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Green Banking Adoption through E-Banking Service Quality: An Empirical Study of Consumer Intention

Pooja Saini[1], Dr. Vinay Pal Singh[2]

[1]Research Scholar Quantum School of Business, Quantum University, Uttarakhand, India

[2]Associate Professor Quantum School of Business, Quantum University, Uttarakhand, India

Abstract: Green banking links environmental responsibility with banking products and the delivery of financial services. Digital statements, electronic receipts and paperless transactions may reduce dependence on physical documentation, but consumers' willingness to adopt these practices can also depend on how they evaluate green banking products and the quality of the electronic channels through which services are delivered. This study examines consumer intention to adopt green banking in relation to Green Product Dimensions (GPD), E-Banking Service Quality (EBSQ), Environmental Concern (EC) and Digital Literacy (DL). The revised framework treats all four constructs as direct predictors and excludes interaction terms and moderation hypotheses. A quantitative questionnaire-based survey yielded 796 valid responses from 943 responses received, after 147 cases were excluded during data screening. The reported structural estimates show that GPD is positively and significantly associated with intention to adopt green banking ($\beta = 0.397$, $t = 13.653$, $p < 0.001$), as is EBSQ ($\beta = 0.303$, $t = 9.847$, $p < 0.001$). The reported direct paths from EC ($\beta = -0.008$, $t = 0.285$, $p = 0.776$) and DL ($\beta = 0.047$, $t = 1.554$, $p = 0.120$) are not statistically significant. The results therefore identify product-related perceptions and electronic service quality as the two supported predictors in the supplied analysis. Because the available estimates were generated for a larger model that included interaction terms, the reduced direct-effects model must be re-estimated in SmartPLS before its final R^2, effect sizes, predictive statistics and model-fit indices are reported. The study contributes a focused account of the factors associated with green banking adoption intention and offers practical guidance for banks seeking to make green services clear, dependable and convenient.

Keywords: Green banking, Green product dimensions, E-banking Service Quality, Adoption intention, Environmental concern, Digital literacy, PLS-SEM

1. Introduction

The banking sector has an important position in the transition towards more sustainable economic activity. Banks influence environmental outcomes through their lending and investment decisions, their internal operations and the services they offer to customers. Green banking commonly refers to banking practices that seek to incorporate environmental considerations into financial products, operational processes and customer-facing services. At the customer level, paperless statements, electronic notices, digital receipts and online transactions are visible examples of practices that may reduce reliance on physical documents. These practices can make environmental responsibility part of an ordinary banking interaction rather than an activity that customers undertake separately.

The development of mobile banking and internet banking has changed the way consumers access financial services. Customers can increasingly check balances, transfer funds, receive statements and complete routine transactions without visiting a branch. Digital channels may reduce the need for travel and paper-based communication, although their overall environmental impact depends on factors such as energy use, infrastructure and customer behaviour. It is therefore important not to equate digital banking automatically with environmental sustainability. The customer-facing question addressed in this study is narrower: which perceptions are associated with consumers' intention to adopt green banking services? Two factors are central to this question. The first is the way consumers evaluate the attributes of green banking products. If the environmental features of a service are unclear, difficult to understand or not seen as useful, customers may have little reason to change established

routines. Conversely, when green product attributes are understandable and perceived as relevant, customers may be more willing to use them. The second factor is E-Banking Service Quality. Even when customers support environmental goals, they may be reluctant to adopt a digital service if it is unreliable, unavailable, confusing or perceived as insecure. A green banking proposition therefore needs to combine credible product attributes with a satisfactory digital service experience.

Environmental Concern and Digital Literacy are also relevant consumer characteristics. Environmental concern captures the importance that individuals attach to environmental problems. Digital literacy reflects the ability and confidence to use digital tools. Both could plausibly be related to adoption intention, but their contribution should be tested as a direct relationship rather than assumed. The present revised paper accordingly focuses on four direct predictors: GPD, EBSQ, EC and DL. The model does not include interaction terms, conditional effects or moderation hypotheses.

The empirical study uses 796 valid responses. Its core purpose is to assess the relationship of GPD and EBSQ with intention to adopt green banking, while also examining whether EC and DL show statistically significant direct associations. This focus keeps the model interpretable and makes the practical implications easier to communicate. It also distinguishes between a construct's direct relationship with intention and its possible role in changing the strength of another relationship.

