Greening Corporate Futures: Unveiling the Mediating Role of Employees' Green Behavior in the Nexus of Green Innovation, Green Taxes, and Environmental Performance

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Abstract

Green Innovation involves developing eco-friendly technologies and practices, Green Taxes are financial incentives or penalties to promote sustainable behavior, collectively enhancing Environmental Performance by encouraging environmentally conscious initiatives and discouraging harmful practices through economic measures. The present study investigates the effects of innovative green technologies and environmentally friendly taxes on the environmental sustainability of banking organizations in Pakistan. A probability sample technique was used to collect data from 332 employees of different banks across the province. The study used SPSS and Smart PLS model to analyze the data collected. The findings showed a strong and favorable correlation between employees' green behavior and environmental performance. Furthermore, it was discovered that Green Innovation as well as Green Taxes significantly and favorably improved Khyber Pakhtunkhwa's environmental performance. The association among Green Innovation, Green Taxes, and Environmental Performance is partially mediated by the Green Behavior of Employees. In order to attain environmental sustainability, the research emphasizes the significance of integrating green taxes and innovations into the banking sector.
Keywords: Green Behavior, Green Innovation, Green Taxes, Environmental Performance

Introduction

As Industrialization races ahead and economies boom due to many countries around the world facing resource shortages and environmental damages to tackle these challenges head-on Green Innovation emerges as a powerful force. Green innovation is not just about cool gadgets it's about solution. These creative endeavors not only cater to consumer and business need, but also actively contribute to the global dream of sustainable development by slashing pollution and environmental harm (Fu et al, 2023).

Naturally, the academic world has embraced green innovations with open arms. A slew of research (Kale & Rath, 2019; Singh et al, 2020; Chang, 2011) dissects its critical components and charts potential paths forward. This quest of knowledge delves deep into the heart of green processes and products innovations, scrutinizing how technology, policy and market forces influences their impact (Li et al, 2018; Zheng et al, 2022; Yang et al, 2022; Peng et al, 2023). Green taxes, as defined by scholars, are fiscal instruments designed to internalize environmental externalities by imposing charges on activates that generate negative environmental impact with the aim of promoting sustainable behavior and addressing environmental challenges (Andersen & Ekins, 2009; Bovenberg & Goulder, 1996)

With the financial sector serving as a cornerstone of development, the environmental impacts of banks have become a critical area of concern. Pakistan, a developing South Asian nation with strategic geographic significance, is grappling with environmental deterioration. The concept of green innovation implies advancements in technology that minimize air pollution, waste disposal recycling ones, environmental degradation and so on (Kraus et al, 2020).   In the dynamic economic landscape of Khyber Pakhtunkhwa (KP) Pakistan, the role of green innovation (GI) and green taxes (GT) are pivotal not only in shaping the financial sector but also in influencing environmental sustainability. According to Lalon, 2015) and (Sahoo &Nayak 2007) in the quest for environmental sustainability, greening the services sector is paramount, with particular stress on the banking industry. This importance is attributed to banks serving as crucial financial pillars that fund and propel various industries, services, and the broader economy. In essence, greening the banking sector i.e. green financing, sustainable investment portfolios and adherence to environmental, social and governance (ESG) principle into their operations, investment and lending practices is pivotal in steering the overall environmental performance of the economic landscape. Recognizing the interconnectedness of economic activities and environmental well-being, Khyber Pakhtunkhwa, a region marked by its economic diversity and natural resources, is experiencing the dual challenge of economic growth and environmental conservation. Pakistan faces challenges in achieving environmental sustainability, evident from the Environmental Performance Index which ranks the country on 169th in international ranking. Despite ongoing struggles, the country continues to work towards improving its environmental standing on the global stage (Environmental Performance Index, 2021).

Exploring opportunities for innovation and improvement guides the formulation of effective strategies for enhancing environmental performance. The practice of carbon emission reductions (CER) is becoming popular amongst businesses, focusing on business sustainability in line with the current trends of eco-friendly and green practices (Xialo Hao, 2023). In the wake of escalating environmental concerns and the imperative for sustainable business practices, organizations are increasingly called upon to adopt environmentally friendly initiatives. As businesses navigate the complex landscape of environmental responsibility, understanding the interconnected dynamics between these strategies and their collective impact becomes paramount. The aim of this study is to explore the complex interrelationships of green innovation, green taxes, employee green behavior, and their collective impact on an organization's environmental performance. It clarifies how employee green behavior influences and relationship between green taxes and green innovation that in turn influences a

company's environmental performance. The paradigm shift towards sustainability has encouraged organizations to use innovative techniques that are in line with environmental stewardship. Environmental performance, within the context of an organizations Environmental management system (EMS), denotes its capacity to diminish its environmental impact. Emphasizing the commitment of a business to preserve the environment in it operational context (Rahayndi& Apriwandi, 2023) sustaining an advantageous environmental performance is important because it shows how committed a company is to safeguard its workplace.

