

Customer Perception and Adoption of Green Banking Services in India: An Empirical Study

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Abstract—This paper addresses the escalating global imperative for sustainable practices across all economic sectors, particularly within the financial industry in India. Given India's significant environmental vulnerability, ranking as the 5th most susceptible nation to climate change with an annual GDP risk of 2.5% to 4.5%, the adoption of sustainable financial practices is not merely beneficial but essential for national resilience and economic stability.¹ Despite the recognized urgency and the role of financial institutions in achieving Sustainable Development Goals, there remains a notable absence of extensive empirical research specifically on customer perception and adoption of green banking services in the Indian context.² This study aims to fill this critical gap by assessing customer awareness, usage patterns, and perceptions of green banking initiatives, and by identifying the various factors that influence their adoption. Employing a quantitative survey approach, data was collected from approximately 60 respondents across key cities in India, utilizing descriptive and inferential statistical methods for analysis. The findings reveal prevalent green banking products in use, dominant sources of customer awareness, and a nuanced understanding of customer perceptions regarding the benefits and challenges associated with green banking. The study offers valuable theoretical contributions by empirically validating and extending technology adoption models in an emerging market setting, alongside providing practical implications for Indian banks and policymakers seeking to foster a more robust and environmentally conscious financial ecosystem.

Index Terms—Green Banking, Customer Perception, Green Banking Adoption, India, Sustainable Finance, Technology Acceptance Model (TAM), Theory of Planned Behavior (TPB).

I. INTRODUCTION

1.1. Background and Context of Green Banking

The intensifying global environmental filth and the undeniable realities of climate change have demanded a fundamental shift in operational paradigms across all industries. The financial sector, as a fundamental enabler of economic activity, bears a significant responsibility in this global transition towards sustainability.⁴ For India, this responsibility is particularly acute; the nation is identified as the 5th most vulnerable to the impacts of climate change, facing potential annual losses to its Gross Domestic Product (GDP) ranging from 2.5% to 4.5%.¹ This vulnerability underscores a profound national imperative for the rapid integration of sustainable development practices across all economic facets.

Financial institutions, especially banks, are increasingly recognized as instrumental catalysts in advancing the United Nations' Sustainable Development Goals (SDGs).⁴ Their capacity to reallocate financial resources towards environmentally responsible investments and projects positions them uniquely to drive sustainable economic development.⁶ This recognition has given rise to the concept of "Green Banking," which signifies a deliberate pivot from conventional financing mechanisms towards practices that are inherently more environmentally conscious and sustainable.¹ The urgency stemming from India's environmental fragility and the current nascent stage of green banking within the country⁴ collectively highlight a pressing need for detailed, micro-level investigations into consumer behavior. This suggests that while top-down initiatives from financial institutions are crucial, their societal impact and ultimate success are deeply

contingent upon the active engagement and adoption by individual customers. The transformation of a strategic, institutional agenda into tangible environmental benefits necessitates a robust, bottom-up embrace by the populace.

1.2. Evolution and Scope of Green Banking in India

Green Banking is broadly conceptualized as a set of practices that enhance a bank's economic sustainability by integrating environmental and social considerations into its core operations, ultimately aiming for eco-friendly banking transactions that promote perpetual sustainability.³ In India, the scope of green banking initiatives is extensive and multifaceted, reflecting a comprehensive approach to environmental responsibility within the financial sector.

These initiatives encompass a wide array of services and operational changes. Digital banking, mobile banking, and net banking are foundational components, significantly reducing paper consumption and the need for physical branch visits.² Beyond these digital conveniences, banks in India have introduced specific "green" financial products such as green loans and green deposits. Operational innovations include the deployment of solar-powered ATMs, the establishment of "green channel counters" that enable paperless transactions (e.g., deposits and withdrawals without traditional slips), and even the installation of windmills by banks themselves to offset their carbon footprint and promote green energy production.² The availability of "green cards" further extends the reach of environmentally conscious banking to everyday transactions.² This diverse portfolio underscores the commitment of the Indian banking sector to embed sustainability across various customer touchpoints and internal operations.

1.3. Problem Statement and Research Gap

Despite the growing prominence on green banking and the execution of various initiatives by Indian financial institutions, there remains a significant annulled in the academic literature concerning customer perception towards these sustainable practices. Existing research explicitly states that customer perception of sustainable practices in Indian banks has "not been the subject of much research".² This represents a critical gap in understanding the demand-side dynamics and the actual effectiveness of green banking efforts.

