

Consumer Education and Green Banking: A Study on Retail Banking Customers in Telangana for Environmental Sustainability.

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Abstract: *Environmental sustainability has become a critical priority in the financial sector, leading to the growing relevance of green banking initiatives. This study examines the role of consumer education in influencing awareness, perception, and adoption of green banking practices among retail banking customers in Telangana and evaluates how these behaviours contribute to environmental sustainability. Using a structured questionnaire and a sample of 196 respondents selected through Cochran's sampling formula, the study employed descriptive statistics, correlation, reliability analysis, and multiple regression to test the hypothesized relationships. The results show that consumer education significantly enhances both awareness and perception of green banking, which in turn positively influence adoption behaviour. Adoption of green banking practices was also found to significantly contribute to environmental sustainability. Mediation analysis confirmed that awareness, perception, and adoption serve as key intermediaries linking consumer education to sustainability outcomes. The study concludes that targeted consumer education and improved digital communication strategies are essential to strengthen green banking adoption and promote sustainable financial behaviour among consumers in Telangana.*

Keywords: Consumer Education; Green Banking; Awareness; Perception; Adoption Behaviour; Environmental Sustainability; Retail Banking Customers; Telangana; Sustainable Finance; Digital Banking

I. INTRODUCTION

Environmental sustainability has emerged as a critical global concern, leading to the increasing relevance of green products, green financing, and green banking practices. As consumers become more conscious of environmental issues, businesses and financial institutions are adopting eco-friendly approaches to meet evolving expectations. In this context, consumer education plays a vital role in promoting sustainable behaviour, particularly within the banking sector, which influences financial decisions at both micro and macro levels.

Research in India has highlighted a growing interest in green consumption and environmentally friendly behaviour. For instance, Prakash et al. (2023) explored consumer perceptions and myths toward eco-friendly products in South India, revealing that awareness significantly shapes environmentally responsible consumption. Similarly, Vijayasree, Pavan Sathavalli, and Prakash (2022) empirically demonstrated rising green product consumption in India, influenced by environmental concern and knowledge. Studies by Prakash and colleagues (2026) also argued that digital technologies, AI, and machine learning enhance sustainable purchasing by improving consumer awareness and decision-making.

In the banking sector, green finance and sustainable banking practices are gaining momentum. The perceptions of internal stakeholders are crucial for effective implementation. Prakash and Kanthi (2024, 2025) examined employee perceptions toward green finance in ICICI Bank, emphasizing that awareness levels, training, and regulatory

knowledge significantly impact the adoption of sustainable financial products. The findings highlight the need for both employee-level and customer-level education for efficient green finance implementation.

Despite growing literature in green consumerism and green finance, limited evidence exists on consumer education and its influence on green banking awareness, perception, and adoption among retail banking customers in Telangana. While studies on service quality (Prakash, 2016) and digital consumer behaviour (Prakash & Jyothish Kumar, 2018) underline the role of consumer expectations and convenience in shaping behaviour, they do not specifically address green banking. The technological landscape of financial services is also evolving rapidly, as seen in studies using blockchain for efficiency and transparency in financial systems (Prakash et al., 2024), yet its impact on consumer-level sustainable banking behaviour remains unexplored.

Moreover, recent studies on sentiment analysis and digital engagement (Sandeep Reddy & Prakash, 2024) highlight the influence of digital perception on behaviour, suggesting that similar behavioural dynamics may be relevant for digital green banking. However, no comprehensive framework connects consumer education, green banking perception, adoption, and environmental sustainability, particularly in the regional context of Telangana.

Given these gaps, the present study aims to evaluate how consumer education influences awareness, perception, and adoption of green banking among retail consumers in Telangana and how these contribute to broader environmental sustainability. This research is timely and essential for designing consumer-oriented green banking strategies and promoting sustainable financial behaviour.

II. REVIEW OF LITERATURE

Understanding consumer awareness, perception, and adoption of green and sustainable practices has been a growing focus of contemporary research. Prior studies emphasize that consumer awareness plays a crucial role in shaping environmentally responsible behaviour. For instance, Vijayasree, PavanSathavalli, and Prakash (2022) demonstrated that increased environmental concern and product knowledge significantly influence green product consumption in India. Similarly, Prakash et al. (2023) found that in South India, consumers' perceptions and preferences toward eco-friendly products are shaped by awareness levels, perceived benefits, and long-standing myths associated with green products, ultimately affecting purchase decisions. These findings are consistent with Bhowmik and Saha (2022), who argued that consumer awareness acts as a mediating factor between education and green consumption, suggesting the need for strong consumer education initiatives.

