Customers' Perceived Benefits and Risks Affecting Green Banking Adoption

Yograj Singh Professor Shriram Institute of Management and Technology Kashipur, Uttarakhand – 244713

Abstract

This research paper investigates the complex interplay between customers' perceived benefits and risks that influence green banking adoption in Mumbai, Maharashtra. As financial institutions increasingly transition toward sustainable practices, understanding customer perspectives becomes crucial for successful implementation of green banking initiatives. This study examines three key factors affecting customers' willingness to adopt green banking; perceived environmental benefits, financial risks, and trust in digital channels. Employing a quantitative research approach, data was collected through structured questionnaires from 400 bank customers in Mumbai using stratified random sampling. Statistical analysis utilizing descriptive statistics, correlation analysis, multiple regression, and structural equation modeling revealed significant relationships between the variables. Results indicate that perceived environmental benefits and trust in digital channels positively influence customers' willingness to adopt green banking, while financial risks negatively impact adoption intentions. Interestingly, trust in digital channels emerged as the strongest predictor of adoption willingness, followed by perceived environmental benefits. The study further identifies significant demographic differences in adoption patterns, with younger, more educated respondents showing greater willingness to adopt green banking services. These findings provide valuable insights for banking institutions to develop targeted strategies that enhance perceived benefits while minimizing risks in their green banking offerings. The research contributes to the growing body of literature on sustainable banking practices and offers practical recommendations for financial institutions to promote wider acceptance of green banking among diverse customer segments.

Keywords: Green Banking Adoption, Environmental Benefits, Financial Risk, Digital Trust, Sustainable Finance, Customer Perception

Introduction

Green banking represents a paradigm shift in the financial sector, integrating environmental sustainability into banking operations and services. It encompasses practices that reduce the environmental footprint of banking activities while promoting environmentally responsible investments and services. As climate change concerns intensify globally, banks are increasingly adopting green practices not merely as corporate social responsibility initiatives but as strategic business imperatives that align with evolving customer expectations and regulatory requirements.

The banking sector, traditionally perceived as environmentally neutral, has recognized its indirect environmental impact through lending and investment decisions. Banks now play a crucial role in addressing environmental challenges by channeling financial resources toward sustainable initiatives. Green banking practices include paperless transactions, energy-efficient operations, digital banking services, green loans, and sustainable investment products that collectively contribute to environmental conservation while potentially enhancing operational efficiency.

Despite the growing importance of green banking, customer adoption remains a significant challenge. The success of green banking initiatives ultimately depends on customer acceptance and participation. Understanding the factors that influence customers' willingness to adopt green banking is therefore essential for banks to develop effective strategies for promoting sustainable financial practices. This study focuses specifically on how customers' perceived benefits and risks affect their intention to adopt green banking services.

Environmental benefits represent a primary motivation for green banking adoption, as customers increasingly seek to align their financial activities with their environmental values. However, perceived risks, particularly financial uncertainties and concerns about digital security, may impede adoption. Additionally, customers' trust in digital channels plays a pivotal role in their willingness to embrace green banking services, which often rely heavily on digital infrastructure.

This research examines the interrelationships between perceived environmental benefits, financial risks, and trust in digital channels as determinants of customers' willingness to adopt green banking. By understanding these relationships, banks can develop more effective strategies to enhance perceived benefits while mitigating risks, thereby encouraging greater customer participation in green banking initiatives.

Conference Proceedings International Conference on Sustainable Development Goals-Challenges, Issues & Practices by TMIMT- College of Management, Teerthanker Mahaveer University, Moradabad 25th & 26th April 2025. TMIMT International Journal (ISSN: 2348-988X) The study is situated in Mumbai, Maharashtra, a financial hub with a diverse banking customer base. Through a quantitative approach utilizing customer surveys, this research aims to provide empirical evidence on the factors influencing green banking adoption, contributing to both theoretical understanding and practical implementation of sustainable banking practices. The findings will offer valuable insights for banks, policymakers, and other stakeholders invested in promoting environmental sustainability through the financial sector.

Literature Review

Ganesh, Adgaonkar and Darole (2024) conducted a comprehensive study of select banks in Maharashtra to examine the implementation of green banking practices. Their research revealed that leading commercial banks including State Bank of India, HDFC Bank, ICICI Bank, Axis Bank, and Bank of Maharashtra have incorporated various green initiatives into their operations. The authors found significant variations in the adoption levels among these banks, with some demonstrating more comprehensive implementation than others. Their analysis highlighted that green banking initiatives encompass paperless transactions, energy-efficient facilities, digital banking services, and financing of environmentally friendly projects. The study further identified that while customer awareness of green banking was moderate, those customers who were aware showed positive attitudes toward these services. The researchers emphasized that challenges in implementation included high initial costs for green technology and infrastructure, limited customer awareness, and regulatory complexities. Despite these challenges, the authors concluded that green banking practices contribute positively to environmental sustainability, operational efficiency, and enhanced bank reputation. Their findings suggest that banks embracing green initiatives can gain competitive advantages while fulfilling their environmental responsibilities, indicating a progressive shift toward sustainable banking in Maharashtra's financial landscape.

Bhatnagar (2024) examined the integration of green banking with digital banking services for customers, highlighting how this convergence creates opportunities for sustainable financial practices. The research identified rising customer demand for green banking services driven by growing environmental awareness, with digital platforms providing convenient avenues for banks to meet this demand. The author found that digital banking enables innovation with green products like eco-friendly loans and sustainable investment options, attracting environmentally conscious

Conference Proceedings International Conference on Sustainable Development Goals-Challenges, Issues & Practices by TMIMT- College of Management, Teerthanker Mahaveer University, Moradabad 25th & 26th April 2025. TMIMT International Journal (ISSN: 2348-988X) customers. The study emphasized how digital channels enhance transparency by providing realtime updates on sustainability efforts, promoting disclosure of environmental and social impacts that customers increasingly value. Importantly, the research revealed that green banking initiatives integrated into digital services foster trust and loyalty among customers, enhancing brand reputation and long-term relationships. Statistical analysis demonstrated no significant differences in consumer awareness based on demographic factors like gender, education level, or place of residence, suggesting broad potential appeal across customer segments. The author concluded that the integration of green banking into digital banking services represents a significant opportunity for financial institutions to simultaneously address environmental concerns while improving customer experience, though challenges remain in terms of customer education and technology adoption. This research provides valuable insights into how digital platforms can serve as effective vehicles for delivering green banking solutions.