1.1 Research problem

Although green banking and digital banking have received growing attention, the existence of a digital channel does not guarantee that customers will adopt a green banking service. Customers may not recognise the environmental attributes of a product, may not trust the service process or may not consider the digital channel convenient enough for regular use. Banks therefore need evidence about which perceptions are most closely associated with customers' stated intention to adopt green banking. The research problem is to establish whether product-related green attributes, electronic service quality, environmental concern and digital literacy are associated with adoption intention in the surveyed sample.

1.2 Research objectives

• To examine the relationship between Green Product Dimensions and consumers' intention to adopt green banking.

• To assess the relationship between E-Banking Service Quality and consumers' intention to adopt green banking.

• To examine the direct relationship between Environmental Concern and intention to adopt green banking.

• To examine the direct relationship between Digital Literacy and intention to adopt green banking.

1.3 Research contribution and scope

The study places product attributes and service delivery in one direct-effects framework. This is useful because customers encounter green banking through both what the service offers and how the service works. The paper does not claim that the two focal predictors fully explain adoption behaviour, nor does it treat stated intention as equivalent to actual use. Its scope is limited to the constructs and the survey evidence available in the supplied manuscript. The results are interpreted as associations within the sample rather than as proof of causality.

2. Literature Review and Hypothesis Development

2.1 Green banking and consumer adoption

Green banking extends environmental considerations into banking products, customer services and organisational processes. At the consumer level, the concept becomes meaningful when customers can identify the relevant

service features and understand how to use them. Digital statements and electronic notifications are examples of operational changes that may reduce paper use. However, the adoption of such features depends on more than their technical availability. Customers must be aware of the service, regard it as useful and be comfortable completing the required tasks through the chosen channel.

Research on sustainable consumption suggests that consumers' environmental evaluations can inform their preferences, but the translation of favourable attitudes into action is not automatic. Kollmuss and Agyeman (2002) discuss the gap between environmental awareness and behaviour, while Stern (2000) emphasises that environmentally significant behaviour is shaped by multiple personal and contextual influences. These insights caution against assuming that concern for the environment alone will lead customers to change their banking routines. In the present study, green banking adoption intention is therefore examined alongside specific product and service perceptions.

2.2 Green Product Dimensions and intention to adopt green banking

Green Product Dimensions refer here to consumers' evaluations of the environmental and functional attributes associated with green banking services. The construct is product-oriented: it concerns the perceived characteristics and value of the green banking offer rather than the quality of the electronic delivery channel alone. Customers may evaluate whether paperless features are easy to understand, whether the service appears relevant to their needs and whether the green element offers a meaningful reason to change their existing behaviour.

The theory of planned behaviour provides a broad foundation for explaining how evaluations and beliefs relate to behavioural intention (Ajzen, 1991). Research on green purchasing has also applied planned-behaviour perspectives to understand consumers' intentions towards environmentally oriented products (Paul et al., 2016; Yadav & Pathak, 2016, 2017). These studies do not establish that every green product context operates identically, but they support the general proposition that favourable evaluations of green product attributes can be relevant to intention.

Green banking services differ from many physical green products because customers may experience them as a combination of financial service, digital interface and environmental feature. A customer may value the reduction of paper-based communication but still need a service that is practical and compatible with ordinary banking tasks. Clear communication of green attributes can help customers recognise the offer and understand the benefits without relying on vague environmental claims. When customers perceive the product attributes positively, they may be more willing to express an intention to adopt the service.

The empirical model reports a positive and statistically significant path from GPD to IAGB. The coefficient is larger than the reported EBSQ coefficient, suggesting that product-related evaluations are an important correlate of intention in this sample. This result is consistent with the view that customers need to understand the value of the green banking offer, not merely have access to a digital channel.

H1: Green Product Dimensions are positively related to consumers' intention to adopt green banking.

2.3 E-Banking Service Quality and intention to adopt green banking

E-Banking Service Quality refers to consumers' assessment of services delivered through electronic banking channels. In the supplied measurement model, EBSQ is represented by six dimensions: Availability, Contact, Design, Efficiency, Fulfilment and Security. These dimensions reflect different aspects of the customer experience. Availability concerns whether the service can be accessed when needed. Contact relates to access to assistance or communication. Design concerns the presentation and organisation of the interface. Efficiency reflects how easily and quickly customers can complete tasks. Fulfilment concerns whether the service delivers what is expected, and Security relates to the perceived protection of transactions and information.

