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Article

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Analyzing CSR and customer engagement through green banking digitalization: with the mediating effect of perceived environmental value and moderation effect of customer's eco-consciousness

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ABSTRACT

In today's increasingly homogenized banking sector, maintaining consumer loyalty, particularly in terms of environmentally conscious practices, presents a significant challenge for institutions globally. While research recognizes corporate social responsibility (CSR) as a potential strategy for enhancing consumer loyalty, its specific impact on green consumer loyalty remains underexplored. This study investigates the relationship between CSR, customer engagement, and green consumer loyalty, with a focus on the banking industry in Pakistan. Additionally, it explores the mediating role of perceived environmental value and the moderating effect of customer eco-consciousness, within the context of green banking digitalization. Structural equation modeling is employed for data analysis. Findings reveal that CSR positively influences consumer loyalty, with customer engagement partially mediating this relationship. Moreover, perceived environmental value mediates the association between CSR and green consumer loyalty, while customer eco-consciousness moderates this relationship. This research provides valuable insights for banking institutions seeking to strategically integrate CSR initiatives, customer engagement, and green banking digitalization to enhance consumer loyalty and environmental sustainability.

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Corporate Social Responsibility; Customer Relationship Management (CRM); Internet/Digital Marketing/e-Marketing

1. Introduction

In an era characterized by heightened environmental awareness, businesses face an increasing demand to integrate sustainability into their core operations. This imperative is particularly pronounced in the banking sector, where institutions are not only expected to provide financial services but also demonstrate a commitment to corporate social responsibility (CSR) and environmental stewardship. The convergence of these dynamics has given rise to a multifaceted research domain, exploring the intricate interplay between CSR, customer engagement, green banking digitalization, perceived environmental value (PEV), and customer eco-consciousness.

The concept of corporate social responsibility (CSR) encompasses various dimensions, including environmental sustainability, employee relations, and targeted marketing, reflecting an organization's long-term impact on society (Latif et al., 2020). However, sustainability itself is subject to diverse interpretations, lacking a universally rigorous definition. Despite this, sustainability's significance lies in its adaptability to different contexts and interpretations.

Consumers increasingly evaluate companies based on their CSR initiatives when making purchasing decisions (Chu et al., 2020). Many companies voluntarily embrace CSR, recognizing its potential to foster

loyalty, identification, and improved procurement processes. However, while consumer concern for environmental practices and ethical standards has grown, this hasn't consistently translated into increased commercial success for sustainable products, indicating a disparity between consumer expectations and purchasing behavior (Bianchi et al., 2019).

This gap, referred to as the sustainability-consumer behavior gap, underscores the importance of a collaborative partnership between consumers and companies to develop environmentally friendly products. Consumers respond differently to CSR initiatives, with a clear understanding of company efforts being crucial for fostering positive attitudes (Glaveli, 2021). CSR initiatives influence consumer evaluations of companies and products, directly impacting consumer preferences and loyalty.

Green banking initiatives (Chen, 2022) aimed at promoting environmentally friendly practices within banking operations, have become increasingly prevalent. These initiatives, which include digitalization efforts to minimize environmental footprints, align with consumer preferences for sustainability (Xie et al., 2015). The transition to sustainability is reshaping banking practices, with banks playing an active role in economic and social sustainability. CSR reports showcase banks' commitments to social and environmental responsibility, highlighting their efforts in green banking and digitalization (Sun et al., 2020). The banking sector, having heavily invested in CSR post-2008 financial crisis, faces pressure to demonstrate efforts toward environmental preservation. Green banking initiatives can enhance consumer satisfaction and loyalty, aligning with the growing trend towards sustainability (Ettinger, 2021).

This study examines the relationship between CSR, customer engagement, and green banking digitalization in Pakistan's banking industry. Specifically, it explores the mediating role of perceived environmental value and the moderating effect of customer eco-consciousness. By employing a moderated mediation approach, this research seeks to offer insights into how banking institutions can strategically integrate CSR, customer engagement, and green banking digitalization to enhance consumer loyalty and environmental sustainability.

Previous research has explored the links between CSR, customer engagement, and sustainability, but there is a notable paucity of studies that explicitly focus on the impact of digitalization on these dimensions within the context of green banking practices (Luthra & Garg, 2021; Salminen et al., 2019). Moreover, limited research exists on the mediating effect of perceived environmental value, a crucial variable in understanding the mechanisms through which green banking digitalization affects customer engagement (Melillo & Mannarino, 2020).

This study also addresses the dearth of research within Pakistan's banking sector, considering its unique cultural and economic context. Incorporating studies conducted within this specific context is crucial for obtaining a comprehensive understanding of how green banking digitalization influences customer engagement and sustainability-driven behaviors in the country (Ahmed & Khan, 2019; Yasin et al., 2020).

Furthermore, the moderating effect of customer's eco-consciousness in the relationship between green banking digitalization and customer engagement remains understudied. This effect is particularly relevant in the context of Pakistan, where there is a growing awareness of environmental concerns among consumers (Akhtar & Hussain, 2018).

Therefore, the objectives of this research proposal are to examine the relationship between CSR initiatives and customer engagement in the context of green banking digitalization, explore the mediating effect of perceived environmental value, investigate the moderating effect of customer's eco-consciousness, and provide recommendations for banks to enhance their green banking strategies and improve customer engagement. This study endeavors to contribute novel insights into the transformative impact of digitalization on sustainability-focused banking practices, offering valuable recommendations for banks in their pursuit of effective green banking strategies informed by customer engagement and eco-consciousness considerations.

2. Literature review

Corporate Social Responsibility (CSR) has evolved from a mere business practice into a strategic imperative for organizations seeking to enhance their reputation, engage customers, and contribute to sustainable development (Carroll & Shabana, 2010). This transformation reflects a growing awareness that

businesses play a crucial role in addressing societal and environmental challenges. In recent years, the integration of CSR principles with digitalization in the banking sector, often referred to as 'Green Banking', has gained prominence. Green Banking entails the use of digital technologies to facilitate environmentally responsible banking operations and communication of sustainability efforts (Hassan, 2018). This literature review aims to explore the intricate interplay between CSR, customer engagement, green banking digitalization, perceived environmental value, and customer eco-consciousness.