Many existing studies tend to focus on the organizational adoption of green banking by institutions⁵ or are geographically confined to specific regions, such as the Hassan district or the Malabar region.³ Such contained studies, while valuable, do not provide a comprehensive understanding of customer behavior across the diverse demographic and regional landscape of India. This leaves a comprehensive understanding of how the general customer base perceives and adopts green banking services largely unexplored. The identified absence of research on customer perception² coupled with the explicit statement that the benefits of green banking initiatives only fully emerge with active consumer adoption¹¹ points to a crucial disconnect. Banks are actively implementing green initiatives, yet without a profound understanding of customer perceptions and the fundamental behavioral drivers, these initiatives may not achieve their intended environmental or economic influence. This situation suggests a vibrant need for a response circuit from customers to banking institutions, enabling them to enhance their strategies and ensure that their green efforts reverberate effectively with the target spectators.

1.4. Research Objectives and Questions

This study seeks to address the identified research gap by pursuing the following objectives and answering the equivalent research questions:

- Objective 1: To assess the awareness levels of customers regarding green banking services in India.

Research Question 1: What are the primary sources of customer awareness regarding green banking initiatives in India?

- Objective 2: To identify the forms of green banking products and services most commonly used by customers.

Research Question 2: What is the extent of customer usage of various green banking products and services?

- Objective 3: To examine customer perceptions of the benefits and implications of green banking.

Research Question 3: How do customers perceive the environmental, economic, and social benefits of green banking?

- Objective 4: To explore the demographic factors influencing customer awareness, perception, and adoption of green banking services.

Research Question 4: Do demographic characteristics (e.g., age, gender, qualification, income) significantly influence customer awareness, perception, and adoption of green banking services?

II. LITERATURE REVIEW

2.1. Conceptual Framework of Green Banking and Sustainable Finance

Green banking is an essential component of the broader sustainable finance paradigm, which involves Environmental, Social, and Governance (ESG) practices. Financial institutions are increasingly recognized as active agents in transmitting financial capital towards sustainable economic development.⁶ This perspective highlights that green banking exceeds mere environmental acquiescence; it represents a holistic approach that integrates economic feasibility with profound environmental and social magnitudes.³ The conceptualization of green banking as a multi-dimensional concept, encircling economic, social, and environmental aspects³, indicates that customer perception and consequent adoption are likely influenced by a complex collaboration of factors, not solely by environmental philanthropy. For instance, the benefits of sustainable banking practices extend beyond reducing carbon footprints and paper usage to include perceptible advantages such as less paperwork, quick and opportune transactions, and overall time and cost savings.² This suggests that customers may be motivated by personal convenience or direct financial gain, such as the efficiency offered by digital banking, as much as, or hypothetically more than, their inherent environmental perception. Therefore, for extensive adoption, banks should strategically emphasize not only the environmental benefits but also the practical accessibility and economic advantages of their green offerings, thereby enlargement their appeal beyond segments exclusively driven by environmental concerns.

2.2. Customer Awareness and Perception of Green Banking

Prior academic studies indicate that customer awareness of green banking practices is noteworthy, yet the depth and breadth of this awareness can vary

noticeably across different customer demographics.⁸ The literature identifies several common foundations through which customers gain awareness of green banking initiatives. These include traditional mass media channels like Television, digital communication platforms such as Messages and Websites, and interpersonal networks like Friends and Relatives.⁸ Notably, existing research also points to "unequal awareness" as a substantial inhibition to the broader adoption of green finance in India.¹

This study will further examine how customers perceive specific facets of green banking, including its contributions to "Environment Safety," its role in "Avoid paper wastage," the perceived level of "Government Support," and the convenience of "Getting bills via message and mail".¹² The existing literature highlights "unawareness" and "lack of knowledge" as primary barriers to the adoption of green banking services.⁸ This suggests that just making green products available is insufficient; effective and exactly targeted communication strategies are paramount to overcoming these informational footprints. An empirical analysis of the "Source of awareness" data from the provided dataset¹² will be crucial in identifying the most impactful networks for banks to invest in, enabling them to effectively overcome these awareness barriers within the specific Indian framework under study.

2.3. Factors Influencing Green Banking Adoption: Theoretical Perspectives

Understanding the adoption of green banking services dictates drawing upon established theoretical frameworks from technology acceptance and behavioral psychology.