Electronic service-quality research treats online service quality as multidimensional rather than as a single feature of the interface. Parasuraman et al. (2005) developed E-S-QUAL to assess electronic service quality, while Santos (2003) proposed a model of virtual service quality. Research on internet banking has also identified service quality and customer attitudes as important areas for understanding electronic banking use (Jun & Cai, 2001; Liao & Cheung, 2002). These contributions support examining service delivery as a distinct construct alongside the environmental characteristics of a banking product.

For green banking adoption, service quality is important because customers must be able to complete routine financial tasks confidently. A digital channel that is difficult to navigate can create friction, even if the service is marketed as environmentally responsible. Delays, poor interface design, limited assistance or uncertainty about transaction completion can weaken the customer experience. Conversely, reliable access, clear design, efficient processes and adequate security can make digital green banking easier to incorporate into daily routines.

The reported path from EBSQ to IAGB is positive and statistically significant. This indicates that respondents who evaluate electronic banking service quality more favourably also tend to report stronger intention to adopt green banking. The result supports the practical view that sustainability messaging should be accompanied by dependable service delivery.

H2: E-Banking Service Quality is positively related to consumers' intention to adopt green banking.

2.4 Environmental Concern and intention to adopt green banking

Environmental Concern describes the degree to which individuals are attentive to environmental problems and regard them as important. It has been examined in research on environmental attitudes and pro-environmental behaviour. Dunlap et al. (2000) provide a revised measure of endorsement of the New Ecological Paradigm, while Bamberg (2003) and Stern (2000) discuss how environmental concern and other personal factors can relate to environmentally relevant behaviour. Such work indicates that environmental concern is a meaningful construct, but its relationship with a specific behaviour may vary by context.

In banking, consumers may express concern about environmental problems without changing how they manage their accounts. The effort required to switch service channels, the perceived usefulness of green banking features, habits, confidence in digital services and the clarity of information can all be relevant. Environmental concern may therefore not translate directly into a stronger intention unless the green banking service is also seen as practical and credible. In this study, EC is treated as a direct predictor only. No claim is made that EC changes the strength of the GPD relationship.

The supplied structural output reports a near-zero, non-significant direct path from EC to IAGB ($\beta = -0.008$, $t = 0.285$, $p = 0.776$). This finding means that the analysis does not provide statistical evidence for a direct association in the estimated model. It should not be interpreted as proof that environmental concern is irrelevant in every banking context. It may instead indicate that general concern does not independently explain adoption intention once the other predictors are considered.

H3: Environmental Concern is positively related to consumers' intention to adopt green banking.

2.5 Digital Literacy and intention to adopt green banking

Digital Literacy refers to the skills and confidence needed to access, navigate and use digital technologies. In a banking context, these capabilities can include understanding menus, completing transactions, interpreting on-screen instructions, identifying official communication and responding appropriately to security prompts. Digital literacy is related to, but not identical to, access to a device or internet connection. A person may own a smartphone yet still find some digital financial tasks difficult.

Technology acceptance research highlights the importance of perceived usefulness and perceived ease of use in explaining technology-related intention (Davis, 1989). Compeau and Higgins (1995) examine computer self-efficacy, while Venkatesh et al. (2003) integrate several perspectives on technology acceptance. These approaches suggest that users' capability and confidence can be relevant to the adoption of digital services. However, capability does not necessarily create an intention to adopt a specific service unless the service is also useful, trustworthy and relevant.

In the present study, DL is included as a direct predictor of IAGB. A direct-effects specification asks whether differences in digital literacy are associated with differences in intention when the other model variables are considered. This is distinct from asking whether digital literacy changes the relationship between service quality and adoption intention. The revised model examines only the former.

The reported direct path from DL to IAGB is positive but statistically non-significant ($\beta = 0.047$, $t = 1.554$, $p = 0.120$). The result does not support a statistically reliable direct relationship in the supplied output. One possible interpretation is that digital literacy alone may not be sufficient to motivate green banking adoption when service quality and green product perceptions are considered. This interpretation remains tentative and should be tested with a re-estimated direct-effects model.

H4: Digital Literacy is positively related to consumers' intention to adopt green banking.