2.1 Corporate Social Responsibility (CSR) and customer engagement

CSR encompasses the interaction between business and society, where enterprises benefit from societal goodwill and, in return, owe certain obligations to society (Lacey et al., 2015). Initially defined by Carroll as consisting of economic, legal, ethical, and philanthropic responsibilities, subsequent studies have expanded upon these domains to include various areas such as social and cultural issues, employee welfare, the environment, diversity, and product safety. This study adopts a social viewpoint, defining CSR as a company's efforts and reputation concerning its perceived societal or stakeholder commitments (Xie et al., 2015). In this context, CSR activities refer to the extent to which customers perceive a company's support for initiatives driven by charitable motives.

Customer engagement has emerged as a critical concept in contemporary marketing literature, serving as a means to foster consumer value and understand modern marketing practices (Zainol et al., 2016). Scholars recognize that customer engagement enhances performance and provides businesses with a genuine competitive advantage (Brodie et al., 2011). Consequently, practitioners strive to cultivate relationships and establish connections with customers through their actions. Strong customer-company relationships are manifested in engagement, where engaged customers maintain robust connections with businesses that become integral to their lives. Customer engagement is understood as the outward expression of behaviors that extend beyond mere financial transactions. While scholars often adopt a multidimensional perspective, defining customer engagement as a psychological state with cognitive, affective, and behavioral dimensions.

Extensive research underscores the profound impact of CSR initiatives on customer engagement, shedding light on the intricate relationship between businesses and their clientele. Companies that are perceived as socially responsible tend to attract and retain customers who share similar values (Bhattacharya & Sen, 2004). This alignment of values creates a resonance that extends beyond mere transactions, fostering deeper and more enduring relationships. CSR engagement encompasses a spectrum of actions, including commitments to environmental sustainability, ethical business practices, and philanthropy (Maignan & Ferrell, 2004). Research by Sen and Bhattacharya (2001) reveals that CSR activities not only positively correlate with customer loyalty but also engender trust and commitment, which are corner stones of sustained customer engagement.

H1: There is a positive relationship between a bank's CSR initiatives and customer engagement levels.

H2: Customers who perceive a bank as socially and environmentally responsible are more likely to engage with the bank.

2.2. Green banking digitalization

The banking sector's digital transformation has not only revolutionized the way financial services are delivered but has also paved the way for a new paradigm known as green banking. In the era of green banking, digitalization is harnessed as a powerful tool to reduce environmental footprints. This innovative approach encompasses various strategies, such as paperless transactions, remote banking services, and the development of eco-friendly financial products (KPMG, 2018). In essence, green banking represents a convergence of technological advancement and sustainability goals, where financial institutions leverage digitalization to align with environmental stewardship. Studies in this domain suggest that green banking initiatives have the potential to enhance an organization's reputation, customer loyalty, and overall sustainability performance (Agrawal & Bhatia, 2019). Several studies have explored the challenges

and prospects associated with promoting green banking initiatives and their impact on banks' environmental performance. Dipika (2015) examined the challenges faced by banks in advancing green banking practices and highlighted future prospects in this area. Yadwinder (2015) found that while efforts are underway to implement green banking facilities, a significant portion of the population remains hesitant or indifferent to utilizing them. Dhamanyanthi & Teresa (2018) identified factors influencing the implementation of green banking in Malaysia and emphasized the need for Malaysian banks to take more proactive measures in their policies to foster green banking practices.

Previous research has also investigated the effects of green banking on banks' environmental performance. Risal and Joshi (2018) analyzed the impact of green banking on the environmental performance of banks in Nepal, suggesting the necessity for banks to undertake further initiatives to enhance the success and productivity of green banking operations. Vidyakala (2020) examined the influence of environmental practices, such as training and energy-efficient measures, on the daily functions of green banking, emphasizing the importance of raising awareness among the general public about green banking services. Sharma and Choubey (2022) developed a conceptual model to understand the impact of green banking initiatives on banks' environmental performance.

Porter and van der Linde (1995) assert that appropriate environmental regulations can drive innovation within organizations, thereby enhancing their competitiveness and performance. This idea is supported by Lin and Yang (2011) and Ma et al. (2016). Green innovation within organizations has been shown to lead to competitive advantage and contribute to shaping the organization's image, as highlighted by Chen (2022), and Kam-Sing Wong (2012). Increased organizational performance has been observed through various forms of innovation, including organizational innovation, green product innovation, and adoption of green practices (Lin & Chang, 2012; Mitra & Datta, 2014; Tachizawa et al., 2015; Vanalle et al., 2017). These findings align with strategic business theories suggesting that innovation leads to improved firm performance (Teece et al., 1997).

Green practices encompass both product-related practices, such as using eco-friendly materials and reducing resource consumption, and process-related environmental practices, like emission controls and adoption of clean technology (González-Benito & González-Benito, 2005). Research by Chu et al. (2020), drawing on resource-based theory, indicates that performance is directly and indirectly influenced by eco-innovation, including process, product, and organizational innovations.

Moreover, several studies have demonstrated a positive relationship between green practices and firm performance across various industries, including container terminal operations, automobile manufacturing, wine production, and manufacturing firms (Atzeni & Carboni, 2019; Leenders & Chandra, 2013; Lin & Chang, 2012). Meta-analyses have further confirmed this positive relationship (Geng et al., 2017; Golcic & Smith, 2013).

Given the importance of green practices in driving performance, it is proposed to examine their relationship with operational, market, cost, and environmental performance within the context of green banking digitalization. However, it is acknowledged that contradictory results have been reported, with some studies showing a negative relationship between green practices and certain performance metrics (Eltayeb et al., 2011; Green et al., 2012; Zhu & Sarkis, 2007), and others finding no impact on operational performance (Perotti et al., 2012). Therefore, further investigation is warranted to understand the nuanced relationship between green practices and performance within the context of green banking digitalization.

