Received: 07 December 2023 | Accepted: 01 April 2024 | Published: 30 June 2024

Sustainable Trends & Business Research

Vol. 02 | Issue 01 | Pages 01-14 |

Research Article

Impact of Green Intellectual Capital and Environmental Management Accounting on Sustainable Performance: The Moderating Role of Stakeholder Pressure

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Declaration of Interests
The authors declare no competing financial or personal interests that could have influenced this work.

Abstract

This study investigates the impact of green intellectual capital—specifically, green relational capital (GRC), green human capital (GHC), and green structural capital (GSC)—on the sustainable performance of firms in Pakistan. It further examines the mediating role of environmental management accounting (EMA) in the relationship between green intellectual capital and sustainable performance, while also exploring stakeholder pressure as a moderator in this relationship. Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS v.4.0.0 software. The findings reveal that while GHC and GRC show positive but insignificant relationships with sustainable performance, GSC has a significant positive impact. EMA is found to have a significant positive relationship with sustainable performance and serves as a significant mediator between GHC and sustainable performance, as well as between GRC and sustainable performance. However, EMA's mediating effect on the relationship between GSC, and sustainable performance is insignificant. Additionally, stakeholder pressure significantly moderates the relationship between EMA and sustainable performance. The study offers valuable insights for scholars and industry professionals seeking to enhance sustainability performance and achieve a competitive advantage in the industry.

Keywords: Green Intellectual Capital, EMA, Stakeholder Pressure, Sustainable Performance.

How to Cite this Work:

Noor, A. & Bano, A. (2024), "Impact of Green Intellectual Capital and Environmental Management Accounting on Sustainable Performance: The Moderating Role of Stakeholder Pressure", *Sustainable Trends and Business Research*, Vol. 02 No 01, pp. 1-14.

1 INTRODUCTION

Sustainability performance, as a secondary concern, has shifted to the primary concept of organizational strategies. Initially, the concept of sustainability was limited to the mitigation of detrimental effects of a company's operations and enforcement of environmental policies. But recently. The concept has broadened its horizons to include the environmental, social, and governance aspects of an organization, which results in the formation of an ESG framework. A significant turning point occurred in 2015, when the United Nations launched the Sustainable Development Goals (SDGs), working as a global roadmap for sustainability programs. Sustainability performance measures are evolving, using advanced data analytics and reporting frameworks from institutions, such as TCFD, the Task Force on Climate-Related Financial Disclosures, and Global Reporting Initiatives (GRI). Recently, firms have recognized their sustainability efforts and received grading and honours from institutions, such as the Carbon Disclosure Project (CDP) (Beiersdorf, 2022; Martin, 2022; Shaukat & Ali, 2024).

While the literature has long identified the value of green intellectual capital, there is still a need to further investigate its implications in today's sustainable era where ecological issues have become a priority (Begum et al., 2023; Khan et al., 2023; Shehzad et al., 2023; Yong et al., 2023). GIC affects firm performance by identifying, acquiring, and communicating external knowledge as knowledge absorption and by facilitating collaborative relationships with stakeholders (Al Issa et al., 2023). In addition to performance, GIC also helps achieve competitive advantage and financial performance. For example, the green innovative strategies propelled by GIC have resulted in superior sustainability performance (Ullah et al., 2022; Vale et al., 2022). GIC plays a linking role for firms in harmonizing human intelligence, market relationships, and organizational processes to better abide by ecological regulations and comply with stakeholder demands concerning environmental issues.

Firms bear losses because of industrial waste that starts from the disposal of dirty water, energy, and other materials (Latifah & Soewarno, 2023; Sari et al., 2020). Firms need a system that assists them in exploring and collecting data required to improve their environmental performance. The EMA is an integrated management system that supports organizations in recognizing, examining, and organizing various types of information (Appannan et al., 2023), resulting in improved environmental performance. Additionally, the literature highlights environmental management accounting as a crucial element in encouraging firms to utilize their strategies and resources when managers' utilization of such resources to enhance sustainability performance is imprecise.