2.6 Conceptual framework

The revised conceptual framework contains four direct paths to Intention to Adopt Green Banking: GPD → IAGB, EBSQ → IAGB, EC → IAGB and DL → IAGB. There are no interaction terms in the revised model. Environmental Concern and Digital Literacy are not moderators, and the paper does not propose conditional or interaction effects. This direct-effects structure aligns each hypothesis with one predictor-to-outcome relationship.

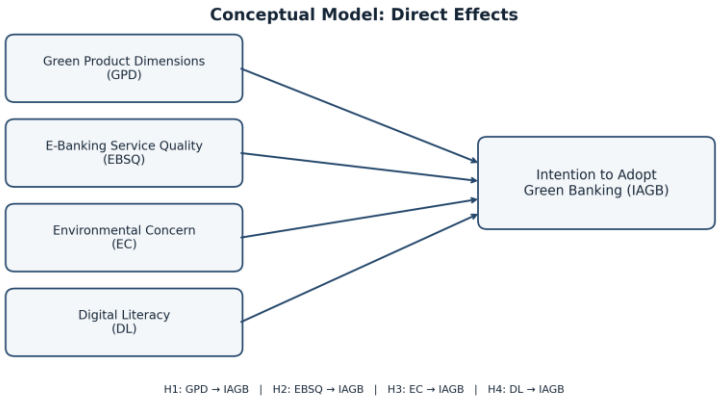


Figure 1. Conceptual model of direct effects on intention to adopt green banking.

Hypothesis	Proposed relationship	Expected direction
H1	GPD → IAGB	Positive
H2	EBSQ → IAGB	Positive
H3	EC → IAGB	Positive
H4	DL → IAGB	Positive

3. Research Methodology

3.1 Research design

The study follows a quantitative, cross-sectional survey design. A structured questionnaire was used to collect respondents' perceptions of green product dimensions, electronic banking service quality, environmental concern, digital literacy and intention to adopt green banking. A survey design is suitable for examining associations among latent constructs measured through multiple indicators. Since the data were collected at one point in time, the design does not establish temporal order or causal effects.

3.2 Sample and data screening

The source manuscript reports 943 responses received. During screening, 147 responses were excluded, leaving 796 valid cases for analysis. The retained sample represents 84.41% of the responses received. The basis for excluding the 147 cases should be fully documented in the final submission—for example, incomplete questionnaires, ineligible respondents or data-quality concerns—using the actual screening records. This revision does not infer a specific reason for exclusion where it was not documented.

Sample processing	Number	Percentage
Responses received	943	100.00
Responses excluded	147	15.57
Final valid responses	796	84.41

The demographic profile reported in the source indicates that 407 respondents were male (51.13%), 385 were female (48.37%) and four preferred not to disclose gender (0.50%). The largest age category was 26–35 years, with 278 respondents (34.92%). Postgraduates represented 326 respondents (40.95%), while private-sector employees accounted for 249 respondents (31.28%). The most common monthly income category was ₹25,001–₹50,000, reported by 246 respondents (30.90%).

Characteristic	Reported category	Frequency	Percentage
Gender	Male	407	51.13
Gender	Female	385	48.37
Gender	Prefer not to say	4	0.50
Age	26–35 years	278	34.92
Education	Postgraduate	326	40.95
Occupation	Private-sector employee	249	31.28
Monthly income	₹25,001–₹50,000	246	30.90
Bank type	Public-sector bank	412	51.75
E-banking use	Daily	293	36.81
Primary device	Smartphone	618	77.64
Green banking awareness	Yes	484	60.80
Willingness to adopt	Willing	340	42.71

3.3 Construct operationalisation

The model uses five constructs in total: GPD, EBSQ, EC, DL and IAGB. GPD is measured through 11 indicators in the supplied study. EBSQ is represented through six dimensions—Availability, Contact, Design, Efficiency, Fulfilment and Security. EC and DL are included as direct predictors in the revised model. IAGB is the outcome construct measured through eight indicators. The exact questionnaire wording and response anchors should be reproduced in an appendix if available; they should not be reconstructed from construct names alone.

The EBSQ dimensions capture different parts of the electronic service experience. Availability and efficiency reflect access and task completion; design concerns the organisation and clarity of the interface; fulfilment reflects whether the service meets expectations; security concerns perceived protection; and contact concerns assistance or communication. Keeping these dimensions conceptually distinct helps banks identify service areas that may require improvement. The source reports that EBSQ was modelled as an overall construct using these dimensions.