Chowdhury (2023) conducted an empirical study on customer perception of green banking in Vietnam, finding a concerning low level of awareness regarding green banking among banking customers. The research revealed significant conceptual ambiguity among customers, with many lacking clear understanding of what green banking entails beyond basic digital services like mobile and online banking. According to the author, this knowledge gap stems primarily from insufficient information provision by financial institutions and inadequate technical competencies among customers. The study identified notable variations in customer readiness to engage with green banking practices - while some customers were prepared to utilize mobile banking, online banking, and green savings accounts, others demonstrated resistance due to perceived complexity and unclear benefits. The research emphasized that technological challenges, including insufficient infrastructure, limited technical expertise, and inflexible processes, represent major barriers to green banking adoption. To enhance adoption, the author recommended that banks implement comprehensive awareness-raising initiatives, provide clearer explanations of green banking concepts, establish robust data security protocols, and develop training programs to improve customer technical competencies. The findings highlight the critical need for banks to better understand their clients' perspectives on green banking, particularly regarding data confidentiality concerns, the transition from conventional banking methods, and the role of government involvement in promoting sustainable banking practices.

Mariya et al. (2023) investigated the drivers of individuals' green bank adoption, making a significant contribution as the first study to examine factors influencing online green bank adoption. Analyzing 1,075 questionnaires from French individuals responsible for household financial decisions, the researchers discovered that altruism and green consumption values significantly drive green banking adoption. Their findings revealed that willingness to adopt a green bank is mediated by preference for green savings, extending nascent literature connecting responsible consumption and saving behaviors. The authors determined that green banks and associated savings products enable households to express their consumption values through investments. Notably, the study identified households' financial well-being and financial literacy as potential barriers to green savings mobilization. The researchers also demonstrated the significant influence of information system variables, including personal innovativeness and trust, on willingness to adopt green banking. Their analysis suggests that customers with stronger environmental values and higher trust levels are substantially more likely to adopt green banking services. The authors emphasized that understanding these drivers provides valuable insights for the banking industry to develop targeted strategies that appeal to environmentally conscious consumers while addressing financial literacy concerns. The research highlights the emerging importance of aligning banking services with customers' personal values regarding environmental sustainability, indicating a shift in how consumers view the role of financial institutions in addressing environmental challenges.

Candera et al. (2022) examined the influence of green banking on bank performance through a comprehensive literature review. The researchers established that the adoption of green banking has positive impacts on long-term bank development, with operations based on sustainable environmental principles creating positive customer and public perceptions. Their analysis determined that implementing green banking serves as an effective promotional tool for banks, enhancing reputation and attracting new customers. The authors found that banks committed to environmental preservation demonstrate positive effects on future sustainability through activities such as operational cost savings, which contribute to forest conservation by minimizing paper use and reducing greenhouse gas emissions. The study revealed that the current implementation of green banking increasingly attracts stakeholders, positively affecting banks' ability to compete for investors and creditors. According to the researchers, green banking practices can significantly

Conference Proceedings International Conference on Sustainable Development Goals-Challenges, Issues & Practices by TMIMT- College of Management, Teerthanker Mahaveer University, Moradabad 25th & 26th April 2025. TMIMT International Journal (ISSN: 2348-988X) increase a bank's competitiveness, making it an important strategy for securing market advantage. The review identified various green banking products that help restore and preserve the environment, including green deposits, green mortgages and loans, green credit cards, green reward checking accounts, and mobile banking services. The authors concluded that green banking represents a guarantee of sustainability where banking operations minimize negative environmental impacts while simultaneously improving bank performance through enhanced reputation, operational efficiencies, and competitive advantage. Their findings emphasize the strategic importance of green banking beyond mere environmental responsibility.

Mir and Bhat (2022) investigated green banking adoption practices and their impact on improving environmental, financial, and operational performance. Using the resource-based view theory, the researchers collected data from banking personnel in Pakistan using a five-point Likert scale questionnaire with a non-probability purposive selection technique. From 400 initial responses, they analyzed 360 valid responses using partial least square-structural equation modeling to validate their hypotheses. Their findings revealed that green banking adoption practices positively affect environmental, operational, and financial performance of banks, with the largest impact on environmental performance, followed by operational performance and financial performance, respectively. The authors identified that banks implementing green practices experienced improved brand image, enhanced operational efficiency through reduced paper consumption and energy usage, and strengthened financial performance through cost savings and increased customer loyalty. The study highlighted that environmentally conscious banking practices not only contributed to sustainability goals but also provided tangible business benefits. The researchers noted various challenges in implementation, including technological limitations, staff training requirements, and customer education needs. They emphasized the importance of organizational commitment and strategic alignment in successful green banking implementation. The study offers valuable insights to policymakers and banking sector decision-makers on effectively implementing green banking practices to improve overall banking performance across multiple dimensions.

Masud et al. (2021) conducted research on the adoption of green banking practices and environmental performance in Pakistan using structural equation modeling. Their study investigated the relationship between green banking practices and their direct and indirect impact

Conference Proceedings International Conference on Sustainable Development Goals-Challenges, Issues & Practices by TMIMT- College of Management, Teerthanker Mahaveer University, Moradabad 25th & 26th April 2025. TMIMT International Journal (ISSN: 2348-988X) on environmental performance. The researchers found that green banking adoption significantly improved environmental metrics, with practices like paperless banking, energy efficiency measures, and sustainable financing showing measurable positive environmental outcomes. Their analysis revealed that banks implementing comprehensive green practices experienced enhanced brand reputation and stakeholder trust, which indirectly contributed to improved financial performance. The authors identified several drivers of green banking adoption, including regulatory pressures, competitive advantages, cost savings opportunities, and growing environmental awareness among customers. The study highlighted challenges in implementation, particularly in terms of initial investment costs, technological infrastructure limitations, and customer awareness barriers. Using advanced statistical techniques, the researchers established causal relationships between specific green banking practices and environmental performance indicators. Their findings emphasized the importance of holistic approaches to green banking that address both internal operations and external financing activities. The authors concluded that green banking represents not only an environmental imperative but also a strategic business opportunity for financial institutions in developing economies like Pakistan. Their research provides an empirical foundation for understanding how specific green banking initiatives translate into measurable environmental benefits while potentially enhancing long-term financial sustainability.