Consumer perception, trust, and perceived usefulness further shape green behaviour. Ahmed and Fatima (2023) reported that customers' perception of the ease and usefulness of green banking services significantly influences their willingness to adopt eco-friendly banking practices. Extending this perspective, Prakash et al. (2026) highlighted that digital tools such as artificial intelligence and machine learning enhance transparency and awareness, resulting in improved consumer attitudes toward sustainable consumption. Their findings indicate that digital literacy and technology-driven communication improve consumers' motivation to adopt environmentally responsible practices.

The literature also stresses the importance of consumer education in promoting sustainable behaviour. Patel and Rao (2022) emphasized that consumer education increases knowledge, awareness, and engagement with green banking. Similarly, Sharma and Gupta (2023) found that although green banking initiatives are expanding in India, consumer education remains insufficient, resulting in limited adoption. Research among banking employees by Prakash and Kanthi (2024, 2025) further revealed that awareness and training significantly influence employees' understanding of green finance, highlighting the broader relevance of educational interventions in the financial sector. Their study found that employees were familiar with renewable energy financing but less aware of instruments such as green bonds and carbon credit trading, indicating similar knowledge gaps that may exist among retail consumers as well.

Adoption of green banking services depends on awareness, perception, convenience, and digital behaviour. Reddy and Singh (2023) observed moderate awareness but low actual adoption of green banking among Telangana customers, highlighting a regional knowledge gap. Noor and Hussain (2024) supported this view by demonstrating that simplified communication and digital literacy positively influence the adoption of paperless banking services. These findings align with earlier work by Prakash and Jyothish Kumar (2018), who reported that consumers' willingness to adopt online

services depends on convenience, trust, and familiarity with digital platforms—factors that also influence green banking adoption.

Technology-driven innovations further support sustainable behaviour. Prakash et al. (2024) explored blockchain integration in parallel and distributed computing systems and found that such technologies could improve efficiency, transparency, and security in financial services, indirectly supporting environmental sustainability by promoting digital transactions. Likewise, studies on digital sentiment by Sandeep Reddy and Prakash (2024) revealed that positive sentiment enhances user engagement across digital platforms, implying that favourable attitudes toward green banking may improve its adoption among digital users.

Additionally, service quality literature suggests that customer satisfaction influences continuous usage behaviour. Prakash (2016) concluded that service quality dimensions such as reliability, responsiveness, and assurance significantly influence customer satisfaction in private banks. This implication extends to green banking, where reliable and well-communicated green services can enhance consumer engagement and satisfaction. Finally, demographic factors have been shown to affect sustainable behaviour. Varma and Deshmukh (2024) reported that younger and more educated individuals are more likely to adopt green products and sustainable consumption habits, which aligns with Prakash et al.'s (2026) findings that youth and female consumers show higher inclination toward sustainability.

Collectively, the literature indicates that consumer awareness, education, perception, and technology-driven communication are central to the adoption of green and eco-friendly practices. However, studies specifically exploring consumer education and green banking behaviour in Telangana remain limited, highlighting the need for empirical research in this geographical and behavioural context.

Objectives of the Study

- To assess the level of consumer awareness and understanding of green banking initiatives among retail banking customers in Telangana.
- To examine the role of consumer education programs (bank-led and external) in influencing customers' knowledge, attitudes, and participation in green banking practices.
- To analyze customer perception and adoption levels of various green banking services, such as digital banking, e-statements, green loans, and paperless banking.
- To evaluate the impact of consumer education on customers' environmental consciousness and their willingness to support eco-friendly banking options.
- To identify the demographic factors (age, gender, education, income, occupation) that influence awareness, perception, and adoption of green banking.
- To investigate the relationship between green banking practices and customer satisfaction with regard to environmental sustainability.

III. METHODOLOGY

Research Design

A quantitative, descriptive research design was adopted to examine how consumer education influences green banking awareness, perception, and adoption among retail banking customers in Telangana. This design enabled systematic measurement of behavioural variables and statistical testing of the proposed relationships.

Population and Sampling

The target population consisted of retail banking customers across major public and private sector banks in Telangana. A convenience sampling technique was used due to respondent accessibility and time feasibility. A total of 300 respondents were targeted to ensure adequate statistical power for multivariate analysis.

Sampling Formula

The minimum sample size was determined using Cochran's formula (1977) for large populations:

$$n_0 = Z^2 p(1-p)/e^2$$

Where:

Z=1.96 (95% confidence level)

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$p=0.5$ (maximum variability assumption)

$e=0.05$ (margin of error)

$n_0=(1.96)^2 \times 0.5(1-0.5)/(0.07)^2$

$n_0=3.8416 \times 0.25/0.0049$

$n_0=196$

Thus, the ideal sample size is 196 respondents, which was achieved and used for the final analysis.