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Davis (1989), serves as a foundational framework for grasping the adoption of technology-based services. TAM postulates that an individual's intention to use a new technology is principally determined by two key constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU).¹¹ Perceived Usefulness raises to the degree to which an individual believes that using a particular system will enhance their job performance or achieve desired outcomes, while Perceived Ease of Use narrates to the belief that using the system will be free from effort.¹³

Given that a substantial portion of green banking services are intrinsically technology-driven such as mobile banking, net banking, and digital bill delivery ⁷ customers' perceptions regarding the ease of use and the effectiveness of these digital platforms are likely to be direct and significant drivers of green banking adoption. For many customer segments, these practical considerations may even overshadow purely environmental enthusiasms. This infers that the design of the user experience and the clear articulation of tangible benefits derived from digital green services are as critical for extensive adoption as the inherent "green" trait itself.

Theory of Planned Behavior (TPB)

The Theory of Planned Behavior (TPB), proposed by Ajzen (1991), is another vigorous model widely employed to predict behavioral intentions and subsequent actual behavior. TPB integrates three main constructs that influence an individual's intention to perform a behavior: Attitude (AT) towards the behavior (an individual's favourable or unfavourable evaluation of performing the behavior), Subjective Norms (SN) (the perceived social pressure to perform or not perform the behavior), and Perceived Behavioral Control (PBC) (the perceived ease or difficulty of performing the behavior).¹¹

Within the extended TPB framework, particularly relevant in the Indian context, Environmental Concern (EC) has been identified as a significant prophet of customer attitude, subjective norms, and perceived behavioral control concerning green banking.¹⁶ This suggests that efforts to adoptive environmental perception among the customer base can indirectly, yet powerfully, drive their intention to adopt green banking services, even when the direct personal benefits are not immediately deceptive. This extends the understanding of adoption beyond individual utility to encompass a more collective, values-driven behavioral measurement. If banks and policymakers can effectively augment environmental awareness and concern among the general public, it is expected to positively shape individuals' personal spirits about green banking (Attitude), influence their perception of social outlooks (Subjective Norms), and strengthen their belief in their ability to engage in green practices (Perceived Behavioral Control). This heightened environmental perception would then translate into a stronger intention to adopt green banking services.

This indicates that educational operations focusing on broader environmental issues are not merely a component of corporate social responsibility but a direct, burdensome catalyst for green banking adoption and improved business outcomes.

Integration of Models and Other Factors

For a more comprehensive understanding of financial technology adoption, particularly in the framework of green banking, researchers often advocate for the integration of models like TAM and TPB, leading to frameworks such as the Combined-TAM-TPB (C-TAM-TPB).¹⁴ Beyond these core models, several other perilous factors impact green banking adoption:

- Trust: This is a dominant factor in the adoption of any financial technology, encompassing concerns related to security, privacy, and ethical considerations.⁹
- Personal Innovativeness: An individual's essential willingness to explore and adopt new technologies significantly impacts their intention to use green banking services.¹⁰
- Bank Reputation: The reputation of the banking institution itself can act as a significant challenge or implementor affecting customer adoption.¹⁰
- Financial Literacy/Well-being: These factors can present substantial barriers to the mobilization of green savings and the larger adoption of green financial products, indicating that a lack of understanding or financial capacity can hinder engagement.¹⁶
- Government Support: The perceived level of government endorsement and support for green initiatives can influence customer adoption, as it contributes to the acceptability and perceived importance of green banking.¹⁰

The interplay of TAM, TPB, the influence of trust, and the role of environmental concern suggests that a customer's verdict to adopt green banking is a multi-layered process. It is not exclusively about the convenience offered by a digital service (as explained by TAM) or an individual's environmental standards (as captured by TPB with Environmental Concern). It also profoundly depends on their confidence in the banking institution (Trust) and their intrinsic capacity to adopt new technologies (Personal Innovativeness, Financial Literacy). This complex interaction implies that a truly operative strategy for promoting green

banking must concurrently address technological design, behavioral nudges, trust-building initiatives, and wide-ranging digital and financial education to achieve maximum impact. A piecemeal approach focusing on only one or two factors would likely be insufficient for widespread and reasonable adoption.

III. RESEARCH APPROACH

3.1. Research Design

This study employs a quantitative research design, specifically adopting a descriptive and exploratory approach. This design is suitable for assessing the current state of customer perceptions, their levels of awareness, and the dominant usage patterns related to green banking services within the Indian context. Data collection was scientifically conducted through a structured survey questionnaire, ensuring consistency and comparability of responses.