3.4 Data analysis procedure

The source manuscript reports the use of SPSS and SmartPLS 4. The measurement assessment includes indicator loadings, Cronbach's alpha, rho_A, composite reliability and average variance extracted. The structural model is evaluated using path coefficients and bootstrapping-based significance tests. The present revision removes interaction terms from the conceptual framework and therefore requires the structural model to be re-estimated with only the four direct paths. Measurement-model values may be retained only if the measurement specification and indicators remain unchanged.

For the final reduced model, the analysis should proceed in stages. First, inspect missing data, response quality and descriptive statistics. Second, assess indicator reliability and internal consistency. Third, examine convergent and discriminant validity. Fourth, estimate the four direct structural paths and use bootstrapping to obtain standard errors, t-statistics, p-values and confidence intervals. Fifth, report collinearity diagnostics, explanatory power and predictive relevance for the reduced model. The structural results from a model containing interactions should not be presented as if they were recalculated for the direct-effects-only specification.

3.5 Ethical and reporting considerations

The manuscript should state how informed consent was obtained, whether participation was voluntary, how respondent confidentiality was protected and whether institutional ethical approval or an exemption applied. These details must reflect the actual study procedures. No approval number or consent procedure is invented in this revision. Transparent reporting is particularly important when survey responses concern customers' technology use and banking perceptions.

4. Results

4.1 Respondent profile

The sample includes respondents with varied demographic and banking-use characteristics. Slightly more than half of respondents were male, and the largest age group was 26–35 years. Postgraduates formed the largest reported education category, while private-sector employees were the largest occupational group. A majority of respondents used public-sector banks, and smartphones were the most frequently reported primary device. These descriptive figures provide context for interpreting the findings but should not be treated as evidence that the sample is representative of all banking customers.

The source also reports that 484 respondents (60.80%) were aware of green banking and 340 respondents (42.71%) reported willingness to adopt it. Awareness and willingness are distinct: awareness indicates recognition of the concept, while willingness reflects a stated readiness to act. The gap between these figures suggests that familiarity with green banking does not automatically translate into stated adoption willingness. The structural

analysis provides a further way to examine how product perceptions and electronic service quality relate to intention.

4.2 Measurement model assessment

The source reports acceptable internal consistency for the constructs presented. Cronbach's alpha values exceed 0.80 for the listed constructs, while composite reliability values range from 0.885 to 0.956. AVE values range from 0.599 to 0.751 for the constructs in the table, meeting the commonly used 0.50 guideline for convergent validity. These results indicate that the indicators share a sufficient proportion of variance with their respective constructs under the reported measurement specification.

Construct	Cronbach's alpha	rho_A	Composite reliability	AVE
Availability (AVL)	0.854	0.859	0.901	0.695
Contact (CON)	0.847	0.849	0.897	0.687
Design (DSN)	0.805	0.809	0.885	0.719
Efficiency (EFF)	0.906	0.912	0.926	0.640
Fulfilment (FUL)	0.861	0.866	0.906	0.706
Intention to Adopt Green Banking (IAGB)	0.905	0.909	0.924	0.602
Security	0.834	0.836	0.901	0.751
Digital Literacy (DL)	0.857	0.857	0.903	0.700
E-Banking Service Quality (EBSQ)	0.866	0.867	0.899	0.599
Environmental Concern (EC)	0.864	0.866	0.907	0.710
Green Product Dimensions (GPD)	0.950	0.952	0.956	0.666

The GPD indicator loadings reported in the source range from 0.720 to 0.856. A loading should be considered alongside the construct's reliability and validity rather than removed solely because it falls below a preferred threshold. The source manuscript notes that some indicators below 0.70 were retained after considering the overall measurement quality. The final paper should retain a clear record of any item deletion or retention decision and should avoid selectively reporting only favourable indicators.

4.3 EBSQ dimensions

Among the six EBSQ dimensions, Efficiency has the highest reported loading on the overall EBSQ construct (0.835). Fulfilment loads at 0.770, Security at 0.765, Availability at 0.763, Contact at 0.754 and Design at 0.753. The reported VIF values range from 1.137 to 1.365. These values do not indicate problematic collinearity among the dimensions under commonly applied guidelines.