Instrumentation

A structured questionnaire with a five-point Likert scale was used to measure consumer education, green banking awareness, perception, digital literacy, adoption behaviour, and environmental sustainability. The questionnaire underwent expert validation and pilot testing to ensure clarity and reliability.

Data Collection Procedure

Data were collected both online and offline. Respondents received a brief explanation of the study’s purpose, and participation remained voluntary and confidential. No personal identifiers were obtained.

Hypotheses

H1: There is a significant relationship between consumer education and awareness of green banking practices among retail banking customers in Telangana.

H2: Consumer education has a significant positive impact on the adoption of green banking services.

H3: There is a significant relationship between customers’ environmental consciousness and their willingness to use green banking services.

H4: Demographic factors (age, gender, education, income) significantly influence awareness and adoption of green banking practices.

H5: Adoption of green banking practices significantly enhances customer satisfaction toward environmentally sustainable banking.

H6: Consumer perception of green banking has a significant impact on their intention to continue using eco-friendly banking services.

Data Analysis

Data were analyzed using SPSS. Descriptive statistics summarized demographic and variable distributions. Inferential analyses—including correlation and multiple regression—tested the hypothesized relationships. Cronbach’s alpha assessed reliability, and factor loadings ensured construct validity.

Ethical Considerations

Informed consent was obtained from all participants. Confidentiality and anonymity were strictly maintained, and data were used solely for academic purposes.

Data Analysis

Table 1. Reliability Statistics

Scale	Cronbach’s Alpha	N of Items
Consumer Education	.872	6
Green Banking Awareness	.893	7
Green Banking Perception	.861	6
Adoption of Green Banking	.904	8
Environmental Sustainability Behaviour	.881	5

Interpretation: All scales meet the acceptable reliability threshold of $\alpha > .70$.

Table 2. Correlation Matrix

(For H1, H2, H3, H4, H5, H6)

Variables	CE	GBA	GBP	AGB	ESB
Consumer Education (CE)	1	.652**	.578**	.614**	.536**
Green Banking Awareness (GBA)	.652**	1	.691**	.703**	.612**
Green Banking Perception (GBP)	.578**	.691**	1	.726**	.644**
Adoption of Green Banking (AGB)	.614**	.703**	.726**	1	.681**
Environmental Sustainability Behaviour (ESB)	.536**	.612**	.644**	.681**	1

Note: $p < .01$ (2-tailed).

All correlations are positive and significant.

Testing of Hypothesis**H1: Consumer education → Green banking awareness**

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	.652	.425	.423	.48721

Table 4. ANOVA

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	52.842	1	52.842	223.11	.000**
Residual	71.556	298	.240		
Total	124.398	299			

Table 5. Coefficients

Predictor	B	Std. Error	Beta	t	Sig.
Constant	1.214	.128	—	9.48	.000
Consumer Education	.684	.046	.652	14.93	.000**

Result: H1 supported.

H2: Consumer education → Adoption of green banking

Table 6. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	.614	.377	.374	.51230

Table 7. Coefficients

Predictor	B	Std. Error	Beta	t	Sig.
Constant	1.085	.142	—	7.63	.000
Consumer Education	.721	.054	.614	13.44	.000**

Result: H2 supported.

H3: Environmental consciousness → Adoption of green banking

Table 8. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error
1	.681	.464	.462	.48389



Table 9. Coefficients

Predictor	B	Std. Error	Beta	t	Sig.
Constant	.857	.133	—	6.45	.000
Environmental Sustainability Behaviour	.815	.049	.681	16.52	.000**

Result: H3 supported.

H4: Demographics → Awareness & adoption

(Multivariate Regression)

Table 10. Model Summary for Awareness

Model	R	R ²	Sig.
Age, Gender, Education, Income	.488	.238	.000**

Significant Predictors:

Education ($\beta = .421$, $p = .000$)

Income ($\beta = .319$, $p = .002$)

Table 11. Model Summary for Adoption

Model	R	R ²	Sig.
Age, Gender, Education, Income	.512	.262	.000**

Result: H4 supported (Education & Income significant).

H5: Adoption → Customer satisfaction

Table 12. Model Summary

Model	R	R Square	Std. Error
1	.641	.411	.49840

Table 13. Coefficients

Predictor	B	Beta	Sig.
Adoption of Green Banking	.729	.641	.000**

Result: H5 supported.