H3: The adoption of green banking digitalization positively affects customer engagement with a bank.

H4: Green banking digitalization positively influences customers' perceptions of a bank's environmental responsibility.

2.3. Perceived Environmental Value (PEV)

Central to the nexus of CSR, customer engagement, and green banking is the concept of Perceived Environmental Value (PEV). PEV is a multifaceted construct representing customers' beliefs, attitudes, and perceptions regarding environmental issues and their assessment of a company's commitment to environmental responsibility (Peattie, 2001). This mediating variable has been a focal point of inquiry, as it is instrumental in bridging the gap between CSR initiatives and customer responses. The literature demonstrates that PEV plays a

pivotal role in mediating (Vlachos et al., 2009). Customers who perceive a company as genuinely committed to environmental responsibility are more likely to engage with and support that company, making PEV a critical factor in shaping customer behaviors and attitudes (Lin & Chang, 2012).

Researchers have found that pro-environmental priming (Trivedi et al., 2021), environmentally responsible strategies, and the introduction of green products (Jabbour et al., 2015) encourage environmentally friendly behavior. Additionally, Leadership in Energy and Environmental Design (LEED) branding in buildings (Khashe et al., 2015) has been shown to promote eco-conscious actions. The positive relationship between proactive measures, including product-process innovation and performance through environmental practices, has been confirmed (Christmann, 2000). Babiak and Trendafilova (2011) have examined how sustainable practices as a component of CSR initiatives can result in pro-environmental behavior. Though green practices were covered to some extent in sustainable practices, the strength of the relationship between the two constructs exclusively needs investigation. The review highlights limited research has been done in the organizational context focusing on the pro-environmental behavior (PEB) of employees at the workplace.

Karassin and Bar-Haim (2016) proposed a multilevel model to determine the factors affecting corporate environmental responsibility (CER). They defined corporate environmental responsibility as a measure of CSR. They found that institutional-level variables, such as regulatory power, have a relationship with CER, while organizational-level variables, such as culture, attitude, and behavior, have a strong and positive relationship with CER. Previous studies have examined how and when employees' perceived CSR affects voluntary pro-environmental behavior (PEB) through employee engagement in hotels. Blok et al. (2015), using the premise of planned behavior theory, examined the PEB of university employees with external factors, namely leadership support and behavior of leaders. PEB was analyzed in terms of how university employees behave when they use computers, heating and lighting facilities, printing and copying documents, and whether they recycle items which have utility value. They found a significant positive relationship between leadership support and employees' PEB at work.

The review also indicated that there is a research gap existing on how voluntary measures bring about environmental change (Bansal & Roth, 2000). In this context, based on Blok et al. (2015) and Wesselink et al. (2017) research, it is argued whether voluntary measures undertaken at the organizational level, such as CSR activities, have a relation with employees' PEB at work. Saeed et al. (2019) examined how green human resource management practices result in employee's pro-environmental behavior through pro-environmental psychological capital. In Canadian manufacturing plants, the mediating role of environmental practices itself has been empirically determined between lean supply management and environmental performance (Hajmohammad et al., 2013), while a few studies have carried out a mediation analysis between internal and external green supply chain management practices with economic, environmental, and operational performance.

Researchers (Babiak & Trendafilova, 2011) have examined green practices as a component of CSR to influence employees' PEB at the workplace. Considering this, and if the hypotheses H5 and H6 were found to be significantly related, then it is proposed to examine the relationship between CSR and customer engagement through green banking digitalization with the mediating effect of perceived environmental value (PEV) and the moderation effect of customer's eco-consciousness.

H5: Perceived Environmental Value (PEV) mediates the relationship between a bank's CSR initiatives and customer engagement.

H6: Perceived Environmental Value (PEV) mediates the relationship between green banking digitalization and customer engagement.

2.4. Moderation effect of customer's eco-consciousness

One of the primary prerequisites for environmental protection within the banking sector is environmental awareness, denoting employees' understanding of the regulations and policies concerning environmental sustainability. Effective planning and implementation of these policies hinge upon environmental awareness (Kokkinen, 2013). Despite the adoption of green practices, there's been a

challenge in translating them into tangible greening behavior or reputation. Gadenne et al. (2009) noted that despite employees' green attitudes, the actual implementation of climate-friendly practices remained low, emphasizing the pivotal role of environmental awareness in driving greening actions within organizations. Recent studies further support this notion, with Arocena and Sutz (2021) uncovering the moderating influence of environmental awareness on the relationship between ISO standardization and firms' environmental performance. Cao and Chen (2019) explored the moderation effect of environmental awareness and found that green innovation policies are more effective when environmental awareness is heightened. Similarly, Khan et al. (2022) investigated the moderating role of environmental awareness in the hospitality industry, concluding that it enhances employees' commitment to sustainable development. Rustam et al. (2020) delved into the moderating effect of environmental awareness, highlighting its significant impact on environmental disclosure and customers' eco-friendly consumption behavior.

Customer eco-consciousness, an intrinsic attribute of individuals, emerges as a significant moderator in the complex interplay between CSR, customer engagement, and environmental responsibility. Eco-conscious customers represent a distinctive segment of the market that is acutely attuned to environmental issues and sustainability concerns (Kotler, 2011). This heightened eco-consciousness prompts them to scrutinize a company's CSR efforts, evaluating their alignment with personal values and sustainability aspirations (Thøgersen, 2010). Consequently, customer eco-consciousness amplifies the impact of CSR on customer engagement. It fosters a dynamic where businesses that earnestly commit to sustainability efforts are likely to garner greater engagement and support from environmentally conscious consumers. In essence, customer eco-consciousness serves as a magnifying lens through which the effects of CSR on customer engagement are intensified.

H7: Customer eco-consciousness moderates the relationship between a bank's CSR initiatives and customer engagement, such that the relationship is stronger for eco-conscious customers.