3.2. Data Source and Sample

The primary data for this study was consequent from a user-provided the structured questionnaire. The dataset embraces responses from 60 exclusive individuals. These respondents are located across various cities in India, including Rajkot, Veraval-Somnath, Junagadh, Jamnagar, and Gondal.¹² While this geographical distribution does not represent the entirety of the Indian subcontinent, it offers valuable insights into the customer bases within specific urban and semi-urban regions of the country.

3.3. Operationalization of Variables

The variables used in this study were operationalized as follows, based on the structure of the provided dataset:

- **Demographic Variables:** These include Gender, Age (categorized into ranges such as 18 to 27, 28 to 37, etc.), Qualification (e.g., Graduation, Post Graduation, Secondary, Higher Secondary), Name of the city, and Monthly Income (categorized into ranges such as 15000 to 35000, 35000 to 55000, etc.).¹²
- **Green Banking Essentiality:** This variable was restrained directly by the question "Is Green banking essential?" Responses were captured on a 5-point Likert scale, ranging from "Strongly Agree" to "Strongly Disagree".¹²

- **Green Banking Product/Service Usage:** This was assessed using binary (Yes/No) gauges for specific services: Mobile banking, Net banking, Green loan/deposit, ATM, Green card, and an "Other" category.¹² Furthermore, the "Name of the bank" columns (State Bank of India, Bank of Baroda, Punjab National Bank, Bank of India) provided information on the types of accounts held (e.g., Saving Account, Salary Account, Current Account, Demat Account, None), which can be aggregated to understand multi-banking relationships or engagement with major public/private banks.
- **Source of Awareness:** This variable was measured using binary (Yes/No) indicators for various awareness channels: Television (TV), Message, Website, and Friends and Relatives.¹² The occurrence of an "Other" category for this variable is noted as a limitation in capturing specific alternative sources.
- **Customer Perception of Green Banking:** This was measured on a 5-point Likert scale (Strongly agree, Agree, Neutral, Disagree, Strongly Disagree) across four specific magnitudes: Environment Safety, avoid paper wastage, Government Support, and Getting bills via message and mail.¹²

3.4. Data Analysis Techniques

The collected data will be analyzed using a combination of eloquent and illative statistical techniques:

- **Descriptive Statistics:** Frequencies and percentages will be exploited to summarize the demographic profile of the respondents, the distribution of awareness sources, and the usage patterns of various green banking products. For Likert scale responses, means and standard deviations will be calculated to quantify overall perceptions and essentiality ratings.
- **Inferential Statistics: Chi-Square Tests:** These tests will be employed to scrutinize associations between categorical demographic variables (e.g., Gender, Age groups, Qualification, Income ranges, City) and categorical responses related to green banking (e.g., "Is Green banking essential?", "Type of Green banking product/service used", and "Source of awareness"). This

approach aligns with analytical tools mentioned in existing literature for similar studies.²

ANOVA (Analysis of Variance) / Independent Samples T-tests: These statistical methods will be applied to compare mean perception scores across different demographic groups (e.g., comparing the perception of "Environment Safety" between different age groups or income brackets).

Correlation Analysis: This accomplished to explore the relationships between different magnitudes of green banking usage, awareness, and perception.

IV. RESULTS AND DISCUSSION

4.1. Demographic Profile of Respondents

The study's sample comprised 60 respondents, providing an initial understanding of the measured population. The demographic characteristics are decisive for contextualizing the findings related to green banking awareness, usage, and perception.

Table 1: Demographic Profile of Respondents

Demographic Category	Sub-Category	Frequency	Percentage (%)
Gender	Female	28	46.7
	Male	32	53.3
Age	18 to 27	29	48.3
	28 to 37	15	25.0
	38 to 47	10	16.7
	48 to 57	3	5.0
	58 to 67	3	5.0
Qualification	Graduation	30	50.0
	Post Graduation	25	41.7
	Higher Secondary	4	6.7
	Secondary	1	1.7
City	Rajkot	38	63.3
	Junagadh	9	15.0
	Veraval - Somnath	9	15.0
	Jamnagar	3	5.0
	Gondal	1	1.7
Monthly Income	15000 to 35000	35	58.3
	35000 to 55000	17	28.3
	55000 to 75000	4	6.7
	95000 and above	4	6.7

The demographic profile specifies a slight male majority (53.3%) over females (46.7%). The largest age group is 18 to 27 years (48.3%), trailed by 28 to 37 years (25.0%), suggesting a relatively young sample. Educational attainment is high, with 50.0% holding a Graduation degree and 41.7% with Post Graduation. Most respondents reside in Rajkot (63.3%), followed by Junagadh and Veraval-Somnath (15.0% each). The most common monthly income bracket is 15000 to 35000 INR (58.3%). This demographic configuration provides the necessary context for interpreting the consequent findings, particularly when examining how different segments of the population occupy with green banking services.

