.640

TABLE 12
EFFECT SIZE (F² -VALUE)

Hypothesized relationships	f-square
Digital financial literacy -> Green banking behavior - H1	0.100
Environmental attitude -> Green banking behavior - H2	0.072
Perceived risk -> Green banking behavior - H3	0.001
Subjective norms -> Green banking behavior - H4	0.049
Green banking intention -> Green banking behavior - H5	0.205

TABLE 13
BLINDFOLDING AND PREDICTIVE RELEVANCE (Q² VALUE)

	Q ² predict	RMSE	MAE
Green banking intention	0.510	0.712	0.499
Green Banking Behavior	0.547	0.686	0.514

TABLE 14
MODEL FIT

	Saturated model	Estimated model
SRMR	0.071	0.071
d_ULS	1.157	1.157
d_G	0.555	0.555
Chi-square	486.891	486.891
NFI	0.749	0.749

TABLE 15
MEDIATION EFFECTS

Hypothesized relationships	Direct effect	Indirect effect	Total effect	VAF %	Bias CI(L)	Bias CI(H)
Digital financial literacy -> Green banking behavior - H _{6A}	0.234 (0.000)	0.148 (0.008)	0.381 (0.000)	38.85	0.261	0.521
Environmental attitude -> Green	0.188	0.110	0.298	36.91	0.198	0.400

banking behavior - H _{6B}	(0.001)	(0.020)	(0.000)			
Perceived Risk -> Green banking behavior - H _{6C}	0.022 (0.677)	0.028 (0.266)	0.051 (0.361)	54.90	-0.069	0.149
Subjective Norms -> Green banking behavior - H _{6D}	0.173 (0.032)	0.127 (0.004)	0.300 (0.000)	42.33	0.142	0.440

DISCUSSION

The present study assessed the direct, indirect, and mediated effects of environmental attitude, perceived risk, subjective norms, and digital financial literacy on green banking behavior, with green banking intention acting as a mediator. The outcome brings important theoretical and practical understanding to the center stage.

Digital financial literacy as a primary driver

Digital financial literacy has arisen as a prime influencer of green banking behavior (H1). Customers with higher awareness of the digital financial system are highly inclined to adopt digital banking interfaces, green financial products and handle technical issues more confidently. The results indicate the role of education and training in the digital financial system in cultivating sustainable banking practices. The considerable size of direct influence of digital financial literacy on green banking behavior reflects that awareness and competence can encourage use of green banking practices directly apart from willful motivation (Morgan & Trinh, 2019; Ozili, 2018). The green banking intention fractionally mediates the effect of digital financial literacy on green banking behavior (H_{6A}).

Environmental attitude and green banking behavior

Interpretation of structural model results established that environmental attitude exercises a considerable and positive influence on green banking behavior and validate the second hypothesis (H2). Environmentally concerned people tend towards paperless transactions, digital statements, and environmentally responsible financial products (Biswas & Roy, 2015). Incomplete mediation of the impact of environmental attitude on green banking behavior by green banking intention highlights the importance of internal motivation of environmentally aware customers (H_{6B}). The results further confirms Theory of Planned Behavior (Ajzen, 1991), which state that affirmative attitude reinforce green banking intention and real behavior.

Perceived risk and green banking behavior

Unexpectedly, perceived risk did not impact green banking behavior considerably. The results indicate that risk of security, privacy and technical apprehensions are not a hurdle anymore to green banking acceptance. The launch of safe and secure digital platforms, government-backed digital programs, and enhanced cyber safety steps employed by banks have triggered this phenomenon. The findings align with the results of (Apau & Lallie, 2022; C. W. Lee et al., 2025; Lestari et al., 2023; Rahma & Ulfah, 2025) where threat perception about digital banking turns out to be irrelevant once users attain enough exposure and trust in the system.

Subjective norms and green banking behavior

The results have indicated that subjective norms significantly influenced green banking behavior (H4). It implies that social influence, peer pressure, and societal expectations are critical factors in shaping green banking adoption. When family members,

peers, or colleagues support environmentally responsible banking practices, someone is more inclined to adopt such behaviors. The partial mediation through green banking intention suggests that social norms shape intention, which in turn drives actual behavior (H6D), aligning with findings of (Al-Swidi et al., 2014; Yadav & Pathak, 2017).

Role of green banking intention as a mediator

The green banking intention has partially mediated the relationships between environmental attitude, subjective norms, digital financial literacy, and green banking behavior. However, the partial mediation suggests that DFL, EA and SN exert direct influence on green banking behavior independent of intention also. This underlines the intricacy of green banking engagement where psychological or objective and automatic or cost-based assessment run in tandem.

CONCLUSION AND IMPLICATIONS

Employing the Theory of Planned Behavior this study investigated the role of digital financial literacy, environmental attitude, perceived risk of digital banking and subjective norms in developing green banking intention and green banking behavior through the SEM technique. The outcome demonstrated that digital financial literacy, environmental attitude, and subjective norms are major driving forces for green banking behavior both directly and indirectly through green banking intention (Kumar & Prakash, 2019). The green banking intention partially mediates the relationships between DFL, EA, SN and green banking behavior, confirming its central role in shaping green banking behavior. In contradiction to expected outcomes, perceived risk does not exercise a major effect on green banking behavior revealing that consumers have gained enough affinity and faith in the digital banking system. Hence, the model displays sizeable explanatory and predictive capacity. It symbolizes that adoption of green banking is not entirely governed by environmental concern but also by society norms and digital proficiency.

Theoretical Implications

The result of the study supplements the present literature in different theoretical ways. First, it enriches the Theory of Planned Behavior by authenticating the green banking intention as a partial mediator between DFL, EA, SN, and green banking behavior. Second, digital financial literacy augments the Theory of Planned Behavior by adding a capability-based approach and demonstrating that digital competency is a major determinant of green banking behavior. The third insignificant influence of perceived risk contests previous fintech studies that highlight security risks as a major hurdle. This signals a probable change in customers' perception as the digital financial ecosystem grows.

Managerial Implications

The results give useful information to banks and financial service companies. First, banks ought to increase awareness of the advantages of green banking services, including lower carbon footprint and sustainable investments. Second, subjective norms have a noticeable impact, which implies that the banks can try using social influence strategies such as friends' recommendations, testimonials, and various promotion methods. Third, since the significance of digital financial literacy points out the necessity of customer education strategies, it is necessary for banks to act in this regard. It is important for banks to launch some staff training programs in their respective banks to make customers more aware and confident of how to use online banking systems.

Policy Implications

From a policy perspective, the findings highlight the importance of digital financial literacy initiatives in achieving sustainable finance aims. It is important for policymakers and regulatory bodies to work with financial institutions to develop inclusive digital literacy programs that focus primarily on rural communities, senior citizens, and digitally marginalized segments of the population. In addition, governments should ensure synergies between digital efforts and sustainability policies to help facilitate green banking.

LIMITATIONS AND FUTURE RESEARCH SCOPE

Nonetheless, there are certain limitations of the present research. First, the fact that the study employed a cross-sectional design restricts the investigation from making causal relationships. Second, the data were self-reported, which may lead to common method bias. Further, the study examined a small number of variables, while other possible determinants such as trust, perceived usefulness, and institutional support were absent. Finally, the results are only applicable in the context of India and should not be considered universally.

Future research could be done to determine the change in green banking behaviors through a longitudinal approach. The characteristics of the model might also be improved by including some other psychological factors or technological variables to make it more informative. Another option would be to perform comparative investigations of various countries and bank systems.

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