EBSQ dimension	Loading on EBSQ	VIF
Availability	0.763	1.309
Contact	0.754	1.231
Design	0.753	1.212
Efficiency	0.835	1.365
Fulfilment	0.770	1.252
Security	0.765	1.137

The loading pattern suggests that all six dimensions contribute to the overall service-quality construct, with efficiency showing the strongest loading in the reported results. This does not mean that efficiency is the only important dimension. Customers may need services to be available, secure and fulfilled as expected, even if these dimensions have somewhat lower loadings. Loading values describe the measurement relationship, not the relative causal effect of each dimension on adoption intention.

4.4 Direct-effects hypothesis testing

The revised hypothesis set includes four direct relationships. The source output provides estimates for the two focal predictors and direct-path statistics for EC and DL. These values are reproduced below for transparency. The estimates for EC and DL were reported in a model that also contained interaction terms; they are therefore provisional evidence for the revised direct-effects paper and should be confirmed by re-estimating the reduced model.

Hypothesis	Relationship	Reported β	Reported t	Reported p	Interpretation
H1	GPD → IAGB	0.397	13.653	<0.001	Positive and significant; supported in supplied output
H2	EBSQ → IAGB	0.303	9.847	<0.001	Positive and significant; supported in supplied output
H3	EC → IAGB	−0.008	0.285	0.776	Not significant; not supported
H4	DL → IAGB	0.047	1.554	0.120	Not significant; not supported

4.4.1 H1: Green Product Dimensions and adoption intention

The reported GPD → IAGB coefficient is positive ($\beta = 0.397$), with $t = 13.653$ and $p < 0.001$. This provides strong statistical evidence of a positive association in the supplied model and supports H1 in that analysis. Respondents who evaluate green product dimensions more favourably tend to report stronger intention to adopt green banking. The result highlights the relevance of the product proposition: customers should be able to identify what makes a service environmentally oriented and understand how to use it.

4.4.2 H2: E-Banking Service Quality and adoption intention

The reported EBSQ → IAGB coefficient is positive (β = 0.303), with t = 9.847 and p < 0.001. This supports H2 in the supplied model. Better evaluations of electronic service quality are associated with stronger intention to adopt green banking. The finding is consistent with the practical importance of a digital channel that is accessible, efficient, secure and capable of delivering the expected service. A sustainability message is unlikely to be sufficient if the digital experience does not meet customers' basic expectations.

4.4.3 H3: Environmental Concern and adoption intention

The reported EC → IAGB coefficient is −0.008, with t = 0.285 and p = 0.776. The coefficient is very close to zero and is not statistically significant. H3 is therefore not supported by the supplied direct-path estimate. The result does not demonstrate that environmental concern has a negative effect; rather, the estimated relationship is negligible and statistically indistinguishable from zero in the reported model. The result should be checked after removing the interaction terms because the coefficients and their uncertainty can change when model specification changes.

4.4.4 H4: Digital Literacy and adoption intention

The reported DL → IAGB coefficient is positive (β = 0.047), with t = 1.554 and p = 0.120. This path is not statistically significant at the conventional 5% level, so H4 is not supported by the supplied estimate. The result suggests that digital literacy, considered as a direct predictor alongside the other constructs, does not show a sufficiently precise independent association with adoption intention in that model. It should not be interpreted as evidence that digital skills are unnecessary for safe or effective use of electronic banking.

5. Discussion

5.1 Green product attributes as a focal correlate of adoption intention

The reported positive relationship between GPD and IAGB indicates that consumers' evaluations of green banking product attributes are closely associated with their intention to adopt. Green banking initiatives can remain abstract to customers if banks communicate only broad sustainability statements. Consumers may need to understand the actual service features, how these features work and what practical value they offer. The observed association supports a customer-centred approach in which green attributes are explained in concrete terms.

This interpretation is consistent with research on green consumption, where perceived value and evaluations of environmentally oriented products have been examined as factors associated with purchase intention (Chen & Chang, 2012; Paul et al., 2016). The present study extends this general reasoning to the banking-service context. It does not establish that environmental benefits alone cause adoption; rather, the results show that more favourable perceptions of green product dimensions are associated with stronger stated intention in the supplied sample.