Green innovation" is the development and use of new ecologically friendly products, processes, and technologies. The creation and application of environmentally friendly technology, procedures, and good have emerged as a main component in accomplishing sustainability objectives. Green innovation is a key strategy for resolving environmental issues caused by economic progress. Green taxes are levied on activities that cause damage to the environment, which incentivizes companies to use cleaner technology, introduce eco-friendly products and services, and lessen their ecological foot print. Green taxes are intended to discourage pollution and other environmental wrongdoings while also encouraging environment friendly production and consumption.

Literature review and hypothesis development

Green Innovation and Environmental performance
The incorporation of eco-friendly products, technology and processes leads to improved product placement as well as long term sustainability. Businesses that frequently create innovations in the green sector are usually more capable of adjusting to changing consumer needs and regulatory restrictions, thus improving environmental performance. As noted by Li et al, (2020) and Zheng et al, ( ) green innovation plays a significant role in the modern corporate world in mitigating the negative effects of climate change. Green technology reduces greenhouse gas emissions, eases environmental pressure, and fosters environment-friendly production, all of which contribute to the advancement of new knowledge (Ali, 2021). Adegbile et al, (2017) stated that integrating green innovation into environmental management plans of businesses raises EP levels. Furthermore, studies demonstrate that Green Innovation can lower a company's environmental impact even in situations where cost and waste reduction are necessary to optimize revenue (Weng et al. 2015) According to research findings of Adegbile et al. (2018) by reducing costs, waste, and the negative environmental effects of their operations, innovative green products and processes also help organizations perform better both morally and financially (Weng et al, 2015). Scholars offer useful insights into obstacles, global perceptions and regulatory influences as well tends to environmental performance through innovation in companies aimed at elevating their environmental sophistication. Thus the Hypothesis is
H_1. There is a positive relationship between green innovation and environmental performance.

Green Innovation, Green Taxes and Employees Green Behavior

Green innovation initiatives within businesses have different effects on the company culture as a whole and subsequently on workers green behavior. Employers can promote a sustainable culture and environmentally conscious behavior among their employees by adopting eco-friendly practices and technologies. GI has been shown to be vital in today's business environment as a means of offsetting the adverse effects of global warming (Li et al., 2020). According to Popp, (2012) industrialized nations now enjoy higher levels of environment quality because of the considerable reduction in pollution and enhancement of environmental conditions brought by sophisticated technology. GI encourages the generation of new knowledge by reducing greenhouse gas emissions, easing environmental stress, and supporting environmentally responsible production (Ali, 2021). For the purpose of implementing efficient policy reactions, it is important to understand what determines poor countries GTI since they would suffer most from climate change (Arundel & Kemp, 2009; Wade Jennings, 2016). Popp, (2012) who contends that local characteristics influence the specific technologies needed for environmental adaptation, gives additional weight to this. Therefore, research focusing on developing countries is crucial to introducing policies that promote green innovation. Green levies have an impact on how businesses design their sustainability strategies. The degree to which environmental taxes promote green innovation depends on market structure (Shen et al, 2021). It also raises questions about the potential impact on the economy and the challenges businesses may have in complying with these levies. The efficiency of incentive programs in encouraging environmentally conscious behavior among staff members. The impact of monetary incentives, recognition programs, and other reward systems are encouraging staff to adopt environmental friendly activities. Along with obstacles to attaining broad employee green behavior, organizations have also faced difficulties implementing green innovation projects and green taxation. These difficulties are included a lack of knowledge, resistance to change, and the requirement for efficient communication techniques to explain the advantages of adopting green practices. In addition to reducing a company's environmental impact, green innovation increases (Weng et al. 2015; Yan & Zhang, 2021). This illustrates how GI can be a mutually beneficial approach to environmental and financial sustainability.Green innovation, green taxes, and green conduct by employees provide a thorough examination of the interrelated elements influencing sustainable business operations. Through an analysis of innovation, taxation, incentive programs, psychological aspects, and real-world case studies enhanced knowledge of how companies can encourage and maintain environmentally conscious behavior in their workforce.

H_2. There is a positive association between Green Innovation and Green Taxes.
H_3. There is a positive association between Green Innovation and Employee's Green Behavior.
H_4. There is a positive association between Green Tax and Employees Green Behavior.

Green Tax and Environmental Performance

There are multiple facets, illuminating significant themes and discoveries within this field. Green taxes are a kind of regulation that governments use to promote eco-friendly behavior. The Environmental Performance (EP) of a company is positively correlated with Green Taxes,. Put simply, businesses that adopt greener finance typically perform better environmentally. Fang et al, (2022) found a positive correlation between the use of renewable energy and environmental taxes. Environmental performance is concerned with a company's business practices that are intrinsically related to the environmental effects that. Green taxes can encourage cleaner production, which can reduce environmental pollution and possibly increase overall economic efficiency (Bovenberg & De Mooij, 1997). As it shows the company's dedication to the environment in the areas where it operates, environmental performance should constantly be maintained at a high level (Rahayudi & Apriwandi, 2023). Green taxes are intended to provide businesses with financial incentives to adopt environment-friendly practices and technologies by internalizing the external costs of pollution. Green tax revenue can be used to fund environment friendly infrastructure and technology, which will stimulate the economy (Bovenberg & De Mooij, 1997). Green tax's financial effects on many industries and companies. According to Hassan et al. (2020) green taxes might promote economic expansion in developed nations, but maybe not in developing nations. Industries react to environmental taxes, taking into account elements like innovation, increased productivity, and modifications to manufacturing procedures Green taxes may even lead to the creation of new jobs in the green industry, thus it will effect on economic productivity (Yip, 2018). There are also many challenges creating by green taxes. Higher unemployment is a possible outcome of green levies. Lin and Li, (2011) recognize that putting environmental taxes into effect may present certain difficulties.