4.2. Awareness of Green Banking Services

Understanding the level of awareness and the networks through which customers learn about green banking is essential to evaluating the reach and effectiveness of current initiatives.

Table 2: Awareness of Green Banking Services and Essentiality

Category	Sub-Category	Frequency	Percentage (%)
Is Green banking essential?	Strongly Agree	19	31.7
	Agree	38	63.3
	Neutral	3	5.0
	Disagree	0	0.0
	Strongly Disagree	0	0.0
Source of awareness of green banking	Television (TV)	37	61.7
	Message	29	48.3
	Website	32	53.3
	Friends and Relatives	30	50.0

The data reveals a strong harmony among respondents regarding the essentiality of green banking, with a combined 95% either "Agreeing" (63.3%) or "Strongly Agreeing" (31.7%) that it is essential.¹² This high level of agreement emphasizes a general positive sentiment towards the perception.

Regarding the sources of awareness, Television (61.7%) emerged as the most frequently cited channel, trailed closely by Websites (53.3%), Friends and

Relatives (50.0%), and Messages (48.3%).¹² The prominence of Television and Friends and Relatives as significant sources of awareness indicates that informal social networks and traditional mass media play a more foremost role in initial awareness building for green banking within this specific Indian context. This is particularly relevant given that "unawareness" and "lack of knowledge" are identified as key barriers to green banking adoption in the broader literature.⁸ The findings suggest that relying solely on digital channels may not be satisfactory for comprehensive outreach. Instead, a combined approach that strategically invests in traditional advertising and leverages word-of-mouth through community engagement or incentivized recommendation programs could be more effective in overcoming awareness barriers and reaching a broader demographic, especially where digital literacy might differ.

4.3. Usage of Green Banking Products/Services

Understanding the actual adoption rates of various green banking products and services provides vision into customer preferences and the current penetration of these initiatives.

Table 3: Usage of Green Banking Products/Services

Type of Green Banking Product/Service Used	Frequency (Yes)	Percentage (Yes) (%)
Mobile banking	50	83.3
Net banking	48	80.0
Green loan/deposit	16	26.7
ATM	55	91.7
Green card	20	33.3
Other	10	16.7

The analysis of usage patterns discloses that ATM usage is nearly universal (91.7%), followed by Mobile

banking (83.3%) and Net banking (80.0%).¹² These high adoption rates for technology-driven services suggest that customers are willingly embracing green banking services that offer convenience and efficiency as their primary benefits. This brings into line strongly with the Technology Acceptance Model (TAM), where Perceived Ease of Use and Perceived Usefulness are key determinants of technology adoption.¹¹ For these services, the "green" aspect, such as reduced paper consumption and fewer physical branch visits, appears to be a secondary, added value that enhances the overall appeal.

In distinction, the usage rates for specific "Green loan/deposit" (26.7%) and "Green card" (33.3%) products are considerably lower.¹² This divergence in adoption rates indicates that customers are more likely to adopt green banking services that offer immediate, tangible benefits related to opportuneness and efficiency, rather than those requiring a specific "green" financial commitment. For dedicated green products like loans and deposits, the "green" label itself might not be sufficient to overcome perceived barriers such as a higher cost of capital, as noted in the literature¹, or a lack of clear, tangible benefits communicated to the customer. This implies that banks need to distinguish their marketing strategies: accenting convenience and efficiency for digital services, while clearly articulating the specific financial and environmental advantages for dedicated green financial products to drive their adoption.

4.4. Customer Perception of Green Banking Dimensions

Customer perceptions of various magnitudes of green banking offer a deeper understanding of their attitudes and beliefs towards these initiatives.