H8: Customer eco-consciousness moderates the relationship between green banking digitalization and customer engagement, amplifying the effect for eco-conscious customers.

In summation, the intricate interplay between CSR, customer engagement, green banking digitalization, perceived environmental value, and customer eco-consciousness underscores the evolving landscape of corporate sustainability in the banking sector. CSR initiatives not only positively influence customer engagement but also serve as catalysts for the integration of sustainability principles into digital banking operations. This integration, known as green banking, is a manifestation of the industry's commitment to environmental stewardship through the application of digital technologies. Perceived Environmental Value (PEV) mediates the relationship between CSR and customer engagement, reinforcing the importance of customers' perceptions of environmental responsibility in shaping their behaviors and attitudes. Furthermore, customer eco-consciousness emerges as a powerful moderator, accentuating the impact of CSR on customer engagement. In essence, these multifaceted relationships emphasize the strategic importance of considering these factors collectively in the pursuit of sustainable banking practices and a greener future.

3. Research model

This study aims to enhance the theoretical framework by offering more precise definitions and operationalizations of the key concepts: Corporate Social Responsibility (CSR), customer engagement, and green banking digitalization.

3.1. Corporate Social Responsibility (CSR)

In the context of this research, CSR refers to a company's commitment to ethical, social, and environmental responsibilities, encompassing initiatives that contribute positively to society and the environment. CSR actions will be operationalized by identifying specific programs, practices, and policies undertaken by organizations, ensuring a comprehensive understanding of CSR's dimensions.

3.2. Green banking digitalization

Green Banking Digitalization is characterized by the integration of digital technologies and sustainable practices within banking operations to minimize environmental impact and promote ecological sustainability. Operationalization will involve detailing the digital initiatives, technologies, and sustainable practices adopted by banks to align with environmental goals.

3.3. Customer engagement

For the purposes of this research, customer engagement refers to the depth and quality of the relationship between customers and a bank, encompassing interactions through digital channels, feedback mechanisms, and other relevant touch points. Operationalization will entail identifying measurable indicators or actions that reflect the degree of engagement, considering both online and offline interactions.

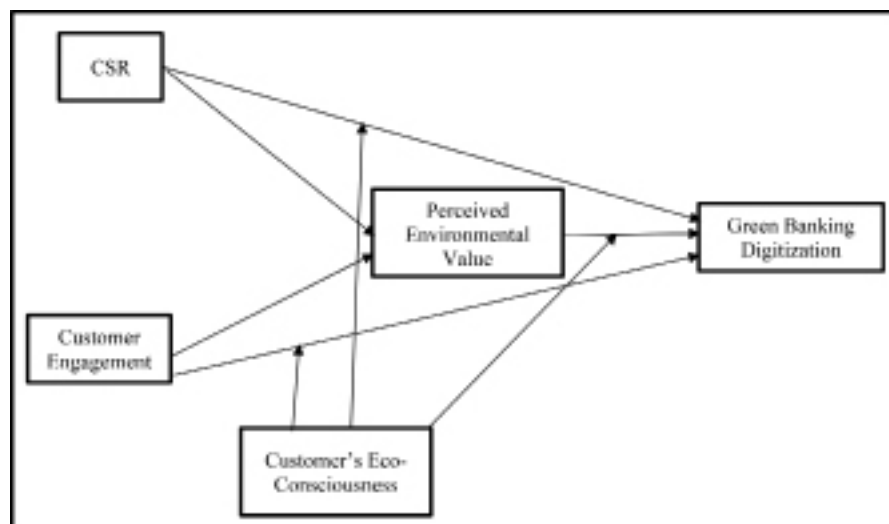
The proposed model posits CSR as the independent variable influencing Green Banking Digitalization, subsequently impacting Customer Engagement. It is essential to precisely define the causal relationships and mechanisms through which these variables interact.

3.4. Perceived environmental value (mediating effect)

Perceived Environmental Value represents customers' perceptions of a bank's environmental responsibility and the positive environmental impact resulting from its green banking initiatives. Operationalization will involve identifying perceptual factors that customers associate with environmentally responsible banking practices.

3.5. Customer's eco-consciousness (moderating effect)

Customer's Eco-Consciousness is defined as the degree to which customers are environmentally aware, conscious of sustainability, and prioritize eco-friendly considerations in their decision-making. Operationalization will entail identifying specific attitudes, beliefs, or behaviors that reflect a customer's environmental consciousness.



In this research model, CSR (Corporate Social Responsibility) serves as the independent variable. Green Banking Digitalization is the intermediary variable, affected by CSR, and in turn influencing Customer Engagement. The mediating effect of Perceived Environmental Value is captured between Green Banking Digitalization and Customer Engagement. Additionally, Customer's Eco-Consciousness moderates the relationship between Green Banking Digitalization and Customer Engagement. This model aims to explore

how CSR influences Customer Engagement through the pathway of Green Banking Digitalization, taking into account the mediating effect of Perceived Environmental Value and the moderating effect of Customer's Eco-Consciousness.

4. Methodology

This study exclusively adopts a quantitative research approach to investigate the intricate relationships among CSR, customer engagement, and green banking digitalization, considering the mediating role of perceived environmental value and the moderating effect of customer's eco-consciousness.

4.1. Data collection

A comprehensive data collection strategy was employed, focusing on primary data from customers of selected banks. The design of a structured survey questionnaire facilitated the measurement of key variables, including CSR initiatives, perceived environmental value, customer engagement, and customer eco-consciousness. The deployment of an online survey platform ensured accessibility to a broad and diverse sample.

4.2. Sampling

A meticulous stratified random sampling technique was applied to ensure the selection of respondents from diverse demographic groups, thereby guaranteeing representation across various customer segments. The determination of the sample size involved a rigorous application of statistical techniques, including power analysis, to enhance the reliability and generalizability of the study's findings.