H_5. There is a positive association between Green Taxes and Environmental Performance.

Employees Green Behavior and Environmental performance

According to Chen & Chang (2013) and Jia et al., (2018), Employees Green Behavior (EGB) is essential to a company's ability to advance its green innovation and research projects since it encourages green creativity. Additionally, EGB has been connected to boost green business performance, as evidenced by study carried out by (Chen et al., 2006; Guerci et al., 2016; Donohue & Torugsa, 2016). There are various facets of this relationship, leading to a solid understanding of how eco-friendly actions taken by employees which improve environmental outcomes of businesses. An organization's environmental performance is positively impacted by employee participation and environmental consciousness. Improved sustainability is facilitated by staff members who take an active role in energy-saving projects, waste reduction strategies, and green initiatives. Previous studies (Jiménez-Jiménez and Sanz-Valle, 2008; de Saá-Pérez and Díaz-Díaz, 2010; de Winne and Sels, 2010; Fu et al., 2015) have proposed a relationship among green human resource management (GHRM) practices and a firm's level of

innovation. The way that company culture influences environmentally conscious behavior among employees and how such behavior impacts environmental performance.

Businesses that emphasize and support sustainability values have a favorable correlation with employee adoption of green practices, which enhances the business's overall environmental performance. Employee education and awareness programs are also essential for promoting environmentally responsible behavior. (EGB) and (GI) have a mutually reinforcing relationship; (GI) functions as a strategic tool that advances the organization's environmental performance (EP), while EGB serves to promote (GI). (GI), supported by (EGB) turns into a useful tool for companies, allowing them to help achieve their environmental objectives and advance sustainable practices. When workers understand how their actions impact the environment, they adopt green innovations and enhance environmental performance. Employees' eco-friendly behavior, particularly their innovative ideas for sustainability, has a supportive impact on businesses environmental performance. Positive environmental outcomes are mostly the result of employees who actively participate in green projects, eco-friendly practices or goods. Employee's participation in environmental decision-making processes increases their commitment to environmentally responsible practices. Their behavior affects attaining sustainability objectives which have a positive effect on an organization's overall sustainability. It is frequently assessed using measures like carbon emissions, disposal of waste, and energy consumption reduction. This implies that companies prioritize environmental sustainability have a higher chance of implementing effective initiatives.

H₆. There is a significant association between employees' green behavior and environmental performance.

Mediating role of Employees Green Behavior
There are positive effects of employee's green behavior practices on an organization's environmental performance (Gilal et al. 2019; Kim et al. 2019; Saeed et al. 2019). Green HRM is essential in promoting employees' green behavior through a variety of mechanisms. Anwar et al. (2020) found that HR practices promote competence building, higher motivation, and employees' active participation in environmental practices. One of the most important factors in converting creative thinking and tax laws into real environmental gains is how much staff members adopt and implement eco-friendly behavior. Green innovation in the workplace introduces new procedures, tools, and supplies that have an impact on workers. In analyzing the fundamental process of Person-Environment fit, we assume that the organization's offerings which are presented as green HRM practices act as the supplies. In this regard, employees exhibit their value for these supplies by embracing sustainable and green behaviors. The effect of EGB upon ultimate performance in the environment is mediated by employees' willingness to embrace these developments. Success hinges on how quickly employees accept and apply these innovations.

Laws pertaining to green taxes have an effect on employee motivation and behavior. Financial incentives such as green tax benefits might motivate staff members to participate in eco-friendly projects. The use of green human resource management strategies, encompassing recruiting, selection, and training have played a significant role in elevating employees' environmental consciousness. Additionally, by recognizing environmental challenges and taking proactive steps to enhance the overall environment, these activities help employees develop their green abilities (Jabbour, 2015; Tang et al., 2017). Organizations can efficiently work toward accomplishing broad environmental goals by integrating environmental issues into employees' goals and duties and assessing how they perform against these environmental goals (Jackson et al., 2011). In addition, the practice of rewarding workers based on their ecological performance can encourage environmentally conscious behavior. It can act as an incentive.

Research Methods

Survey Instrument Development

After a careful review of the literature, we determined measuring scales for environmental performance, green innovation, especially green taxes, and employees' green behavior. In order to examine the possible impact on innovative green practices on the staff's green behavior and environmental performance, a standardized questionnaire was used to collect primary data, with environmental green behavior serving as a mediator. The survey was split into two parts: the first part collected demographic information, while the second half covered relevant endogenous and external factors. A Likert scale with five points was used to assess the responses, with 1 representing "strongly disagree" and 5 representing "strongly agree. "Having an alpha value of 0.799, the Green Innovation (GI) index items which were modified from previous studies showed good dependability. Banks' emphasis on green innovation was gauged using the six-item Green Taxes (GT) scale. Based on Kraus et al. (2020) and Tang et al. (2018), the employees' green behavior (EGB) scale assessed components including offering remote customer support services. The seven-item Environmental Performance scale was developed based on studies on aggregate environmental performance. For example, the scale includes (GT), (EGB), and (GI). These examples seek to persuade banks to run with less emissions of greenhouse gases. The dependability value for these components was found to be 0.819.