5.2 E-banking service quality remains important

The positive EBSQ coefficient highlights the service-delivery side of green banking. Consumers experience digital banking through a sequence of tasks: accessing the channel, navigating the interface, completing a transaction, receiving confirmation and obtaining help if a problem occurs. A weakness in any of these steps may affect confidence in the service. Banks therefore need to treat service quality as a continuing operational priority rather than a secondary feature of a green banking campaign.

The six dimensions provide a practical diagnostic structure. Availability concerns whether customers can access services when required. Design concerns clarity and ease of navigation. Efficiency concerns the effort and time needed to complete tasks. Fulfilment concerns whether the channel delivers the expected result. Security concerns

perceived protection of accounts and personal information. Contact concerns the availability of assistance. The model's overall EBSQ path does not establish separate causal effects for each dimension, so managers should not rank the dimensions by their effect on adoption without an additional structural analysis.

5.3 Environmental concern did not show a significant direct relationship

The non-significant EC path suggests that general environmental concern did not independently predict intention in the supplied estimate. This finding is compatible with the broader observation that environmental concern and actual behaviour are not always aligned. Consumers may care about environmental issues but prioritise convenience, familiarity, reliability and confidence when choosing how to conduct banking transactions. In addition, customers may not clearly connect routine digital banking features with measurable environmental outcomes.

The practical response should not be to dismiss environmental concern. Instead, banks can communicate environmental features accurately, avoid overstated claims and make the connection between the service and its intended environmental benefit understandable. However, the current statistical result does not justify claiming that such communication will increase adoption; that proposition would need to be tested. The immediate empirical conclusion is limited to the absence of a significant direct path in the supplied output.

5.4 Digital literacy did not show a significant direct relationship

The non-significant DL path suggests that digital literacy did not independently explain adoption intention in the supplied estimate. Several explanations are possible, but none can be confirmed without further evidence. The sample may include respondents who already have sufficient skills for common transactions, leaving limited variation in literacy relevant to intention. Alternatively, customers with different levels of digital skill may have similar intentions when they evaluate the product as useful and the channel as reliable. These are possible interpretations rather than tested mechanisms.

Digital literacy remains practically important for inclusion, safety and successful service use. A non-significant direct path should not be interpreted as a reason to reduce user support. Banks can continue to provide simple navigation, accessible language, clear security prompts and assistance for customers who need it. Future studies could examine specific literacy dimensions and actual use behaviour, but the present paper retains DL only as a direct predictor.

5.5 Integrated interpretation

The direct-effects framework separates product perceptions, service quality and two individual-level characteristics. The reported evidence is strongest for GPD and EBSQ. This pattern suggests that adoption intention in the sample is more closely associated with how customers evaluate the green banking offer and the quality of the electronic channel than with the two personal characteristics' direct paths in the supplied model. This conclusion should remain tied to the current sample and specification.

The findings also indicate that green banking adoption should not be treated solely as an environmental-attitude issue or solely as a technology issue. The product needs to communicate a credible green proposition, while the electronic channel needs to deliver a dependable service experience. Product communication and service operations should therefore be coordinated. This integrated interpretation follows directly from the two supported paths without invoking interaction effects.

6. Theoretical Implications

The study brings together product-related green perceptions and electronic service quality to explain intention to adopt green banking. The GPD relationship is consistent with the proposition that favourable evaluations of environmentally oriented products can be associated with behavioural intention. The EBSQ relationship is

consistent with electronic service-quality research, which treats online service delivery as an important aspect of customer evaluation (Parasuraman et al., 2005; Santos, 2003). In combination, the constructs capture the perceived offer and the delivery experience.

The non-significant direct paths from EC and DL add a useful boundary to the interpretation. Environmental concern and digital capability may be relevant in the broader literature, but their independent associations with a specific adoption intention cannot be assumed. In the supplied estimates, neither path is statistically significant. The revised model therefore avoids treating theoretical relevance as proof of an empirical effect. This distinction strengthens the paper's alignment between hypotheses and reported evidence.

The theoretical contribution is modest and context-specific. The study does not establish a new universal theory of green banking adoption. Instead, it provides sample-based evidence that product attributes and electronic service quality are associated with intention, while the direct paths for environmental concern and digital literacy are not supported in the supplied output. Re-estimation of the reduced model is necessary before making final claims about explanatory power or relative predictor importance.