Bukhari et al. (2021) evaluated the attractiveness and perceived risks associated with green banking services in Bangladesh. Their research found that access to green banking services has significant potential to improve and promote environmentally friendly practices in the Bangladeshi banking sector. The authors identified that beyond its environmental benefits, green banking offers advantages to clients by providing new channels for financial service delivery in a convenient and efficient manner. However, their analysis revealed that despite these attractive features, numerous perceived risks impede adoption. The study categorized these risks into financial, time-related, individual, and cyber risks, all of which were found to negatively influence consumer perception of green banking attractiveness. Through empirical investigation, the researchers confirmed a clear relationship between perceived risks and service attractiveness, with both factors subsequently influencing clients' behavioral intentions toward green banking services. Social and task attractiveness emerged as the primary factors drawing clients to green banking services, while security concerns remained significant barriers. The authors noted that inadequate technological Conference Proceedings International Conference on Sustainable Development Goals-Challenges, Issues & Practices by TMIMT- College of Management, Teerthanker Mahaveer University, Moradabad 25th & 26th April 2025. TMIMT International Journal (ISSN: 2348-988X) infrastructure and limited awareness presented additional challenges to widespread adoption. Their findings emphasized the need for banks to develop strategies that address these perceived risks while enhancing the attractiveness of green banking services. The research provides valuable insights into the complex decision-making process of banking customers when evaluating green banking services, highlighting the importance of risk mitigation in promotional strategies aimed at increasing adoption rates in developing economies.

Chourasia (2020) examined green banking in India, focusing on strategies adopted by banks for sustainable development. The research identified that green banking combines operational improvements, technology integration, and changing client habits to promote environmentallyfriendly banking practices. The author found that Indian banks have begun implementing various green initiatives following the Reserve Bank of India's policy guidance on Green Banking and Green IT initiatives. The study revealed that computerized environments and online banking facilities were helping banks promote the green banking concept while simultaneously reducing paper usage at both banker and customer levels. The research highlighted innovative approaches by Indian banks, including IndusInd Bank's introduction of solar-powered ATMs, SBI's adoption of green banking policies and green home loans, Union Bank of India's energy efficiency measures, IDBI Bank's membership in the National Action Plan on Climate Change, and ICICI Bank's Corporate Environmental Stewardship initiatives. The author emphasized that these green banking initiatives were enabling banks to develop effective environmental management systems while gaining competitive advantages as social awareness about environmental issues increased. The study identified that banks adopting socially and environmentally responsible lending and investing strategies were altering their processes for bond underwriting, investment banking, and corporate lending in ways that enhanced their market position. The research concluded that green banking goes beyond corporate social responsibility to create measurable business benefits while contributing to environmental sustainability in India's rapidly evolving financial sector.

Narwal (2020) conducted research on customer awareness, inception, and adoption of green banking. The study found that numerous banks had begun taking action to preserve the environment through the creation of green products, including green cards, green loans, and paperless banking. The author identified that while green banking efforts might not be the primary

factor in a customer's decision to choose a specific bank, they do positively influence customer bank selection. The research emphasized that banks, like other businesses, must play a role in environmental protection for the sake of society and a healthier future. The study revealed that banks were educating their clientele about the importance of environmental protection while developing environmentally friendly financial solutions. According to the author, although the banking industry is typically seen as environmentally favorable with small internal environmental impacts related to water, energy, and paper usage, banks were making concerted efforts to encourage green industry growth to help the environment recover. The research highlighted that green banking initiatives were positioned to grant customers broader access to deposit and loan products via online and mobile banking channels, while helping financial institutions streamline operations and increase efficiency. The author concluded that the concept of green banking would benefit customers, banks, industries, and the overall economy by promoting sustainable practices that reduce environmental impact while enhancing financial service accessibility through digital platforms.

Research Gap

Gap 1: Limited understanding of the interrelationship between perceived benefits and risks in green banking adoption

Gap 2: Insufficient research on the mediating role of trust in digital channels in green banking adoption

Research Objectives

- To examine the interrelationship between perceived environmental benefits, financial risks, and willingness to adopt green banking services among customers in Mumbai, Maharashtra
- **2.** To analyze the mediating role of trust in digital channels in the relationship between perceived environmental benefits, financial risks, and willingness to adopt green banking

Hypotheses

H₁: There is a significant relationship between perceived environmental benefits, financial risks, trust in digital channels, and willingness to adopt green banking among customers in Mumbai, Maharashtra.

H₂: Trust in digital channels mediates the relationship between perceived environmental benefits, financial risks, and willingness to adopt green banking.

Research Methodology

Theoretical & Conceptual Framework

This study employs an integrated theoretical framework that combines the Technology Acceptance Model (TAM), the Theory of Planned Behavior (TPB), and the Trust-Risk Model. TAM provides insights into how perceived usefulness (environmental benefits) influences adoption intentions, while TPB incorporates subjective norms and perceived behavioral control elements that affect adoption decisions. The Trust-Risk Model addresses how perceived risks and trust interact to influence technology adoption. This integrated approach offers a comprehensive foundation for understanding the complex factors affecting green banking adoption.

The conceptual framework positions willingness to adopt green banking as the dependent variable, influenced by three independent variables: perceived environmental benefits, financial risks, and trust in digital channels. Additionally, the framework examines how trust in digital channels mediates the relationship between the other independent variables and adoption willingness. Demographic factors such as age, education, income, and gender are incorporated as control variables that may influence the relationships between the main variables.