Data Collection and Sampling

The research has two main goals; the first one is to find out how green innovation effect the employees green behavior and environmental performance among employees of banks operating in developing nations, particularly in Pakistan following the pandemic Khyber Pakhtunkhwa, Pakistan. The second is to ascertain how employees green behavior among employees mediates the connection between Green Innovation and Green Taxes & Environmental Performance. The private commercial banks in Khyber Pakhtunkhwa, were chosen on the basis of their aggressive involvement in green taxes and green innovation projects. The study's objective is to look into the function that financial institutions, especially private commercial banks, play in various green projects and the role the they play in

sustainable economic development between March and December 2023. Convenient sampling was used to gather primary data from private commercial Banks via a systematic 332 questionnaires.

Common Bias Method

There is a chance that our dataset has common method bias (CBM) because we collected data on both independent and dependent variables using a questionnaire survey (Podsakof and Organ, 1986). According to (Conway and Lance, (2010), Common Bias Method is especially linked to self-reported data and has the ability to overstate connections between measurement items. As stressed by (Kraus et al.2020).The Harman single-factor strategy was used in this study to deal with possible common bias method (CBM). Using this method, the amount of variation that can be attributed to a single factor is evaluated. If the total variance is less than 50%, CBM is not present. Our empirical results validated that standard technique bias is not a substantial concern in our dataset, as a single factor accounted 36.860% of the whole variance. We can move forward with the investigation of the study hypotheses with this assurance.

Table 1

The demographic profile of the respondent's

Variables	particulars	Frequency	percentage%
Gender	Male	278	83.73
	Female	54	13.55
Age (years)	21-30	82	24.70
	31-40	172	51.81
	41-50	78	23.49
Qualification	Undergraduate	37	11.14
	Postgraduate	293	88.25
	MPhil or PhD	2	6.64
Job Position	Manager	40	12.05
	Assistant Manager	55	16.57
	Principal Officer	46	13.86
	Officer	99	29.81
	Banking Assistant	3	.90
	Banking Trainee	3	.90
	Others	86	25.90
Working Experience	Less than one year	19	5.72
	1-3 years	55	16.57
	3-6 years	69	20.78
	Above 6 years	189	56.93

Data Analysis and Results

According to (Ringle and associates, 2015). This study used Structural Equation Modelling (SEM) via Smart PLS 4 to investigate the links among green innovations (GI), Green Taxes (GT), and environmental Performance (EP), in addition to the mediating effect of Employees' Green Behavior (EGB). Partial least-squares SEM (PLS-SEM) presents advantages over traditional regression techniques, including improved accuracy in estimating for mediation (Preacher & Hayes, 2004). Chin, (1998) asserts PLS-SEM yields a more accurate mediation effect computation since it can better account for measurement errors. Furthermore, previous studies show that because PLS-based SEM, particularly with Smart PLS, does not need the validation of normality assumptions. So it is suitable for both simple and complicated experimental investigations (Hair et al, 2016). PLS-SEM includes both structural as well as measurement techniques. While the outer model generates linkages between measurable and invisible variables, the inner modelling focuses at interactions between latent constructs. To confirm the findings of the study, 5000 subsamples were employed in a bootstrapping technique. In-depth assessments of the measurement plus structural model results are presented in the following sections.

Measurement of inner model

Tests for validity and reliability were carried out to make sure the variables used in this study were robust. The measuring model's findings, including the validity and reliability of the constructs, are shown in Table 2. The empirical results showed that individual factor loadings, which ranged from 0.629 to 0.791 (Figure 3), exceeded the suggested cutoff of a 0.50 (Hair et al., 2012). This represents the dependability of every study item. To examine the inner reliability of the structures, Cronbach's alpha (CA) and a composite reliability (CR) value were calculated, with value better than 0.60 deemed suitable (Hair et al., 2012). All variables showed (CA) and (CR) values above the recommended limit of 0.60, indicating strong internal consistency, in accordance with (Bagozzi & Yi's 1988). Convergent validity of the investigated variables was examined utilizing the average variance accounted (AVE) value. The empirical results in Table 2 suggest (AVE) values that range from 0.489 to 0.594, surpassing the required values for convergent validity as they above the 0.50 threshold point (Hair et al., 2012). Discriminant validity of the study variables was tested by two commonly employed techniques: the Hetero trait-Mono Trait (HTMT) correlation ratio and the criterion developed by Fornell-Larcker. The correlations among each set of constructs were lower than the square root of their (AVE), as shown by the results in Table 3. Furthermore, all components displayed high discriminant validity, with (HTMT) values < 0.85 (Fornell and Larcker, 1981; Hair et al., 2010; Henseler et al., 2015). The variance inflation factor (VIF) was also used in the study to look for problems with multicollinearity. The (VIF) values, displayed in Table 3, were found to be less than 5, in keeping with the suggestion by Hair et al. (2012), demonstrating the lack of multicollinearity concerns while confirming the discriminant reliability of the variables.