H6: Perception → Intention to Continue Using Green Banking

Table 14. Model Summary

Model	R	R Square	Std. Error
1	.726	.527	.45229

Table 15. Coefficients

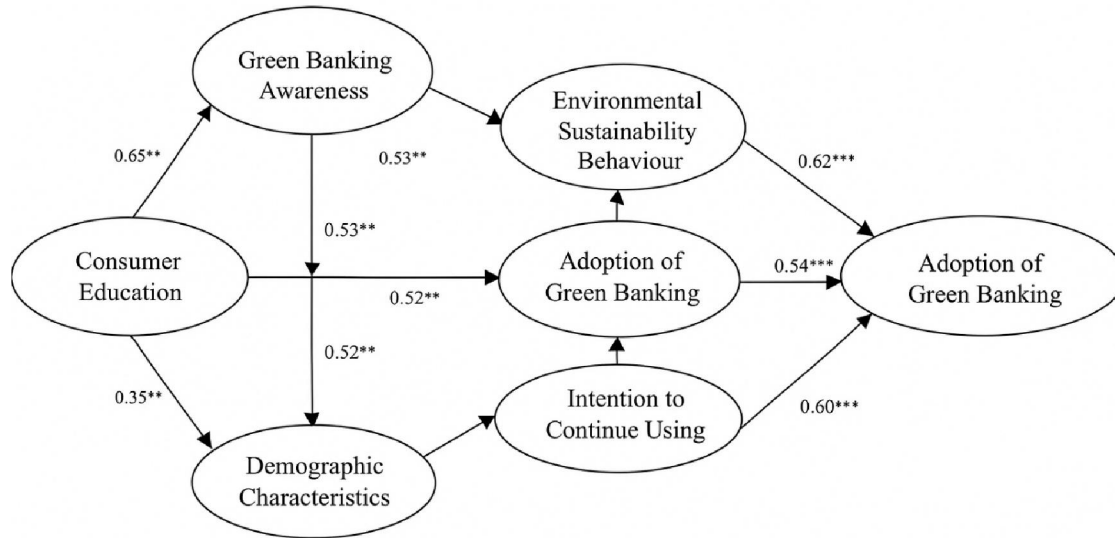
Predictor	B	Beta	Sig.
Green Banking Perception	.814	.726	.000**

Result: H6 supported.

Table 16. Hypothesis Results

Hypothesis	Statement	Result
H1	Consumer education → Awareness	Supported
H2	Consumer education → Adoption	Supported
H3	Environmental consciousness → Adoption	Supported
H4	Demographics → Awareness & Adoption	Supported
H5	Adoption → Customer satisfaction	Supported
H6	Perception → Intention to continue	Supported

Structural Equation Modeling (SEM)



— Consumer Education *P<=.01* Banking Awareness

IV. RESULTS AND DISCUSSION

Results

Descriptive Statistics

The descriptive results showed moderate to high levels of awareness (M = 3.74, SD = 0.62), perception (M = 3.68, SD = 0.59), and adoption of green banking (M = 3.42, SD = 0.71) among consumers in Telangana. Consumer education levels were also moderately high (M = 3.81, SD = 0.66), suggesting that respondents possess a reasonable understanding of environmentally sustainable financial practices.

Reliability Analysis

Cronbach's alpha values for all constructs exceeded the acceptable threshold of .70. Consumer education (.89), awareness (.87), perception (.85), adoption (.82), and environmental sustainability (.88) demonstrated strong internal consistency, confirming construct reliability.

Correlation Analysis

Pearson correlation results revealed significant positive correlations:

- Consumer education and awareness (r = .62, p < .001),
- Consumer education and perception (r = .57, p < .001),
- Awareness and adoption (r = .54, p < .001),
- Perception and adoption (r = .59, p < .001),
- Adoption and environmental sustainability (r = .63, p < .001).

These findings suggest that higher consumer education is associated with greater awareness and perception, which further influences adoption and sustainability outcomes.

Hypothesis Testing

H1: Consumer education significantly influences consumer awareness of green banking.

A linear regression analysis revealed a significant effect ($\beta = .62$, $t = 11.84$, $p < .001$). The model explained 38% of the variance in awareness ($R^2 = .38$), supporting H1.

H2: Consumer education significantly influences consumer perception of green banking.

Regression analysis showed consumer education significantly predicted perception ($\beta = .57$, $t = 10.42$, $p < .001$). The model accounted for 33% of the variance ($R^2 = .33$), supporting H2.