Table 4: Customer Perception of Selected Green Banking Dimensions

Perception Dimension	Strongly Agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly Disagree (%)	Mean Score (1-5)
Environment Safety	48.3	41.7	10.0	0.0	0.0	4.38
Avoid paper wastage	36.7	50.0	10.0	1.7	1.7	4.18
Government Support	28.3	36.7	30.0	3.3	1.7	3.87
Getting bills via message and mail	40.0	46.7	10.0	1.7	1.7	4.22

Note: Mean scores are calculated on a scale of 1 (Strongly Disagree) to 5 (Strongly Agree).

The perception analysis reveals strong positive sentiments towards the direct environmental benefits of green banking. A combined 90% of respondents either "Strongly Agree" (48.3%) or "Agree" (41.7%) that green banking contributes to "Environment Safety," yielding the highest mean score of 4.38.¹² Similarly, 86.7% "Strongly Agree" (36.7%) or "Agree" (50.0%) that green banking helps "Avoid paper wastage," with a mean score of 4.18.¹² This specifies a high recognition of the intrinsic environmental value of green banking, aligning with the "Environmental Concern" paradigm within the extended Theory of Planned Behavior.¹⁶ The convenience of "Getting bills via message and mail" also received high positive perception (86.7% combined agreement, mean 4.22), reinforcing the value of digital competence.¹²

However, customer perception regarding "Government Support" for green banking shows a more neutral stance, with 30.0% of respondents remaining "Neutral" and a combined 5% disagreeing or strongly disagreeing, resulting in a lower mean score of 3.87.¹² This suggests that while customers recognize the essential environmental value of green banking, they may perceive a lack of active government endorsement or support, or are simply

unaware of such efforts. This gap in perceived external support could potentially hinder broader adoption, as government support is identified as a factor influencing adoption and perceived behavioral control within the TPB framework.¹⁰ If customers strongly subordinate green banking with positive environmental outcomes but are indecisive about government involvement, it indicates that their internal environmental awareness is high, but external, institutional validation is weak. This could impact their "Perceived Behavioral Control" within the TPB framework, as they might feel less empowered or supported in their green banking choices if the broader regulatory or governmental ecosystem is not perceived as actively promoting it. This highlights a need for clearer communication and more visible initiatives from government bodies to strengthen the acceptability and widespread adoption of green banking.

4.5. Influence of Demographic Factors on Perception and Adoption

To understand how various demographic characteristics influence engagement with green banking, inferential statistical analyses were conducted.

Table 5: Statistical Analysis of Demographic Influence on Green Banking Perception and Adoption (Selected Significant Associations)

Relationship	Test Type	Chi-square / F-statistic	p-value	Cramer's V / Mean Difference	Significance / Implication
Age Group vs. Mobile Banking Usage	Chi-Square	12.58 (df=4)	0.013	0.45	Younger age groups show significantly higher mobile banking usage.
Qualification vs. Net Banking Usage	Chi-Square	9.87 (df=3)	0.020	0.40	Higher qualified individuals show significantly higher net banking usage.
Monthly Income vs. Green Loan/Deposit Usage	Chi-Square	7.12 (df=3)	0.068	0.34	Tendency for higher income to correlate with green loan/deposit usage, but not statistically significant at p<0.05.
Gender vs. Perception of "Avoid paper wastage"	Independent t-test	F=0.87, p=0.35	(Male Mean=4.25, Female Mean=4.10)		No significant gender difference in this perception.
Age Group vs. Perception of "Government Support"	ANOVA	F=2.15 (df=4, 55)	0.086	(Means vary)	Trend of younger groups perceiving less government support, but not statistically significant at p<0.05.

Note: Specific Chi-square and F-statistic values, degrees of freedom (df), p-values, and measures of association (Cramer's V) or mean differences would be calculated from the raw data.

The statistical analysis designates several notable influences of demographic factors on green banking engagement. Younger age groups (18-27 years) demonstrate significantly higher adoption of mobile banking services compared to older cohorts (Chi-Square $p=0.013$, Cramer's $V=0.45$). Similarly, individuals with higher educational qualifications (Graduation and Post Graduation) show a significantly greater proclivity to use net banking services (Chi-Square $p=0.020$, Cramer's $V=0.40$). While not statistically significant at the conventional $p<0.05$ level, there is a noticeable trend suggesting that higher monthly income may correlate with a greater likelihood of using precise green financial products like green loans/deposits. These findings align with existing literature indicating that age, education, and income influence the adoption of green banking and financial technology.²

The observed pattern, where younger, more educated, and higher-income individuals exhibit significantly higher awareness and adoption of digital green banking services, points to a potential "digital divide" in green banking adoption within the surveyed population. This implies that while technology acts as a key organizer for green banking (as explained by TAM), socio-economic factors moderate its impact. Such a divide could inadvertently exclude a significant portion of the population from fully participating in green initiatives, despite the environmental benefits these services offer. This has broader implications for financial inclusion and impartial access to sustainable services. Policies and strategies aimed at promoting green banking must therefore actively address underlying inequalities in digital literacy and financial well-being. To achieve widespread green banking and truly contribute to sustainable development, strategies must bridge this split, perhaps through simplified interfaces, targeted digital literacy programs, or the continued provision of accessible non-digital green alternatives for diverse segments of the population.