Table 2 Outcomes of the Measurement Model

Variables	Items	Factor Loading		CA	CR	AVE	R^2
Environmental Performance							
EP1	0.697	0.819	0.852	0.564	0.428		
	EP2	0.741					
	EP3	0.791					
	EP4	0.768					
	EP5	0.727					
	EP6	0.661					
Green Innovation	GI1	0.623		0.799	0.836	0.489	0.391
	GI2	0.629					
	GI3	0.702					
	GI4	0.759					
	GI5	0.641					
	GI6	0.723					
Green Tax	GT1	0.632		0.834	0.863	0.594	0.300
	GT2	0.708					
	GT3	0.795					
	GT4	0.775					
	GT5	0.748					
	GT6	0.632					
	GT7	0.775					
Employees Green Behavior	EGB1	0.775		0.665	0.788	0.589	0.325
	EGB2	0.753					
	EGB3	0.713					

CA, Cronbach's alpha; CR, Composite Reliability; AVE, Average Variance Explained

*Table*3

Discriminant Validity

Variables	EP	GI	GT	EGB
Fornell-Larcker Criterion				
EP	*0.732*			
GI	0.505	*0.681*		
GT	0.537	0.533	*0.751*	
EGB	0.535	0.480	0.502	*0.747* .
HTMT Criterion				
EP				
GI	0.592			
GT	0.613	0.616		
EGB	0.687	0.630		0.638

The bold italic value indicate the square root of AVE

Predictive relevance and effect size

In this study, Q^2 was computed based on past research to examine the predictive importance of the PLS (partial least squares route model, applying the blindfolding approach (Geisser, 1974; Stone, 1974; Hair et al., 2019). The Q^2 value ought to be more than zero, according to (Chin 2001), and Q^2 values greater than 0.02, 0.15, and 0.35, according to (Cohen, 2013), imply small, medium, & substantial predictive significance, respectively. The Q^2 results for Green Taxes (GT) (0.186), Green Innovation (GI) (0.204), and the Environmental Performance (EP) (0.261) in the present investigation exceeded the suggested minimum level of 0.15, indicating a medium predictive relevance impact (Cohen, 2013). Consequently, this study's conceptual framework shows that it can predict constructs that are endogenous (Cohen, 2013). Furthermore, evaluating the impact of size (f^2) for every path parameter in the model of structure is advised by (Henseler et al, 2009). F^2 values larger than 0.35, 0.15, and 0.02 are regarded as substantial, moderate, and tiny, respectively, according to (Cohen's, 2001) standards. The f^2 value, as proposed by (Götz et al, 2010), shows how much a distinct construct affects a dependent construct. Based on empirical findings, Green Innovation (GI) has a small effect on Green Taxes (GT) (0.057) and Green Employees Behavior (EGB) (0.092), but a large influence on Environmental Performance (ET) (0.438). As compared to the effect of EGB on EP (0.102), Green Taxes have a smaller impact on the environment's performance (EP) (0.126) and EGB (0.080) (Table 4).

*Table*4

Effect size of the Model

Variables	EP	GT	EGB
GI	.057	.438	.092
GT	.080		.126
EGB	.102		

Structural model and test of hypothesis

In order to confirm the research hypotheses, the present investigation applied path analysis and SEM (structural equation modeling), following a measurement model mentioned in the previous section. t and p-values were computed during the validation procedure, and a hypothesis was deemed confirmed if its t-value was greater than 1.96 or its p-value was under 0.05. On the other hand, if these requirements weren't satisfied, hypotheses weren't supported. After a thorough review, it was determined that the structural model had a moderate-to-large power to explain, accounting for 45.1% of the variation observed in the environmental performance (EP), 31.6% in Green Focus (GF), and 34.3% in Green Innovation (GI). It follows that the theoretical framework utilized in this study has a strong ability to explain phenomena (Chin, 1998).

According to Table 5, which presents the research hypotheses' results, Green Innovation (GI) has a significant impact on (EP) (β = 0.218, p-value = 0.000), (GT) (β = 0.533, p = 0.000), and (EGB) (β = 0.290, p = 0.000). These findings confirm Hypotheses 1-3. Additionally, (GT) confirms Hypotheses 4-5 by significantly benefiting (EP) (β = 0.264, p = 0.000) and (EGB) (β = 0.339, p = 0.000). The empirical data, with a p-value of 0.000 and a β-value of 0.285, show that EGB significantly influences EP and support Hypothesis 6.

Furthermore, the study examined the mediating role of (EGB) amongst the study's parameters (GI, GT, and EP) using a Variance Accounted for (VAF). As per (Hair et al, 2010)'s guidelines, a VAF value below 20% indicates none mediation, a score around 20% and 80% indicates partial mediation, while a number above 80% indicates full mediation. Table 6 provides the VAF data, demonstrating a 54.38% mediation impact. This lends credence to Hypothesis 7, which states that (EGB) largely mediates the GI-EP relationship in banking institutions after the pandemic. Additionally, the data corroborate Hypothesis 8 by showing that (EGB) partially mediates the link between (GT) and (EP), with a mediating influence of 33.77%.