Type of Research

This study employs a descriptive and explanatory research design with a quantitative approach. The descriptive component aims to characterize customers' perceptions of green banking benefits and risks, while the explanatory component seeks to establish causal relationships between the independent variables and the dependent variable. This mixed approach enables both a comprehensive description of customer perceptions and an analysis of how these perceptions influence adoption willingness.

Source of Data Collection

The research utilizes primary data collected through structured questionnaires administered to bank customers in Mumbai, Maharashtra. The questionnaire was designed based on validated scales from previous studies on green banking, technology adoption, and customer perceptions. Secondary data from academic literature, industry reports, and banking statistics supplement the primary data to provide context and support for the research findings.

Research Instrument

A structured questionnaire was developed with six sections:

- 1. Demographic information (age, gender, education, income, occupation)
- 2. Perceived environmental benefits (6 items)
- **3.** Perceived financial risks (6 items)
- **4.** Trust in digital channels (6 items)
- **5.** Willingness to adopt green banking (6 items)
- **6.** Current banking behavior (4 items)

All perception-based items were measured using a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The questionnaire was validated through expert review and pilot testing with 40 respondents to ensure reliability and validity before final administration.

Population

The population for this study comprises all retail banking customers aged 18 and above residing in Mumbai, Maharashtra. According to recent demographic data, Mumbai has approximately 8.5 million adult banking customers across various banks, including public, private, and foreign institutions.

Sampling Unit

The sampling unit is an individual retail banking customer who maintains at least one active bank account and resides in Mumbai, Maharashtra.

Sample Size with Proper Calculation

The sample size was determined using the following formula for finite population: $n = [Z^2pq + ME^2] \div ME^2$

Where:

n = sample size

Z = Z-score (1.96 for 95% confidence level)

p = estimated proportion (0.5 for maximum variation)

q = 1-p (0.5)

ME = margin of error (0.05 or 5%)

 $n = [(1.96)^2 \times 0.5 \times 0.5 + (0.05)^2] \div (0.05)^2$

 $n = [3.8416 \times 0.25 + 0.0025] \div 0.0025$

 $n = [0.9604 + 0.0025] \div 0.0025$

 $n = 0.9629 \div 0.0025$

n = 385.16

Rounding up and accounting for potential non-responses, the final sample size was set at 400 respondents.

Area of the Study

The study was conducted in Mumbai, Maharashtra, India's financial capital. Mumbai was selected due to its diverse banking customer base, high concentration of banking institutions, and varying levels of green banking implementation across different banks operating in the city.

Sampling Technique Used

The study employed stratified random sampling to ensure representation across different demographic segments and banking types. The population was stratified based on:

- 1. Geographic zones of Mumbai (South, Central, Western, Eastern, and Harbor)
- 2. Bank types (public, private, and foreign)
- 3. Age groups (18-30, 31-45, 46-60, and above 60)

Within each stratum, simple random sampling was used to select respondents, ensuring proportional representation across different segments of the banking customer population.

Statistical Tools Used

The collected data was analyzed using a combination of statistical tools:

- 1. Descriptive statistics (mean, standard deviation, frequency distributions)
- 2. Reliability analysis (Cronbach's alpha)
- 3. Correlation analysis (Pearson's correlation coefficient)
- 4. Multiple regression analysis
- 5. Structural equation modeling (SEM) for hypothesis testing and mediation analysis
- 6. Independent samples t-test and ANOVA for group comparisons
- 7. Factor analysis for scale validation

IBM SPSS Statistics 27 and AMOS 26 software were used for data analysis and model testing.

Data Analysis & Interpretation

Table 1: Demographic Profile of Respondents

Demographic Variable	Category	Frequency	Percentage
Gender	Male	216	54.0
Gender	Female	184	46.0
Age	18-30 years	128	32.0
	31-45 years	156	39.0

	46-60 years	84	21.0
	Above 60 years	32	8.0
	High School	48	12.0
Education	Undergraduate	196	49.0
Ludeation	Postgraduate	124	31.0
	Professional Degree	32	8.0
	Below ₹25,000	68	17.0
Monthly Income	₹25,001-₹50,000	152	38.0
Wontiny meome	₹50,001-₹75,000	104	26.0
	Above ₹75,000	76	19.0
	Salaried	224	56.0
Occupation	Business/Self-employed	88	22.0
Occupation	Professional	52	13.0
	Retired/Homemaker	36	9.0

Table 1 presents the demographic profile of respondents. The sample consists of 54% male and 46% female respondents, indicating a fairly balanced gender distribution. The age distribution shows that the majority of respondents (71%) are between 18-45 years, representing a relatively younger banking customer base. Education levels indicate that most respondents (88%) have at least an undergraduate degree, suggesting a well-educated sample. In terms of income, the largest segment (38%) falls in the ₹25,001-₹50,000 monthly income bracket, while occupation data shows that salaried employees constitute the majority (56%) of respondents.

Table 2: Descriptive Statistics	s of Study Variables
--	----------------------

Variable	Mean	Standard Deviation	Skewness	Kurtosis	Cronbach's Alpha
Perceived Environmental Benefits	3.86	0.74	-0.68	0.43	0.84
Financial Risks	3.42	0.82	0.12	-0.57	0.82
Trust in Digital Channels	3.64	0.91	-0.45	-0.26	0.87

Willingness to Adopt	3 7 2	0.88	-0.58	0.31	0.89
Green Banking	5.72	0.00	-0.56	0.51	0.09

Table 2 presents the descriptive statistics of the main study variables. The means range from 3.42 to 3.86 on a 5-point scale, indicating generally positive perceptions across all variables. Perceived environmental benefits has the highest mean (3.86), suggesting strong recognition of the environmental advantages of green banking among respondents. Financial risks shows the lowest mean (3.42), though still above the midpoint, indicating moderate concerns about financial risks. All variables demonstrate acceptable standard deviations, indicating good variability in responses. Skewness and kurtosis values fall within the acceptable range of ± 2 , suggesting normally distributed data. Cronbach's alpha values range from 0.82 to 0.89, exceeding the threshold of 0.7, which confirms the internal consistency reliability of the measurement scales.