4.3. Data analysis

The data analysis process incorporated advanced statistical techniques, notably structural equation modeling (SEM). The rationale behind choosing Structural Equation Modeling (SEM) as the primary analytical tool warrants further elaboration. SEM allows for the simultaneous examination of complex relationships between multiple variables, making it particularly suitable for our research questions. This method enables the modeling of latent constructs and the assessment of both direct and indirect effects in a single analytical framework. Structural Equation Modeling offers advantages such as the ability to analyze complex relationships, test theoretical models, and explore both measurement and structural models simultaneously. These features align with the nuanced nature of our research, where we seek to understand the interplay among CSR, customer engagement, green banking digitalization, perceived environmental value, and customer eco-consciousness.

Mediation analysis, focusing on the mediating role of perceived environmental value, will be assessed using Sobel tests. Moderation effects, examining the influence of customer eco-consciousness, will be analyzed using Hayes' PROCESS macro, allowing for a thorough exploration of moderation effects within the proposed model.

By employing these advanced statistical techniques, our study aims to provide a robust and comprehensive understanding of the relationships under investigation. The use of SEM allows for a nuanced examination of the proposed hypotheses and contributes to the methodological rigor of

Table 1. Mean, Skewness and Kurtosis.

Variables	Mean	St. Deviation	Skewness	Kurtosis
CEC	4.0089	.83579	−1.272	1.134
PEV	3.7800	.85408	−.673	−.182
GBD	4.0093	.73602	−1.193	1.340
CSR	3.8471	.66388	−.723	−.059
CE	3.7075	.83410	−.644	−.333

our research. This choice aligns with the complexity of our study objectives, ensuring a thorough analysis of the interrelated variables in the context of CSR, customer engagement, and green banking digitalization.

5. Results

We learned about gender, marital status, educational background, employment status, income, and work experience during the demographic assessment. Data was collected from various service sectors in Pakistan for this investigation, and we used SPSS to compute the frequencies and percentages for gender, marital status, qualifications, employment status, income, and work experience. The study included 300 participants, including 122 females and 178 males. The majority of respondents are from the younger generation, and many have extensive work experience. Furthermore, the organizations involved in this study have a long track record of success (Table 1).

The table above depicts the data's normal distribution. Bulmer proposed a rule of thumb for assessing skewness in 1979, stating that its value should be between +1 and -1. Similarly, Mac Gillivray and Balandan developed a kurtosis scale, indicating that its value should be between +3 and -3. All the values are within the prescribed range.

5.1. Test of multicollinearity

There is no multicollinearity problem if the Value of Variance Inflation Factor (VIF) is less than five, as a general rule. If the VIF value is between 5 and 10, there is a mild multicollinearity problem, and if the VIF value is equal to or greater than 10, there is an extreme multicollinearity problem (Table 2).

Sr.#	Variables	Tolerance	VIF
1	CEC	0.241	1.324
2	PEV	0.328	1.292
3	CSR	0.239	2.523
4	CE	0.312	2.315

A reliability analysis is essential for determining the dependability of both the instrument and the questionnaire items. It is a necessary step before performing various tests because it allows for the identification and potential exclusion of items that may cause disruptions. The widely accepted guideline for determining instrument reliability is that a Cronbach's alpha value of 0.7 or higher is considered good, 0.8 or higher is even better, and 0.9 or higher is excellent. The above table shows the values of the composite reliability which is determined with the help of the AVE (average variance extracted). All the values are within the prescribe threshold which is above the value of 0.50.

A value of +1 represents a perfectly positive association, -1 represents a perfectly negative association, and 0 represents no relationship between the two variables. To assess the strength of relationships, two types of correlation coefficients are used: Pearson and Spearman. When dealing with interval and ordinal scales, Pearson and Spearman's correlation coefficients are appropriate for assessing the relationship between independent and dependent variables (Zou et al., 2003). All variables have positive correlations, and the correlation values are shown in the table below (Table 3).

The above table clearly shows the values of the discriminant validity. These values are with the prescribed threshold that is 0.90 and that the values of the tables in the rows and columns should be less than the 0.90.

Table 2. Reliability analysis.

Variable	Cronbach alpha	No of items	AVE
CEC	0.748	03	0.567
PEV	0.710	04	0.598
GBD	0.814	05	0.612
CSR	0.793	08	0.602
CE	0.758	04	0.589
Over all reliability	0.918	24	0.650

Table 3. Correlation analysis.

Item	CEC	PEV	GBD	CSR	CE
CEC	1				
PEV	.565**	1			
GBD	.536**	.535**	1		
CSR	.670**	.619**	.577**	1	
CE	.553**	.511**	.489**	.671**	1

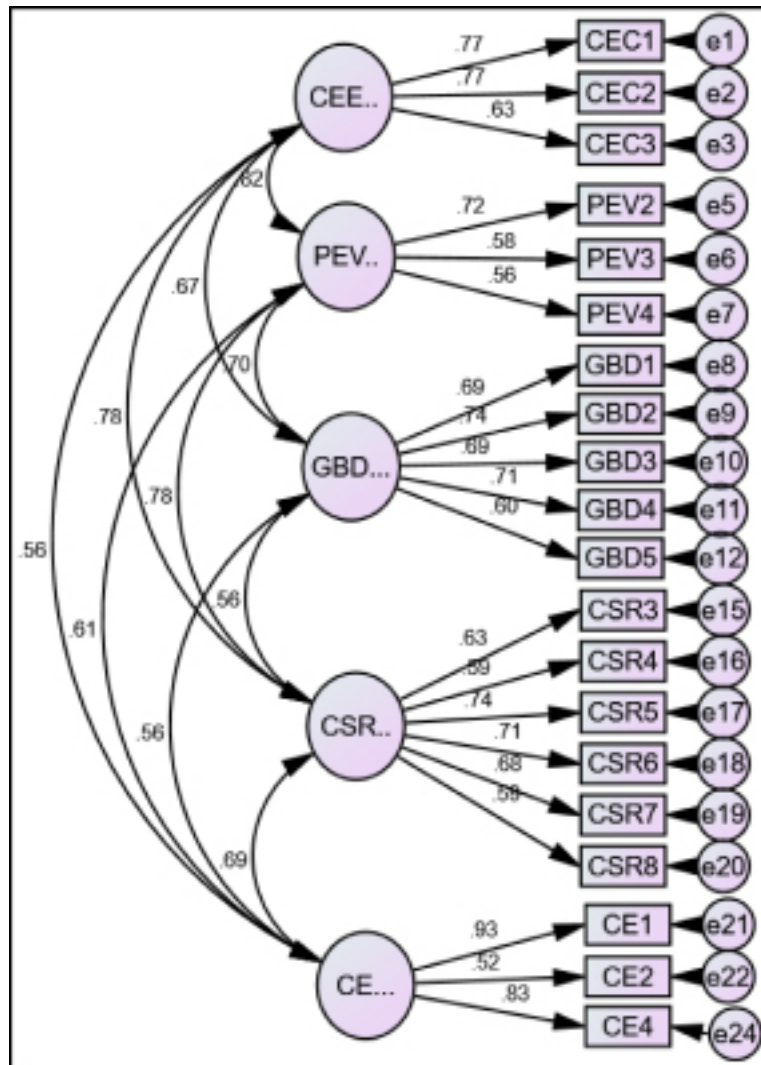
**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