Table.5 Output of the research Hypothesis

	path coefficient	β-values	t. statistics	p- value	Results
H₁	GI ⟶ EP	0.218	4.768	0.000	Accepted
H₂	GI ⟶ GT	0.533	6.855	0.000	Accepted
H₃	GI ⟶ EGB	0.290	5.011	0.000	Accepted
H₄	GT ⟶EGB	0.339	5.326	0.000	Accepted
H₅	GT ⟶EP	0.264	4.192	0.000	Accepted
H₆	EGB ⟶EP	0.285	5.243	0.000	Accepted
Mediation Analysis Results					
H₇	GI ⟶EGB ⟶EP	0.292	3.622	0.000	Partial Mediation
H₈	GT ⟶EGB ⟶EP	0.101	3.736	0.000	Partial mediation

Table.6 VAF of the Mediator variable of Employees Green Behavior

IV	DV	MV	IE	TE	VAF%
GI	EP	EGB	0.292	0.511	54.38%
GT	EP	EGB	0.101	0.285	33.77%

IV; Independent Variable, DV; Dependent Variable, MV; Mediating Variable,
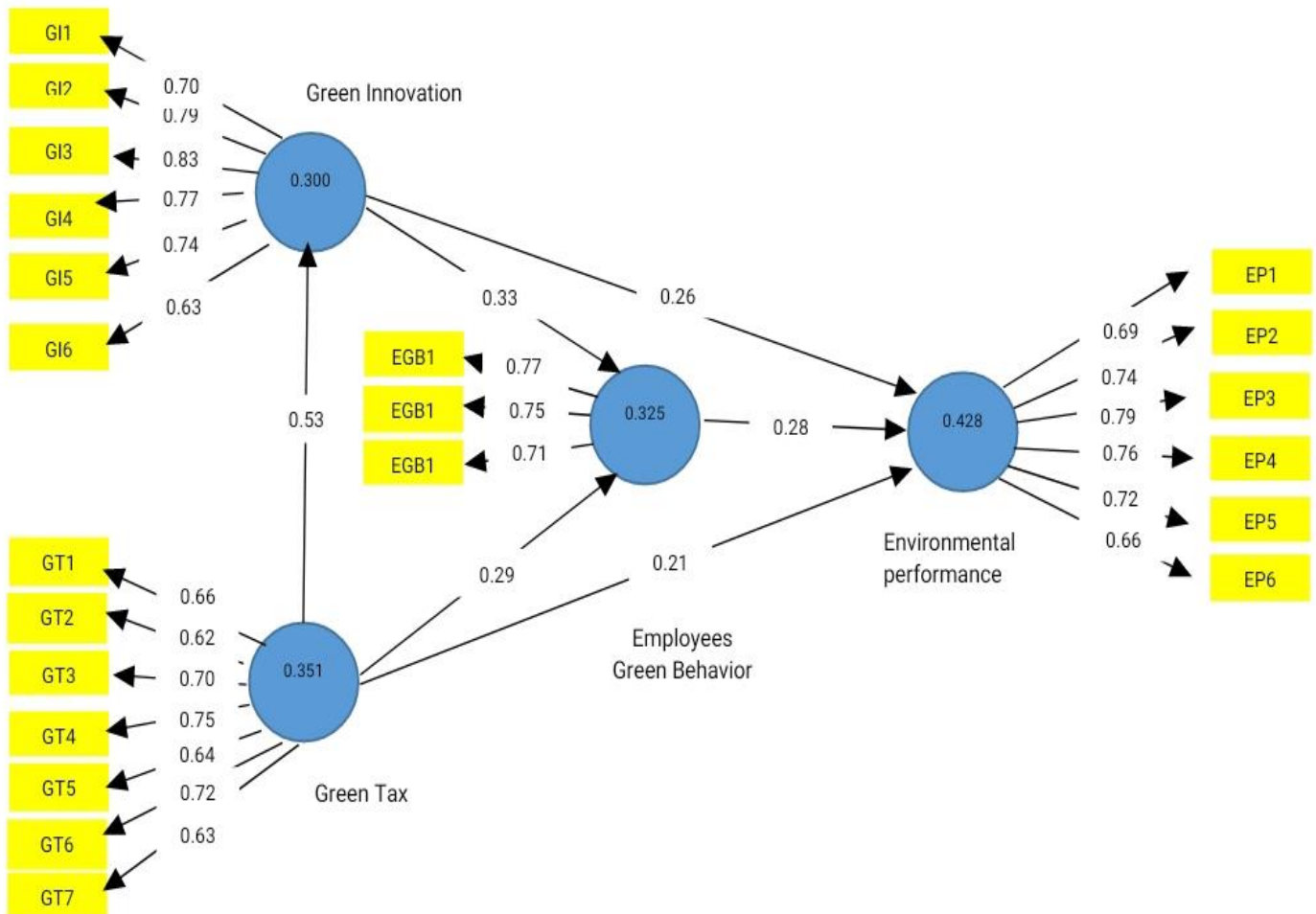IE; Indirect effect, TE; Total effect
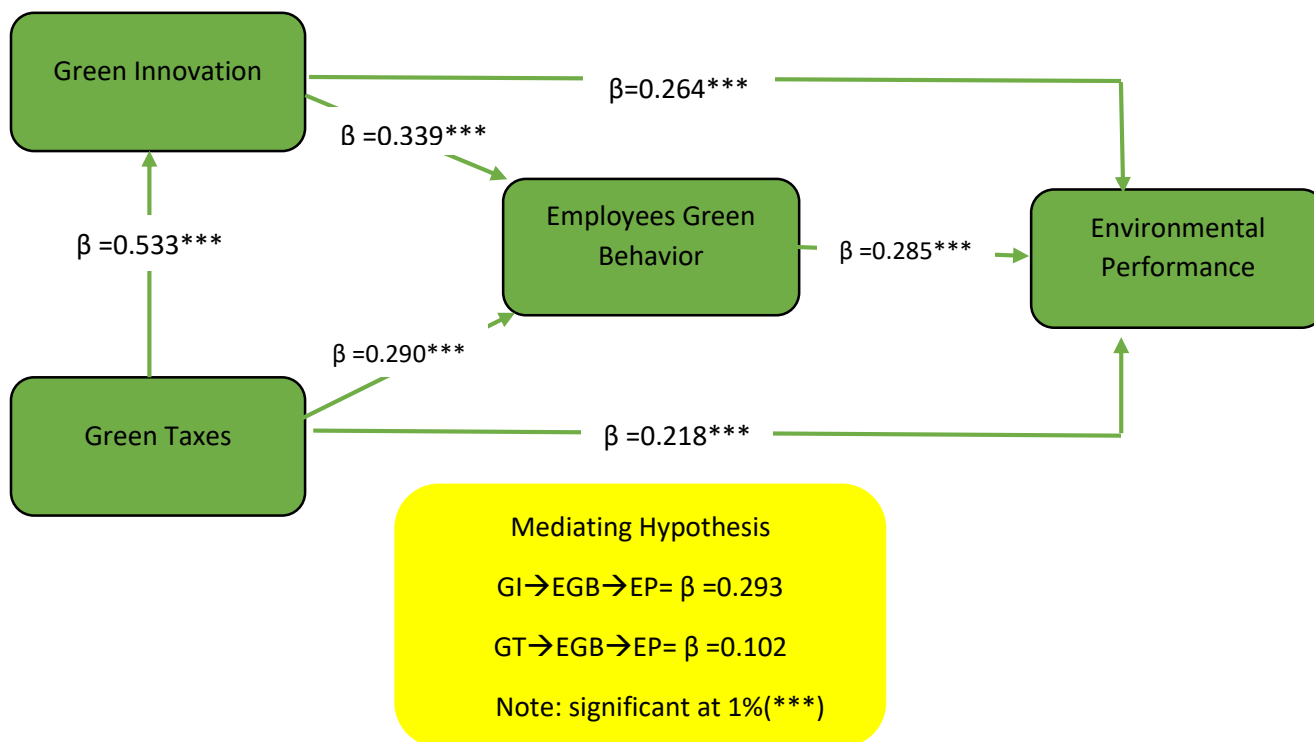
Figure 1. Measurement Model