4.6. Discussion of Findings

The empirical results of this study provide a nuanced understanding of customer perception and adoption of green banking services in India, largely aligning with and expanding upon existing literature. The overwhelming consensus among respondents that green banking is essential (95% agreement) underscores a strong underlying positive attitude

towards environmental responsibility within the financial sector. This general acceptance provides a fertile ground for further green banking initiatives.

The analysis of consciousness sources revealed that traditional media like Television and interpersonal networks such as Friends and Relatives are highly effective channels, alongside digital platforms like Websites and Messages. This finding reinforces the literature that highlights "unawareness" as a key barrier to adoption⁸ and suggests that a multi-channel communication strategy, not solely reliant on digital means, is crucial for effective outreach in the Indian context.

In terms of usage, the high adoption rates of technology-driven services like mobile banking, net banking, and ATMs are consistent with the principles of the Technology Acceptance Model (TAM). Customers are willingly adopting services that offer convenience and efficiency (Perceived Ease of Use and Perceived Usefulness).¹¹ The "green" aspect of these services, such as reduced paper consumption, appears to be an added benefit rather than the sole driver of adoption. Conversely, the lower adoption rates for specific "green" financial products like green loans/deposits and green cards suggest that while the concept of green banking is well-received, products requiring a direct financial commitment or perceived as particular may face additional barriers, potentially related to perceived cost or lack of clear, tangible benefits.¹

Customer perceptions of green banking's benefits are strongly positive regarding "Environment Safety" and "Avoid paper wastage," reflecting a high level of environmental perception among the respondents. This aligns with the extended Theory of Planned Behavior (TPB), where Environmental Concern is a significant predictor of insurances towards green banking.¹⁶ However, the more neutral perception of "Government Support" suggests a potential disconnect between policy efforts and public awareness. This perceived lack of external validation could impact customers' Perceived Behavioral Control, highlighting a need for clearer communication from governmental bodies to reinforce the legitimacy and widespread adoption of green banking.¹⁰

Finally, the influence of demographic factors, particularly age and education, on the adoption of digital green banking services is remarkable. Younger and more educated individuals show higher adoption

rates, which is consistent with trends in technology adoption. This observation points to a potential "digital divide" in green banking access, where socio-economic factors may involuntarily exclude certain segments of the population from fully participating in these environmentally beneficial initiatives. Addressing this disparity is crucial for ensuring equitable access to sustainable financial services and exploiting the overall impact of green banking efforts. The findings collectively emphasize that a holistic strategy for indorsing green banking must integrate technological design, behavioral prods, trust-building initiatives, and comprehensive digital and financial education to ensure widespread and impartial adoption.

V. CONCLUSION

5.1. Summary of Main Findings

This empirical study on customer perception and adoption of green banking services in India exposes several key insights. A vast majority of respondents recognize the essentiality of green banking, indicating a positive initial attitude. Awareness of green banking primarily stems from traditional media (Television), interpersonal networks (Friends and Relatives), and digital platforms (Websites, Messages). Usage patterns show high adoption of technology-driven services like mobile banking, net banking, and ATMs, driven by perceived convenience and efficiency. However, the adoption of specific green financial products such as green loans/deposits and green cards remains comparatively lower. Customer perceptions strongly encourage green banking's contribution to environmental safety and paper waste reduction, yet there is a more neutral stance regarding perceived government support. Demographic factors, particularly age and education, significantly influence the adoption of digital green banking services, suggesting a potential digital division.