Table 3: Correlation Matrix of Study Variables

Variable	1	2	3	4
1. Perceived Environmental Benefits	1			
2. Financial Risks	-0.31**	1		
3. Trust in Digital Channels	0.42**	-0.46**	1	
4. Willingness to Adopt Green Banking	0.56**	-0.48**	0.64**	1

**Note: ** p < 0.01

Table 3 presents the correlation matrix of the study variables. All correlations are statistically significant at p < 0.01. Perceived environmental benefits shows a moderately positive correlation with willingness to adopt green banking (r = 0.56), indicating that higher perceptions of environmental benefits are associated with greater adoption willingness. Financial risks demonstrates a moderately negative correlation with willingness to adopt green banking (r = -0.48), suggesting that higher perceived financial risks are associated with lower adoption willingness. Trust in digital channels exhibits the strongest positive correlation with willingness to adopt green banking (r = 0.64), indicating that higher trust levels are strongly associated with greater adoption willingness. The negative correlation between financial risks and trust in digital channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial risks and trust in digital channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial risks and trust in digital channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived financial channels (r = -0.46) suggests that higher trust levels are associated with lower perceived

risks. These correlations provide preliminary support for the hypothesized relationships between the variables.

Variable	le Unstandardized Stand		t-value	р-	VIF	
	Coefficients	Coefficients		value		
	В	Std. Error	Beta			
(Constant)	1.762	0.245		7.192	0.000	
Perceived	0.328	0.052	0.275	6.307	0.000	1.324
Environmental						
Benefits						
Financial Risks	-0.204	0.048	-0.190	-4.252	0.000	1.384
Trust in Digital	0.426	0.044	0.440	9.682	0.000	1.462
Channels						

Table 4:	Multiple	Regression	Analysis	- F	Factors	Affecting	Willingness	to	Adopt	Green
Banking										

 $R = 0.742, R^2 = 0.551, Adjusted R^2 = 0.547, F = 162.308, p < 0.001$

Table 4 presents the results of multiple regression analysis with willingness to adopt green banking as the dependent variable. The model explains 55.1% of the variance in adoption willingness (R² = 0.551), which is statistically significant (F = 162.308, p < 0.001). All three independent variables are significant predictors of adoption willingness. Trust in digital channels emerges as the strongest predictor (β = 0.440, p < 0.001), followed by perceived environmental benefits (β = 0.275, p < 0.001), while financial risks negatively influences adoption willingness (β = -0.190, p < 0.001). The Variance Inflation Factor (VIF) values range from 1.324 to 1.462, well below the threshold of 10, indicating no multicollinearity issues. These results provide strong support for H1, confirming a significant relationship between the three independent variables and willingness to adopt green banking.

 Table 5: Mediation Analysis - Trust in Digital Channels as Mediator

Path	Direct Effect	Indirect Effect	Total Effect	Sobel Test
Perceived Environmental Benefits → Willingness	0.328**	0.153**	0.481**	Z = 6.284, p < 0.001
Financial Risks \rightarrow Willingness	-0.204**	-0.146**	-0.350**	Z = 5.972, p < 0.001

Note: ** p < 0.01; Bootstrap samples: 5000

Table 5 presents the results of mediation analysis examining the mediating role of trust in digital channels. For the path from perceived environmental benefits to willingness, the direct effect (0.328) and indirect effect through trust (0.153) are both significant, with a total effect of 0.481. The Sobel test confirms the significance of this mediation (Z = 6.284, p < 0.001). For the path from financial risks to willingness, the direct effect (-0.204) and indirect effect through trust (-0.146) are both significant, with a total effect of -0.350. The Sobel test confirms the significance of this mediation (Z = 5.972, p < 0.001). These results support H2, confirming that trust in digital channels partially mediates the relationships between perceived environmental benefits, financial risks, and willingness to adopt green banking.

Variable	Group	Mean	Std. Deviation	t/F	p-value
Gender	Male	3.76	0.84	t = 1.032	0.303
Gender	Female	3.67 0.92		t = 1.052	
	18-30 years	4.12	0.76		0.000**
Age	31-45 years	3.78	0.82	F = 18.74	
1150	46-60 years	3.36	0.91	1 – 10.7 1	
	Above 60 years	3.15	0.94		
	High School	3.24	0.97		0.000**
Education	Undergraduate	3.65	0.88	F = 15.62	
Laucation	Postgraduate	3.92	0.79	1 - 15.62	
	Professional Degree	4.08	0.71		

Table C. Cway	In Differences in	Willingnood to	Adamt	Croop Dopling
\mathbf{I} able of \mathbf{U}	ID Differences in	vv mmgness lo	AUODL	чтеен ранкше

Conference	Proceedings	International	Conference	on	Sustainable	Development	Goals-
Challenges,	Issues & Prac	ctices by TMI	MT- College	of 1	Management,	Teerthanker M	Iahaveer
University, N	Moradabad 25t	h & 26th April	2025. TMIMT	[] Inte	ernational Jour	rnal (ISSN: 234	8-988X)

Income	Below ₹25,000	3.58	0.94		0.041*
	₹25,001-₹50,000	3.68	0.89	F = 2.78	
	₹50,001-₹75,000	3.79	0.83	1 - 2.76	
	Above ₹75,000	3.84	0.82		

Note: ** p < 0.01, * p < 0.05

Table 6 presents group differences in willingness to adopt green banking across demographic variables. Gender shows no significant difference in adoption willingness (t = 1.032, p = 0.303). Age demonstrates significant differences (F = 18.74, p < 0.001), with younger respondents (18-30 years) showing the highest willingness (mean = 4.12) and older respondents (above 60 years) showing the lowest willingness (mean = 3.15). Education level also shows significant differences (F = 15.62, p < 0.001), with higher education levels associated with greater adoption willingness. Income demonstrates a significant but weaker effect (F = 2.78, p = 0.041), with higher income groups showing slightly greater adoption willingness. These results suggest that age and education are particularly important demographic factors influencing green banking adoption.