Robustness test

We investigated the relationships between the variables being studied using a variety of techniques, such as partial least squares modeling of structural equations (PLS-SEM) and ordinary least squares (OLS) models of regression, in order to assure the accuracy of the results. All of the hypotheses in both models, include the mediation hypothesis, are consistently supported by the data shown in Tables 5 and 7. This emphasizes how stable the underlying paradigm used in this study is.

Table.7.Output of the OLS Regression Model

	path coefficient	β-values	t.statistic	p.value	Results
H$_1$	GI —›EP	0.190	3.415	0.000	Accepted
H$_2$	GI —›GT	0.563	11.186	0.000	Accepted
H$_3$	GI —›EGB	0.342	5.675	0.000	Accepted
H$_4$	GT —›EGB	0.316	5.503	0.000	Accepted
H$_5$	GT —›EP	0.264	4.961	0.000	Accepted
H$_6$	EGB —›EP	0.281	5.513	0.000	Accepted
Mediation Analysis Results					
H$_7$	GI —›EGB —›EP	0.292	3.953	0.000	Partial Mediation
H$_8$	GT —›EGB —›EP	0.101	3.895	0.000	Partial mediation

Green Innovation

β=0.264***

β =0.339***

β =0.533***

Employees Green Behavior

β =0.285***

Environmental Performance

β =0.290***

β =0.218***

Mediating Hypothesis

GI→EGB→EP= β =0.293

GT→EGB→EP= β =0.102

Note: significant at 1%(***)