5.2. Common method variance

There are different methods to identify the common method issue. For the current study, Harman's single factor test applied to the overall sample. The presence of common method bias identifies in the study if one factor explains more than 50% variance. The result of Harman's single factor test for the current study shows that 25.151% variance explains by one factor with eigenvalue more than one. It means that the value of one factor was not crossing the threshold level in the present study. So, there was no CMB issue identity in the current study.

5.3. Measurement model (Table 6)



SEM (Structural Equation Modelling) is used to investigate relationships by presenting data and underlying assumptions. It is used for both exploratory and confirmatory models, and it aids in the analysis of

Table 4. Discriminant validity (HTMT) Hetro-Trait Mono-Trait Method.

Item	CEC	PEV	GBD	CSR	CE
CEC	.665**				
PEV	.565**	.678**			
GBD	.536**	.535**	.465**		
CSR	.670**	.619**	.577**	.576**	
CE	.553**	.511**	.489**	.671**	.602**

Table 5. Initial eigenvalues & squared loadings.

Component	Initial Eigenvalues			Extraction sums of squared loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	11.568	36.151	25.151	10.568	20.151	25.151
2	2.61	8.157	24.308			
3	1.617	5.054	23.363			
4	1.421	4.441	44.803			
5	1.259	3.935	37.738			
6	1.088	3.401	51.139			
7	0.996	3.113	56.253			
8	0.909	2.841	60.094			
9	0.867	2.709	67.803			
10	0.808	2.524	75.326			
11			

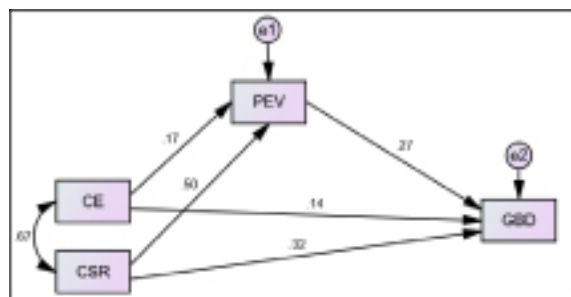
Extraction Method: Principal Component Analysis.

Table 6. Fitness Summarys.

Model	Hypothesized	Thresholds
CMIN/DF	2.594	< 3
RMR	0.073	Closer to 0
GFI	0.877	≥ 0.9
AGFI	0.850	≥ 0.8
CFI	0.899	≥ 0.9
RMSEA	0.073	< 0.08

latent variables. SEM includes a variety of techniques such as factor analysis, path analysis, and regression. Confirmatory Factor Analysis (CFA) combines elements of multiple regression analysis and factor analysis. In this study, we used AMOS 26 to evaluate the model and its measurements. Confirmatory Factor Analysis (CFA) was used in this study, and graphical representations of individual factors were created using AMOS 26. Following the establishment of CFA, the next step is to assess the model's overall fit. To assess model fitness, several criteria must be considered, including the Comparative Fit Index (CFI), which should range from 0 to 1. All the values are within the prescribed threshold.

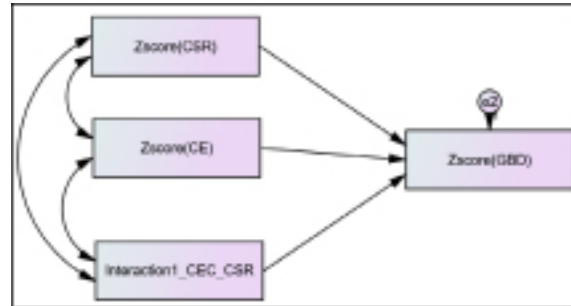
5.4. Mediation analysis



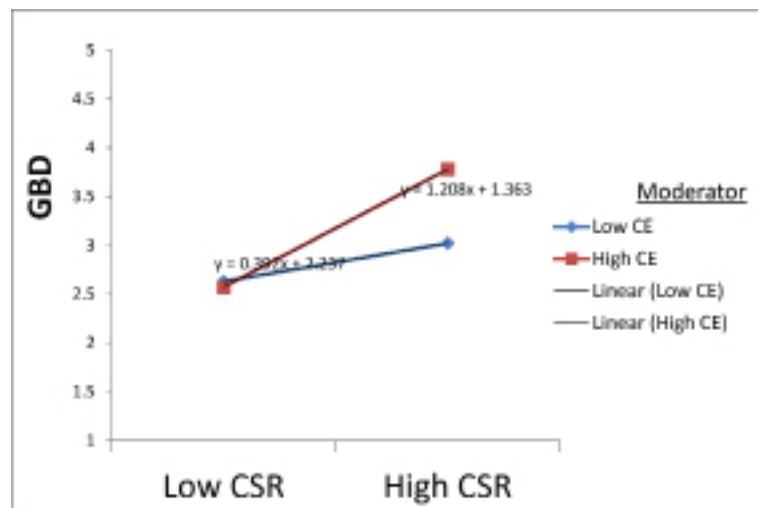
Hypothesis	Dβ W/O Med	Dβ with Med	Iβ	Med. Type
CE→PEV→GBD	$\beta = 0.455$ $p = 0.001$	$\beta = 0.319$ $p = 0.001$	$\beta = 0.134$ $p = 0.001$	Partial Mediation
CSR→PEV→GBD	$\beta = 0.185$ $p = 0.001$	$\beta = 0.138$ $p = 0.001$	$\beta = 0.043$ $p = 0.001$	Partial Mediation