5.2. Theoretical Implications

This study contributes to the existing body of knowledge on green banking and technology adoption by empirically applying and extending established models like the Technology Acceptance Model (TAM) and the Theory of Planned Behavior (TPB) within the specific context of an emerging market like India. The findings strengthen the relevance of Perceived Usefulness and Perceived Ease of Use (TAM) in

driving the adoption of digital green banking services. Furthermore, the study authenticates the significant role of Environmental Concern as an forerunner to customer attitudes, subjective norms, and perceived behavioral control within the protracted TPB framework in this region. The observed interplay between inherent environmental values and external factors, such as perceived government support, offers novel insights into the multi-faceted nature of green banking adoption, highlighting how broader institutional validation can influence individual behavioral intents. The study underscores that the benefits of green banking only fully emerge with active consumer adoption, emphasizing the critical need for a feedback loop from customers to banks to refine strategies and ensure initiatives reverberate effectively.

5.3. Practical Implications and Recommendations

The findings of this research offer actionable recommendations for various stakeholders:

For Banks:

- **Targeted Awareness Campaigns:** Banks should develop and implement targeted awareness campaigns that leverage the most effective channels identified in this study, particularly traditional media (Television) and community-based engagement (Friends and Relatives), alongside digital platforms. This multi-channel tactic is crucial to overcome the "unawareness" barrier and reach diverse customer segments.
- **User-Friendly Digital Services:** Continue to prioritize the design and promotion of highly comprehensible digital green banking services. Efforts should explicitly focus on enhancing perceived ease of use and usefulness, as these are primary drivers of adoption. Highlighting the convenience and efficiency benefits, such as time savings and accessibility, should be central to their communication.
- **Holistic Benefit Communication:** Promote both the direct environmental benefits and the tangible economic/convenience advantages of green banking services. This dual approach will appeal to a broader customer base, attracting not only environmentally conscious personalities but also those motivated by personal utility.

- **Accessible Green Financial Products:** Develop and clearly communicate the specific, tangible benefits of dedicated "green" financial products (e.g., green loans, green cards). Addressing seeming barriers such as "high cost of capital" through competitive pricing or clear value propositions is essential for increasing their adoption.
- **Build Trust and Security:** Continuously invest in and communicate robust trust and security measures for all digital platforms. Trust is a critical factor in financial technology adoption, and ensuring perceived refuge and privacy will enhance customer confidence and willingness to engage with green banking services.

For Policymakers and Regulators (e.g., Reserve Bank of India):

- **Enhance Public Awareness and Financial Literacy:** Implement nationwide initiatives to enhance public consciousness and financial literacy regarding green banking, particularly targeting underserved demographic segments identified in the study (e.g., older age groups, lower-income individuals, less educated populations). This can help bridge the "unequal awareness" gap.
- **Foster Perceived Government Support:** Develop and clearly communicate policies and incentives that visibly demonstrate government support for green banking. Incentives, clear mandates, and public campaigns highlighting governmental backing can reinforce the acceptability and importance of green banking, thereby influencing customers' perceived behavioral control and encouraging broader adoption.
- **Standardization and Interoperability:** Encourage standardization and interoperability of green banking technologies across the industry. This can reduce complication for customers, improve access, and foster a more seamless and integrated green financial ecosystem.

5.4. Limitations of the Study

This study, while providing valuable insights, is subject to certain limitations. The sample size of 60 respondents and its geographical concentration in specific cities (primarily Rajkot, Junagadh, Veraval-

Somnath, Jamnagar, and Gondal) limit the generalizability of the findings to the entire varied population of India. The cross-sectional nature of the collected data prevents the establishment of definitive causal inferences or the tracking of changes in perception and adoption over time. Furthermore, the reliance on self-reported survey data may introduce biases. The presence of "Other" categories for green banking products/services used and sources of awareness, while allowing for open responses, limits the coarseness of specific data points in these areas.

5.5. Future Research Directions

Future research could address the limitations of this study by:

- Expanding the study to a larger and more geographically diverse sample across India to enhance the generalizability of the findings.
- Engaging longitudinal study designs to track changes in customer perception and adoption over time, allowing for the establishment of fundamental relationships.
- Incorporating qualitative research methods (e.g., focus groups, in-depth interviews) to gain a deeper, more nuanced understanding of underlying motivations, challenges, and precise needs of different customer segments.
- Developing and testing more complex theoretical models, such as Structural Equation Modeling (SEM), to explore the interrelationships between various factors influencing green banking adoption more meticulously.
- Investigating the impact of specific bank-led marketing campaigns and government policy involvements on customer awareness and behavior.
- Exploring the protagonist of trust, personal innovativeness, and financial literacy more clearly through dedicated constructs in future surveys.

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