7. Practical and Managerial Implications

7.1 Communicate green product features clearly

Banks should explain green banking features in concrete language. Customers should be able to identify which services are paperless, how digital statements can be accessed and how to manage preferences for electronic communication. Claims about environmental benefit should be accurate and proportionate to the evidence. Communication should distinguish a specific operational feature from a broad claim that a product is environmentally sustainable.

7.2 Improve the complete digital service journey

Service-quality improvement should cover the entire customer journey rather than one visible interface feature. Banks should monitor service availability, transaction completion, response time, ease of navigation, security communication and the accessibility of customer support. The significant EBSQ path suggests that customers' evaluation of the electronic service experience is associated with their intention to adopt green banking. The current model does not quantify the separate causal contribution of each EBSQ dimension, so further dimension-level analysis would be needed to prioritise investments statistically.

7.3 Make digital banking accessible without assuming uniform skill

Although the direct DL path was not significant, banks should not assume that all customers have the same digital capabilities. Plain-language instructions, readable interfaces, guided onboarding and accessible support can reduce avoidable difficulty. Security education should help customers distinguish legitimate bank communication from suspicious requests. Such measures are justified by the need for safe and inclusive banking services, not by a claim that the present model found a significant direct effect of literacy.

7.4 Evaluate awareness and adoption separately

The descriptive results show that 60.80% of respondents reported awareness of green banking, whereas 42.71% reported willingness to adopt. Banks should therefore measure awareness, stated intention, actual enrolment and sustained use as separate outcomes. Awareness campaigns can be evaluated for whether they improve understanding; adoption campaigns can be assessed for whether customers activate and continue using the relevant services. This approach avoids treating campaign reach as equivalent to behavioural change.

7.5 Use evidence-led sustainability communication

Green banking communication should avoid implying that every digital transaction automatically produces a net environmental benefit. Banks can describe the specific operational change, such as reducing paper statements, and provide transparent explanations of what is known. Clear claims can support trust and prevent environmental messaging from becoming a source of scepticism. The study's GPD result supports the importance of customers' evaluation of green product attributes, while the actual impact of particular communication strategies remains an empirical question for future testing.

8. Conclusion

This study examines consumer intention to adopt green banking through a direct-effects framework involving Green Product Dimensions, E-Banking Service Quality, Environmental Concern and Digital Literacy. The analysis is based on 796 valid survey responses. In the supplied estimates, GPD is positively and significantly associated with IAGB ($\beta = 0.397$, $t = 13.653$, $p < 0.001$), and EBSQ is also positively and significantly associated with IAGB ($\beta = 0.303$, $t = 9.847$, $p < 0.001$). The reported direct paths from EC and DL are not statistically significant.

The findings suggest that consumers' evaluations of the green banking offer and the electronic service experience are important correlates of adoption intention in this sample. Environmental concern and digital literacy should not be described as significant direct predictors on the basis of the available output. The revised paper removes all moderation hypotheses and interaction paths. It does not retain interaction-based model-fit or explanatory statistics as results for the reduced model.

A final technical step is essential: the direct-effects-only model must be rerun in SmartPLS. The resulting path coefficients, bootstrapped confidence intervals, R^2, adjusted R^2, f^2, predictive-relevance measures and fit indices should replace any values inherited from the original model. Subject to that re-estimation, the paper provides a focused account of the relationships between green product perceptions, electronic service quality and intention to adopt green banking.

9. Limitations and Future Research

The study has several limitations. First, the cross-sectional design captures perceptions at one point in time and does not establish causality. Second, the outcome is stated intention rather than observed use. Future studies could follow customers over time or compare stated intention with enrolment and transaction records, subject to appropriate consent and data protection. Third, the survey relies on self-reported responses, which may be affected by recall, social desirability or common method influences.

Fourth, the sample characteristics limit the extent to which findings can be generalised to all banking customers or regions. Replication across different states, bank types, age groups and levels of digital access would help assess the stability of the relationships. Fifth, the available manuscript does not provide the full questionnaire wording, the complete discriminant-validity output or a detailed account of data screening. These should be included in the final submission where available.

Sixth, because the present revision removes interaction terms, the reduced structural model requires fresh estimation. Future reports should not rely on R^2 or predictive statistics from a different specification. Researchers could also compare alternative direct-effects models using theory-driven criteria and report the measurement and structural assessments transparently. Any extension should be justified by the research question and supported by appropriate data rather than added solely to increase model complexity.

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