The above table clearly shows the results of the mediating relationship between variables. The PEV partially mediates the relationship between CE and GBD with indirect $\beta=0.134$ and $p=0.001$. The PEV also partially mediates the relationship between CSR and GBD with indirect $\beta=0.043$ and $p=0.001$. The partial mediation means that the direct relationship between the CE, CSR, and GBD is significant in the presence of the PEV.

5.5. Moderation analysis



The graph depicts the moderating effect of Corporate Social Responsibility (CSR) as the independent variable (IV) on (GBD), the dependent variable (DV). The values of the B are calculated through the AMOS. The first variable, CSR (IV), has $B1=0.400$ ($p=0.002$). The second variable is the moderator, CEC, which has $B2=0.175$ ($p=0.000$). The third variable represents the interaction between CSR (IV), GBD (DV), and the CEC moderator, with $B3=0.204$ ($p=0.000$). The below graph shows the strong moderating effect between the variables.



In this study, we also examine the moderating effect of customer eco-consciousness between customer engagement and perceived environmental value. However, according to the results, there is no moderating effect proof on that path of the model.

6. Discussion

In this research, we delved into the intricate web of relationships involving corporate social responsibility (CSR), customer engagement (CE), green banking digitalization (GBD), perceived environmental value (PEV), and customer eco-consciousness (CEC) within the banking industry. Our hypotheses were designed to illuminate these complex connections, and our study's results offer valuable insights into this multi-faceted landscape.

Our first hypothesis (H1) posited a positive relationship between a bank's CSR initiatives and customer engagement. Our findings corroborate this hypothesis, affirming the significance of CSR in cultivating stronger bonds between banks and their customers. Customers indeed respond positively to socially responsible actions, fostering a sense of engagement.

The second hypothesis (H2) explored the idea that customers who perceive a bank as socially and environmentally responsible are more inclined to engage with the institution. Our research supports this notion, highlighting the pivotal role customer perceptions play in influencing engagement levels. Customers are more likely to engage with banks they perceive as aligning with their values.

Our third hypothesis (H3) centered on the positive influence of green banking digitalization on customer engagement. Our study demonstrates a favorable relationship between the adoption of green banking digitalization and customer engagement. This underscores the value of digitalization in augmenting customer engagement, particularly within the context of environmentally responsible banking practices.

Hypothesis four (H4) proposed that green banking digitalization positively influences customers' perceptions of a bank's environmental responsibility. Our research validates this hypothesis, suggesting that digitalization serves as an effective means for banks to convey their commitment to sustainability, thereby enhancing customers' perceptions.

Hypotheses five (H5) and six (H6) dealt with the mediating effect of perceived environmental value (PEV) between CSR and customer engagement and between green banking digitalization and customer engagement, respectively. Our study finds partial mediation in both cases, indicating that customers' perceptions of a bank's environmental value significantly mediate the translation of CSR initiatives and digitalization into heightened engagement levels.

Hypotheses seven (H7) and eight (H8) examined the moderating effect of customer eco-consciousness (CEC) on the relationships between CSR initiatives and customer engagement and between green banking digitalization and customer engagement, respectively. Our results reveal a robust moderating effect of CEC on the CSR-customer engagement relationship, signifying that the influence of CSR varies based on customers' eco-consciousness levels. However, in the case of green banking digitalization, our findings suggest that CEC does not exert a moderating effect on the relationship.

Our findings align with and contribute to existing literature on CSR, customer engagement, and green banking. The positive relationship between CSR and customer engagement is consistent with previous research emphasizing the role of CSR in fostering customer loyalty and trust (Bhattacharya & Sen, 2004; Sen & Bhattacharya, 2001). Similarly, our identification of perceived environmental value as a mediator echoes the findings of studies highlighting the importance of customer perceptions in linking CSR to engagement (Vlachos et al., 2009).

Furthermore, our exploration of the moderating effect of customer eco-consciousness adds nuance to existing literature on the role of individual differences in shaping the impact of CSR on customer engagement (Kotler, 2011; Thøgersen, 2010). While eco-consciousness intensifies the influence of CSR on engagement, its lack of significant moderation in the green banking digitalization context underscores the need for further investigation into contextual factors shaping these relationships.

In essence, our study contributes to the broader discourse on sustainable banking practices, emphasizing the integration of CSR, digitalization, and customer-centric strategies to foster engagement and advance environmental responsibility.

7. Implications and future recommendations

7.1. Implications

7.1.1. Theoretical implications

The study contributes to the theoretical understanding of sustainable banking practices by highlighting the positive influence of green banking (GB) activities on banks' environmental performance. By identifying GB as a driver of environmental sustainability within the banking sector, the research adds depth

to the literature on sustainable finance and its impact on organizational outcomes. Furthermore, the study elucidates the role of green financing as a significant mediator between GB activities and banks' environmental performance, providing insights into the mechanisms through which eco-friendly projects are financed and their subsequent impact on environmental outcomes. Additionally, by identifying and exploring the challenges hindering the development of GB in the Pakistani banking sector, the study sheds light on the theoretical complexities and practical barriers associated with implementing sustainable banking practices, thus contributing to a deeper understanding of the theoretical underpinnings of green banking.