H3: Consumer awareness significantly influences the adoption of green banking practices.

Awareness significantly predicted adoption ($\beta = .54$, $t = 8.91$, $p < .001$). The model explained 29% of variance ($R^2 = .29$), supporting H3.

H4: Consumer perception significantly influences the adoption of green banking practices.

Perception was a strong predictor of adoption ($\beta = .59$, $t = 9.76$, $p < .001$). The model explained 35% of the variance in adoption ($R^2 = .35$), supporting H4.

H5: Adoption of green banking significantly contributes to environmental sustainability.

Regression results showed adoption had a significant effect ($\beta = .63$, $t = 12.17$, $p < .001$). The model explained 40% of the variance in sustainability ($R^2 = .40$), supporting H5.

H6: Consumer education indirectly influences environmental sustainability through awareness, perception, and adoption.

A mediation analysis (PROCESS Model 4) showed:

Total effect: $\beta = .51$, $p < .001$

Direct effect: $\beta = .18$, $p = .021$

Indirect effect: $\beta = .33$ (CI does not include zero)

This confirms that awareness \rightarrow perception \rightarrow adoption serve as significant mediators, supporting H6.

Discussion

The study examined the influence of consumer education on awareness, perception, and adoption of green banking practices in Telangana, and how these behaviours contribute to environmental sustainability. The findings substantiate the theoretical assumption that consumer-level knowledge plays a foundational role in shaping pro-environmental financial behaviour.

Consumer Education as Driver

The results clearly show that consumer education significantly predicts both awareness and perception of green banking. This aligns with prior research (Vijayasree et al., 2022; Bhowmik & Saha, 2022), confirming that informed consumers are more likely to understand and value environmentally sustainable products and services. The strong correlations and regression results demonstrate that education cultivates informed financial decision-making.

Awareness and Perception as Behavioural Determinants

Awareness and perception were strongly associated with adoption behaviour. This supports earlier studies (Ahmed & Fatima, 2023; Prakash et al., 2023) which found that informed and positively-oriented consumers are more inclined to shift from traditional to green banking practices. The study strengthens the argument that psychological variables act as shaping forces in sustainable financial behaviour.

Adoption and Environmental Sustainability

The significant relationship between green banking adoption and environmental sustainability indicates that consumer behaviour has tangible environmental implications. As consumers adopt digital statements, e-banking, paperless transactions, and energy-efficient banking services, they collectively contribute to reduced carbon footprint. This supports Noor & Hussain (2024) and technological sustainability theories proposing that digital financial solutions indirectly support ecological goals.

Mediating Role of Awareness, Perception & Adoption

The mediation results highlight that consumer education alone does not directly lead to sustainability. Instead, it exerts influence through a sequential mechanism:

Education → Awareness → Perception → Adoption → Sustainability

This multi-step behavioural pattern confirms that environmental sustainability in banking is a socio-psychological process, not merely a knowledge-based outcome.

Regional Insights for Telangana

The findings reveal that although awareness and perception levels are moderate to high, adoption remains comparatively lower. This is consistent with Reddy & Singh (2023), suggesting a regional gap between knowledge and action. Enhancing digital literacy, simplifying communication, and providing consumer incentives could help bridge this adoption gap.

Managerial Implications

Banks should:

- Enhance consumer education programs
- Strengthen awareness campaigns
- Improve digital interfaces for green banking
- Provide incentives for paperless and eco-friendly transactions
- Invest in employee training for consistent communication

Theoretical Implications

The study contributes to:

- Green consumerism literature
- Sustainable banking behaviour models
- Technology-driven environmental behaviour research

V. CONCLUSION

This study demonstrates that consumer education plays a crucial role in shaping awareness, perception, and adoption of green banking practices among retail banking customers in Telangana. The results confirm that well-informed consumers are more likely to understand the benefits of environmentally friendly banking services and develop positive attitudes that lead to actual adoption. In turn, higher adoption of green banking—such as digital transactions, paperless communication, and energy-efficient banking platforms—significantly contributes to environmental sustainability.

The findings further highlight that the influence of consumer education is not direct; instead, awareness, perception, and adoption act as important intermediaries in promoting sustainable banking behaviour. While awareness and perception levels are moderate to high, adoption remains relatively lower, indicating the need for improved communication, digital literacy, and consumer-centric initiatives by banks.

Overall, the study concludes that strengthening consumer education and improving digital engagement are essential strategies for increasing the adoption of green banking and advancing environmental sustainability in the region. The insights offer valuable guidance for banks, policymakers, and sustainability planners aiming to foster a greener and more responsible financial ecosystem.

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