Table 7: Factor	Analysis of C	Green Banking	Adoption	Determinants
-----------------	---------------	----------------------	----------	--------------

	Factor 1:	Factor 2:	Factor 3:	Factor 4:
Items	Environmental	Financial	Digital	Adoption
	Benefits	Risks	Trust	Willingness
EB1: Green banking helps	0.842	0.112	0.186	0.214
reduce paper waste				
EB2: Green banking	0.824	0.075	0.145	0.176
contributes to reducing carbon				
footprint				
EB3: Green banking promotes	0.796	0.043	0.212	0.203
sustainable resource use				
EB4: Green banking	0.778	0.098	0.187	0.196
encourages environmentally				
responsible behavior				

EB5: Green banking supports	0.756	0.126	0.167	0.184
conservation efforts				
EB6: Green banking	0.732	0.138	0.203	0.169
demonstrates social				
responsibility				
FR1: Green banking may	0.082	0.845	-0.142	-0.186
involve higher service charges				
FR2: Green banking may lead	0.105	0.823	-0.165	-0.194
to hidden costs				
FR3: Digital transactions may	0.094	0.795	-0.248	-0.232
lead to financial errors				
FR4: Green banking might	0.126	0.778	-0.193	-0.176
offer fewer financial benefits				
FR5: Technical issues could	0.087	0.756	-0.276	-0.204
result in financial losses				
FR6: Green banking might	0.114	0.724	-0.187	-0.168
involve complicated fee				
structures				
DT1: Digital banking channels	0.176	-0.187	0.863	0.264
are reliable				
DT2: Digital banking channels	0.193	-0.215	0.847	0.248
maintain privacy				
DT3: Digital banking	0.204	-0.276	0.832	0.256
platforms are secure				
DT4: Digital banking systems	0.167	-0.248	0.814	0.235
prevent unauthorized access				
DT5: Digital banking portals	0.184	-0.192	0.796	0.223
handle transactions accurately				

DT6: Digital banking	0.156	-0.168	0.768	0.215
platforms provide adequate				
customer support				
AW1: I intend to use green	0.204	-0.194	0.275	0.856
banking services				
AW2: I plan to increase my use	0.223	-0.182	0.264	0.842
of green banking options				
AW3: I would recommend	0.196	-0.176	0.238	0.827
green banking to others				
AW4: I prefer banks that offer	0.215	-0.164	0.256	0.812
green banking services				
AW5: I am willing to pay a	0.176	-0.228	0.184	0.756
premium for green banking				
AW6: I would switch banks to	0.164	-0.206	0.192	0.732
access better green banking				
services				
Eigenvalue	5.24	4.86	4.92	5.08
Variance Explained (%)	21.83	20.25	20.50	21.17
Cumulative Variance (%)	21.83	42.08	62.58	83.75

Kaiser-Meyer-Olkin Measure: 0.894; Bartlett's Test: p < 0.001

Table 7 presents the results of factor analysis for the main constructs. The Kaiser-Meyer-Olkin measure (0.894) and Bartlett's test (p < 0.001) confirm the suitability of the data for factor analysis. The analysis extracted four distinct factors explaining 83.75% of the total variance. All items loaded strongly on their respective factors (> 0.7) with minimal cross-loadings, confirming the discriminant validity of the measures. Factor 1 (Environmental Benefits) explains 21.83% of the variance, Factor 2 (Financial Risks) explains 20.25%, Factor 3 (Digital Trust) explains 20.50%, and Factor 4 (Adoption Willingness) explains 21.17%. These results confirm the construct validity of the measurement scales used in the study.

Results and Findings

The analysis of data collected from 400 banking customers in Mumbai reveals several significant findings regarding the factors affecting green banking adoption. The results support both hypotheses proposed in the study, providing valuable insights into customer perceptions and behaviors toward green banking services.

First, the study confirms a significant relationship between perceived environmental benefits, financial risks, trust in digital channels, and willingness to adopt green banking (H1). The multiple regression analysis shows that these three factors collectively explain 55.1% of the variance in adoption willingness, which is substantial and statistically significant. Trust in digital channels emerges as the strongest predictor of adoption willingness ($\beta = 0.440$), followed by perceived environmental benefits ($\beta = 0.275$), while financial risks negatively influences adoption willingness ($\beta = -0.190$). This finding suggests that while environmental concerns motivate customers to adopt green banking, their confidence in digital platforms plays an even more crucial role in adoption decisions.

Second, the mediation analysis confirms that trust in digital channels partially mediates the relationship between perceived environmental benefits, financial risks, and willingness to adopt green banking (H2). The significant indirect effects through trust indicate that how customers perceive environmental benefits and financial risks partially translates into adoption willingness through their level of trust in digital channels. This finding highlights the central role of digital trust in the green banking adoption process, serving as a conduit through which other perceptions influence adoption decisions.

The descriptive statistics reveal generally positive perceptions across all variables, with perceived environmental benefits scoring the highest (mean = 3.86). This suggests strong recognition of the environmental advantages of green banking among Mumbai banking customers. The moderate score for financial risks (mean = 3.42) indicates that while customers perceive some financial risks associated with green banking, these concerns are not overwhelming.

Demographic analysis shows significant differences in adoption willingness across age, education, and income groups, but not across gender. Younger and more educated customers demonstrate

Conference Proceedings International Conference on Sustainable Development Goals-Challenges, Issues & Practices by TMIMT- College of Management, Teerthanker Mahaveer University, Moradabad 25th & 26th April 2025. TMIMT International Journal (ISSN: 2348-988X) higher willingness to adopt green banking, which aligns with previous research suggesting that these demographic segments are generally more receptive to technological innovations and environmental initiatives. The positive correlation between income and adoption willingness, though weaker than other demographic factors, suggests that financial capacity may influence adoption decisions to some extent.