Discussion

The empirical data corroborate the hypothesis by demonstrating that (GT) significantly affects the (EP) of commercial banks. This implies that (GI) plays a crucial role in assisting businesses in achieving environmental sustainability by promoting pro-environmental behaviors via the use of sustainable cutting-edge technologies, such as mobile and digital bank and distant customer care services. The results of the study align with previous research demonstrating that technological innovation has a significant impact on enhancing environmental performance (Awawdeh in et al, 2022; Dwivedi et al, 2021). Additionally, the study shows a strong and positive correlation between banks' (GT) and (GI),

indicating that (GT) can support green innovation by making it easier to access new funding sources and capital, such as digital financing. This result is in line with studies showing that (GI) advances (EP) by fusing cutting-edge technology to power a green economy, like big data and artificial intelligence (Cen and He, 2018; Wang et al., 2022a, b). The study also shows that (GI) has a beneficial impact on banks' (EGB), highlighting the important role that GI implementation plays in the growing uptake of eco-sustainable activities by commercial banks. This finding supports this advice. The relationship between (GT) and (EGB) is also examined in the study, and the results show that (GT) significantly improves EGB. Banks that support environmentally friendly initiatives, like online banking, eco-friendly technology, and remote customer support, can help businesses advance green innovation. This conclusion, which highlights the crucial role that (GT) plays in empowering companies to undertake green initiatives, contrasts with the inconclusive findings in the body of current literature. Moreover, the results indicate that banks' environmental performance (EP) is impacted by both (GT) and (EGB), highlighting the advantages of funding green projects and putting green initiatives into practice for improved environmental outcomes for businesses. These results are consistent with earlier research showing a positive correlation between (GI), (GT), (EGB), and (EP). The results of the mediation analysis show that there is some partial mediation of the impact of (GT), (GI). On the (EP) of private commercial banks. This implies that (GI) and (GT) affect banks' (EP) through (EGB) in both direct and indirect ways. Furthermore, (EGB) serves as a partial mediator between (GI), (GT), and (EP), highlighting the vital role that banks' green initiatives play in enhancing the (GI), (GT), and (EP) link. All things considered, (GI), (GT), and (EGB) greatly improve (EP), which helps to minimize carbon emissions, use less energy, and embrace eco-friendly activities. The study underscores how crucial it is for bank executives to concentrate on green technology, technical innovations, and pro-environmental project finance in order to improve environmental performance generally and support sustainable development.

Conclusion

The results of the investigation have shown that green innovation (GI) significantly affect the environmental performance (EP), green innovation (GI) benefited green taxes) GT, and employees green behavior EGB improved environmental performance EP. The results also indicated that the link among (GI), (GT), and (EP) is somewhat mediated by (EGB). The paper highlights the crucial part that Green Innovation (GI), Green Taxes (GT), and Employees Green Behavior (EGB) play in reaching higher Environmental Performance (EP) in order to expedite the industries sustainable development goals. Additionally, it recommends that the banking industry priorities incorporating green taxes and green innovation into their daily operations.

Theoretical and practical Contributions

The study's findings make significant theoretical and practical improvements to the fields of environmental Performance, employees' green behavior (EGB), green taxes (GT), and green innovations (GI), especially following the pandemic's aftermath. The association among (GI), (GT), and banks' environmental performance (EP) is made clearer by the study after the pandemic from a theoretical standpoint and highlights the mediating function of (EGB). This work is noteworthy as it is the first to examine (GI), (GT), (EGB), and (EP) in detail within a single framework. It also shows how financial institutions in developing nations can use green innovations, (GT), and (EGB) strategically to improve their (EP) in times of crisis. Practically speaking, the results highlight how crucial it is that banks include green innovations, (GT), and (EGB) into their everyday operations in order to achieve sustained environmental performance after the epidemic. The study's conclusions provide regulators and leaders in the banking sector with useful managerial insights. Adopting the newest inventions, funding environmentally friendly initiatives to slow down environmental deterioration, encouraging management to have pro-environmental views, and establishing an innovative and green culture within the company are some of the recommendations. Furthermore, the study indicates that GT and EGB can be significantly advanced by the Pakistani government and state bank. This can be accomplished by creating a reward programs for financial institutions that prioritize funding green projects such as clean energy, pollution control, and carbon-neutral businesses and that make use of innovative green technologies like artificial intelligence (AI), block chain, internet banking, and phone banking. To improve environmental sustainability, this study essentially persuades managers to embrace new technologies.

Limitations of the study and future research directions

Even though this study significantly added to the body of knowledge on Green Innovations (GI), Green Taxes (GT), Employee 'Green Behavior (EGB), and Environmental Performance (EP), there are still several gaps that present opportunities for additional study. First, there are concerns about whether the study's findings apply to other emerging nations or industries. Because the sample population was limited to 332 employees of banks Khyber Pakhtunkhwa. To overcome this constraint, future research projects could make use of larger and more varied samples that span other nations and industries to validate and increase the study's results' applicability. Secondly, although EGB was considered a possible mediator in the study's investigation of the effects of GI on GT and EP after the pandemic, there are chances for further research to look into other mediators. Examining elements like Green HRM, technological expertise, and environmental strategy could improve the existing model's comprehensiveness and explanatory capacity. Additionally, research in the future may examine the pandemic's effects by contrasting current conclusions with newly gathered data from the post-pandemic era. Lastly, whether the investigated organizations engaged in sustainable policies and programs to show legal compliance or a dedication to improving sustainability performance was not

taken into consideration by the assessment items utilized for (EP. Future research could focus on various motorists, supporters, acceleration devices, and stimulant influencing environmental sustainability in order to provide a more comprehensive understanding of the subject.

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