7.1.2. Managerial implications

The findings of the study offer actionable insights for banking authorities and managers to enhance environmental performance through the adoption of green banking initiatives. It is recommended that banking authorities prioritize the integration of GB activities into daily operations, leveraging digital banking solutions and green financial products such as green debit and credit cards to simultaneously improve both environmental performance and profitability. Furthermore, banking institutions should allocate resources towards financing eco-friendly projects, focusing on renewable energy, waste management, and energy efficiency initiatives to bolster environmental sustainability. Addressing the identified challenges in GB development, such as high investment costs and customer knowledge gaps, requires proactive measures such as introducing cooperative loan schemes and conducting educational programs to raise awareness among customers and bank employees about GB initiatives. By implementing these recommendations, banking managers can effectively promote green banking practices and enhance environmental performance within their organizations.

7.1.3. Policy implications

The study underscores the importance of policy measures in incentivizing and promoting green banking practices at the national level. To encourage the adoption of GB, the government of Pakistan can offer tax exemptions to banks and non-bank financial institutions, aligning policy measures with sustainable development goals and fostering eco-friendly banking practices. Regulatory oversight by institutions such as the Pakistan Bank is essential to ensure the alignment of financing activities with sustainable economic development objectives and SDGs. Moreover, promoting collaboration among nations, banks, non-bank financial institutions, international organizations, and businesses is crucial to address challenges and facilitate the adoption of green banking practices. Regulatory bodies like BB can play a central role in coordinating and incentivizing such collaborative efforts, thereby promoting the widespread adoption of sustainable banking practices and enhancing environmental performance across the banking sector.

7.2. Future recommendations

To build on this research and address its limitations, several recommendations are proposed for future studies. Firstly, longitudinal studies could benefit from examining the long-term impact of CSR initiatives and green banking digitalization on customer engagement. This would provide insights into the sustainability of these relationships over time. Secondly, investigating these relationships in various cultural contexts can offer a broader perspective on the influence of CSR and digitalization on customer engagement. Different cultures may respond differently to sustainability initiatives. Thirdly, qualitative studies can complement quantitative findings by delving deeper into customer perceptions and motivations. In-depth interviews and focus groups can provide richer insights into the nuances of customer engagement. Fourthly, experimental research can be employed to establish causality between CSR initiatives, green banking digitalization, perceived environmental value, and customer engagement. Experimental designs allow for greater control over variables. Additionally, refinement of measurement scales for variables such as eco-consciousness and perceived environmental value can enhance the accuracy of future research findings. Consideration of external factors, such as regulatory changes and societal trends that may influence the relationships between CSR, digitalization, and customer engagement is also recommended. Lastly, extending the research to other industries beyond banking to assess whether similar relationships

exist and whether the impact of CSR and digitalization varies across sectors can provide valuable insights. In conclusion, this research provides valuable insights into the complex dynamics of CSR, green banking digitalization, customer engagement, and customer perceptions. Future research endeavors can build upon these findings to further refine our understanding of these relationships and their implications in a rapidly evolving business landscape.

8. Conclusion

In summary, this study provides valuable insights into the complex dynamics of corporate social responsibility (CSR), customer engagement, and green banking digitalization, offering practical guidance for ethical banking in the digital age. CSR has shifted from a choice to a strategic necessity, especially in the banking sector where it merges with digitalization to create 'Green Banking'. This approach combines CSR principles with digital strategies to reduce environmental impact and engage customers in eco-friendly financial practices. The study confirms that CSR initiatives positively impact customer engagement, emphasizing the need for banks to align with sustainability and ethics to strengthen customer relationships. Customers are more likely to engage with banks they perceive as socially and environmentally responsible.

Digitalization emerges as a key driver of customer engagement in sustainable banking, with a positive relationship found between green banking digitalization and customer engagement. Digital tools enhance customer interactions and relationships, particularly in the realm of sustainability. Additionally, green banking digitalization effectively communicates a bank's commitment to environmental responsibility, positively influencing customer perceptions.

Perceived environmental value (PEV) partially mediates the relationship between CSR initiatives, green banking digitalization, and customer engagement, highlighting the importance of customer perceptions in driving engagement. While customer eco-consciousness moderates the relationship between CSR initiatives and customer engagement, it does not significantly affect the relationship between green banking digitalization and customer engagement.

In conclusion, this research offers insights for financial institutions aiming to navigate the path of sustainability and customer-centric practices. It emphasizes the alignment with customer values, sustainability efforts, and effective use of digital technologies in an era marked by environmental awareness and technological advancement, shaping the future of ethical banking.

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Disclosure statement

The authors of the research article declare that they have no conflicts of interest to disclose. We affirm that the research was conducted in an unbiased and impartial manner, without any financial or personal interests that could influence the research, analysis, or the reporting of its findings.

About the authors

Ahmed Muneeb Mehta, as the Principal/Associate Professor at Hailey College of Banking and Finance, University of the Punjab, and a Research Fellow at INTI International University, Malaysia, spearheaded the majority of the work for this research paper. Dr. Mehta was instrumental in the conceptualization, design, and execution of the study, including data collection, analysis, and interpretation. Additionally, Dr. Mehta actively contributed to the drafting and refinement of the manuscript. You may contact Dr. Mehta at ahmedmehta@puhcbf.edu.pk.

Tanti Handriana, serving as the Head of the Department of Management at the Faculty of Economics and Business, Universitas Airlangga, provided valuable supervisory guidance and oversight throughout the research process. Dr. Handriana's expertise and mentorship significantly contributed to the refinement of research methodologies, interpretation of findings, and manuscript review. You can reach Prof. Dr. Tanti Handriana at tanti.handriana@feb.unair.ac.id.

While Dr. Ahmed Muneeb Mehta led the substantive aspects of the research, Dr. Tanti Handriana's supervisory role ensured the academic rigor and integrity of the study. Their combined efforts resulted in the successful completion of the research article, 'Analyzing CSR and Customer Engagement through Green Banking Digitalization: With the Mediating Effect of Perceived Environmental Value and Moderation Effect of Customer's Eco-consciousness'.

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Data availability statement

We are committed to sharing research data, methods, and materials when possible, in a manner consistent with ethical and legal considerations.

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