Factor analysis confirms the construct validity of the measurement scales, with all items loading strongly on their respective factors and minimal cross-loadings. The four extracted factors collectively explain 83.75% of the total variance, indicating that the measurement instrument effectively captures the constructs under investigation.

Overall, the findings suggest that customer adoption of green banking is influenced by a complex interplay of perceived benefits, risks, and trust factors, with trust in digital channels playing a particularly crucial role in the adoption process. Demographics also influence adoption willingness, with younger, more educated, and higher-income customers showing greater receptivity to green banking services.

Suggestions

Based on the research findings, several strategic suggestions can be offered to banking institutions seeking to enhance green banking adoption among customers:

- 1. Strengthen Digital Trust Infrastructure: Given the paramount importance of trust in digital channels, banks should prioritize investments in robust security systems, transparent data protection policies, and user-friendly digital interfaces. Regular security audits, clear communication about security measures, and prompt resolution of technical issues can help build and maintain customer trust in digital banking platforms.
- 2. Develop Educational Campaigns on Environmental Benefits: While customers generally recognize the environmental benefits of green banking, targeted educational campaigns highlighting specific environmental impacts of traditional banking and quantifiable benefits of green alternatives could further enhance perceived environmental benefits. These

campaigns should utilize concrete examples and metrics to make environmental benefits tangible and meaningful to customers.

- **3. Implement Risk Mitigation Strategies**: To address concerns about financial risks, banks should develop and communicate clear risk mitigation strategies, such as transaction insurance, zero-liability policies for unauthorized transactions, and transparent fee structures. Clear explanations of how green banking can actually reduce certain financial risks (such as fraud through paper statements) could help shift customer perceptions.
- 4. Target Young and Educated Customer Segments: Given the higher adoption willingness among younger and more educated customers, banks should develop tailored marketing strategies for these segments, highlighting aspects of green banking that align with their values and preferences. These segments can serve as early adopters and advocates for wider green banking adoption.
- 5. Develop Age-Specific Adoption Strategies: For older customer segments showing lower adoption willingness, banks should develop specialized approaches that address their specific concerns and preferences. This might include enhanced customer support, simplified interfaces, and gradual transition paths from traditional to green banking services.
- 6. Create Tiered Green Banking Products: To accommodate varying financial capacities across income segments, banks should develop tiered green banking products with different feature sets and fee structures. This approach ensures accessibility for lower-income segments while offering premium features for higher-income customers willing to pay for advanced green banking services.
- 7. Establish Transparent Communication on Costs and Benefits: To address financial risk perceptions, banks should maintain transparent communication about the costs and benefits of green banking services, emphasizing long-term savings and non-monetary benefits to offset perceived short-term costs or risks.
- 8. Develop Strategic Partnerships: Banks should collaborate with environmental organizations, digital security firms, and consumer advocacy groups to enhance the

credibility and effectiveness of their green banking initiatives. These partnerships can provide external validation and specialized expertise that strengthen customer trust and adoption willingness.

Implications

This research offers several important implications for theory, practice, and policy in the domain of green banking:

Theoretical Implications

- The study contributes to green banking literature by providing empirical evidence on the interrelationship between perceived benefits, risks, and trust factors in influencing adoption decisions. The finding that these factors collectively explain a substantial portion of variance in adoption willingness advances theoretical understanding of green banking adoption determinants.
- 2. The confirmation of trust in digital channels as a partial mediator between perceptions and adoption willingness extends existing theoretical models by highlighting the mechanism through which customer perceptions translate into adoption behavior. This mediation effect suggests that theoretical models of green banking adoption should incorporate trust as a central connecting construct rather than treating it merely as an independent variable.
- **3.** The identification of demographic differences in adoption willingness contributes to understanding how individual characteristics influence green banking adoption, highlighting the need for more nuanced theoretical models that account for demographic heterogeneity in adoption patterns.

Practical Implications

1. For banking institutions, the findings provide a clear roadmap for enhancing green banking adoption by addressing the three key factors—environmental benefits, financial risks, and digital trust—with particular emphasis on building digital trust as the strongest predictor of adoption willingness.

- 2. The confirmed partial mediation effect of trust suggests that banks should not only communicate environmental benefits and address financial risks directly but also focus on how these aspects enhance or diminish trust in their digital channels. This indirect pathway represents an additional lever for influencing adoption decisions.
- **3.** The demographic differences in adoption willingness highlight the importance of segmentspecific strategies rather than one-size-fits-all approaches to promoting green banking services. Banks can use these insights to develop targeted marketing and educational campaigns for different customer segments.

Policy Implications

- 1. For regulatory bodies, the findings highlight the importance of policies that enhance digital trust in the banking sector, such as standardized security protocols, data protection regulations, and consumer education initiatives on digital banking security.
- 2. The strong influence of perceived environmental benefits suggests that policy initiatives highlighting the environmental impact of banking activities and incentivizing green banking adoption could effectively promote sustainable financial practices.
- **3.** The identified financial risk concerns point to the need for regulatory frameworks that protect consumers from potential financial risks associated with green banking, thereby enhancing adoption willingness across customer segments.

Limitations

While this study provides valuable insights into green banking adoption factors, several limitations should be acknowledged:

1. Geographic Scope: The study is limited to Mumbai, Maharashtra, and may not fully represent the diverse banking customer base across India. Regional differences in banking practices, environmental awareness, and digital literacy might influence adoption patterns differently in other areas.

- 2. Cross-sectional Design: The cross-sectional nature of the data collection provides a snapshot of customer perceptions at a specific point in time but does not capture how these perceptions evolve over time or how adoption behavior unfolds in practice.
- **3. Self-reported Data**: The reliance on self-reported survey responses may introduce social desirability bias, particularly regarding environmental attitudes and adoption intentions, potentially inflating the reported willingness to adopt green banking.
- **4. Limited Variable Set**: While the study examines three key variables influencing green banking adoption, other potential factors such as social influence, regulatory support, or bank-specific characteristics are not included in the model.
- **5. Demographic Representativeness**: Despite efforts to ensure demographic diversity through stratified sampling, certain segments of the banking population, particularly those with limited banking access or digital literacy, may be underrepresented in the sample.
- 6. Intention-Behavior Gap: The study measures willingness to adopt rather than actual adoption behavior, and previous research suggests a potential gap between stated intentions and actual behavior in technology adoption contexts.
- 7. Limited Bank-specific Analysis: The research examines customer perceptions across different banks without detailed analysis of how specific banks' green banking offerings might influence customer perceptions and adoption willingness.

Scope of Future Research

This study opens several avenues for future research that could address its limitations and extend its findings:

1. Longitudinal Studies: Future research could adopt longitudinal designs to track how customer perceptions and adoption behavior evolve over time, particularly as green banking offerings mature and environmental awareness continues to grow.

- 2. Geographical Expansion: Extending the research to diverse geographical regions within India and internationally would provide insights into how cultural, economic, and regulatory differences influence green banking adoption patterns.
- **3.** Actual Adoption Behavior: Studies measuring actual green banking adoption behavior rather than intentions would address the intention-behavior gap and provide more concrete evidence on the factors influencing real-world adoption decisions.
- **4.** Additional Variables: Incorporating additional variables such as social influence, personality traits, regulatory factors, or bank-specific characteristics could enhance the explanatory power of adoption models and provide a more comprehensive understanding of adoption determinants.
- **5. Qualitative Explorations**: In-depth qualitative research exploring customer narratives around green banking could provide richer insights into the underlying motivations, concerns, and decision-making processes not fully captured by quantitative methods.
- 6. Comparative Bank Studies: Research comparing adoption patterns across different banks with varying green banking offerings could illuminate how specific implementation approaches influence customer perceptions and adoption willingness.
- **7. Experimental Designs**: Experimental research testing different messaging strategies, risk mitigation approaches, or trust-building interventions could provide causal evidence on effective methods for enhancing green banking adoption.
- 8. Technology Integration Studies: Research examining how emerging technologies like blockchain, artificial intelligence, or biometrics might influence trust and adoption in green banking could provide forward-looking insights for banking innovation.

Conclusion

This study provides comprehensive insights into the factors influencing customers' willingness to adopt green banking services in Mumbai, Maharashtra. The research confirms significant relationships between perceived environmental benefits, financial risks, trust in digital channels, and adoption willingness, with trust emerging as the strongest predictor of adoption intentions. Conference Proceedings International Conference on Sustainable Development Goals-Challenges, Issues & Practices by TMIMT- College of Management, Teerthanker Mahaveer University, Moradabad 25th & 26th April 2025. TMIMT International Journal (ISSN: 2348-988X) The findings also establish that trust in digital channels partially mediates how perceived benefits and risks translate into adoption willingness, highlighting the central role of digital trust in the green banking adoption process.

The research reveals important demographic differences in adoption willingness, with younger, more educated, and higher-income customers showing greater receptivity to green banking services. These demographic patterns suggest the need for targeted approaches that address the specific concerns and preferences of different customer segments. The generally positive perceptions across all variables indicate a favorable climate for green banking expansion, though financial risk concerns remain a potential barrier to wider adoption.

The findings have significant implications for banking institutions seeking to enhance their green banking initiatives. By strengthening digital trust infrastructure, developing educational campaigns on environmental benefits, implementing risk mitigation strategies, and tailoring approaches for different demographic segments, banks can effectively promote green banking adoption among their customers. For policymakers, the results highlight the importance of regulatory frameworks that enhance digital trust, highlight environmental impacts, and protect consumers from financial risks associated with green banking.

Despite limitations in geographical scope, research design, and variable selection, this study makes a valuable contribution to understanding green banking adoption determinants in an emerging market context. Future research expanding the geographical scope, adopting longitudinal designs, measuring actual adoption behavior, and incorporating additional variables would further enhance understanding of this increasingly important domain of sustainable finance.

As environmental concerns continue to grow and digital banking becomes increasingly prevalent, understanding the complex factors influencing green banking adoption becomes ever more crucial. This research provides a foundation for banking institutions, policymakers, and researchers to collaboratively advance green banking adoption, contributing to both environmental sustainability and financial inclusion in an increasingly digital banking landscape.

References

- Bhatnagar, A. (2024). Green Banking (Digital Banking for Customers). Journal of Emerging Technologies and Innovative Research, 11(4), 183-192.
- Bukhari, S., Woodside, F., Hassan, R., Hussain, O., & Shoaib, S. (2021). Evaluating Attractiveness and Perceived Risks: The Case of Green Banking Services in Bangladesh. International Journal of Bank Marketing, 39(2), 284-303.
- Candera, M., Marwa, T., Isnurhadi, I., & Yuliani, Y. (2022). The Influence of Green Banking on Bank Performance. International Conference on Agriculture, Engineering, Social Science and Education, 108-114.
- Chourasia, R. (2020). Green Banking in India: A Study of Various Strategies Adopt by Banks for Sustainable Development. International Journal of Engineering Research & Technology, 9(4), 12-18.
- Chowdhury, T. (2023). Customer Perception on Green Banking An Empirical Study in Vietnam. Journal of Law and Sustainable Development, 11(12), 1-18.
- Ganesh, S. A., & Darole, P. S. (2024). Green Banking- A Study of Select Banks in Maharashtra. International Journal of Research Publication and Reviews, 5(11), 5783-5786.
- Mariya, P., Maxime, M., & Jessie, P. (2023). Going green? On the drivers of individuals' green bank adoption. Business Ethics, the Environment & Responsibility, 32(4), 1128-1147.
- Masud, M. A., Hossain, M. S., & Kim, J. D. (2021). Adoption of green banking practices and environmental performance in Pakistan: a demonstration of structural equation modelling. Environment, Development and Sustainability, 23(9), 13210-13226.
- Mir, M. F., & Bhat, S. A. (2022). Green banking adoption practices: improving environmental, financial, and operational performance. International Journal of Quality & Reliability Management, 39(8), 1828-1847.
- Narwal, K. P. (2020). Customers' Awareness, Inception And Adoption of Green Banking. JPM Journal for Multidisciplinary Research, 1(1), 109-119.