Recent corporate scandals, such as BP's Deepwater Horizon oil spill in 2010, Volkswagen's diesel emissions in 2015, Fargo's fake accounts scandal in 2016, Facebook's Cambridge Analytic data breach in 2018, and Wells Boeing's 737 MAX crisis in 2019, triggered the need for robust stakeholder management and sustainability within organizations. From Volkswagen's diesel emissions scandal, persistent pressure from stakeholders can result in major business evolutions and greater compliance with environmental regulations (Boiral et al., 2022). Furthermore, stakeholder pressure functions as a guard against sustainability malpractices by ensuring that firms maintain accountability and transparency in their practices (Arian et al., 2023; Shaukat et al., 2023).

Management accounting literature states that businesses are usually conscious of the need to adapt their designs to coordinate them with strategic goals and directions, such as sustainability programs (Asiaei et al., 2021; Asiaei et al., 2022b). Yusliza et al. (2020) found that GIC favourably fosters sustainability performance and helps firms gain a competitive edge. Widyastuti et al. (2021) examined the positive relationship between GIC and sustainability performance. Similarly, Asiaei et al. (2022b) found that GIC, mediated by EMA, enhances the environmental performance of firms. This study provides green intellectual resources to improve firms' capacity to meet market demand for adapting to environmental variations. Appannan et al. (2023) study the relationship between environmental strategies, environmental management accounting performance, and environmental performance.

This study contributes to the literature in the sustainability context by first examining the impact of GIC dimensions–that is, green relational capital, green human capital, and green structural capital–on the sustainable performance of firms located in Pakistan. Second, it analyses the mediating impact of environmental management accounting on the relationship between GIC and SP. Third, this study maintains its originality and, to the best of our knowledge, is the first to include stakeholder pressure as a moderator in the relationship between environmental management accounting and sustainability performance. The study will analyse data collected using partial least squares structural equation modelling with the help of SmartPLS v.4.0.0 software. The study results provide valuable insights for scholars and industry professionals that will help them gain an in-depth understanding of how to foster the sustainable performance of firms and how to earn a competitive advantage in the market.

The remainder of this paper is organized as follows. Section 2 consists of a literature review that provides the basis for hypothesis development. Section 3 describes the methodology adopted for the data analysis. Section 4 provides the study results, along with their interpretations and discussion. Finally, Section 5 presents the conclusions, study implications, and limitations.

2 LITERATURE REVIEW

2.1 Resource Orchestration Theory

This study employs the resource orchestration theory (Sirmon et al., 2011), which is a broadened version of the resource-based view. According to RBV, a firm's capital comprises structural, human, and physical resources. Structural capital consists of the firm's systems and reporting framework as well as the interactions between various departments and surrounding units. Human capital is the integration of employees' knowledge, capabilities, and intelligence about distinct perspectives. Finally, physical resources contain physical assets, such as buildings and supplies. (Shehzad et al., 2023).

Resource orchestration theory is based on the concepts of green capabilities and capital, such as green intellectual capital and ambidexterity innovation. These resources are favourable for green performance when they are combined, organized, and leveraged appropriately for a particular market. The basic idea of this theory is resource mobilization, which is the better placement, collaboration, and direction of resources for specific utilization (Asiaei et al., 2021). Based on theoretical literature, GIC is a green resource that governs and plans the relationship between basic organizational resources. Moreover, the resource orchestration theory contends that resource ownership does not always result in value creation. It also drives competitive advantage by orchestrating resources, such as gathering, combining, and maintaining (Andersén, 2023; Asiaei et al., 2022a; Zhao et al., 2021).

This theory is crucial for guiding organizations in the proper utilization of resources to improve sustainability performance. This theory states that organizations can foster sustainable performance and innovation by coordinating internal resources and leadership styles. In contrast to the RBV, resource orchestration theory focuses on the efficient administration of intangible assets. According to this theory, managers are key to the effective utilization of organizational resources to enhance innovation and sustainable performance (Rustiarini et al., 2023).

2.2 Sustainable Performance

As per the Brundtland Report issued in 1987, sustainable development emphasizes the importance of conserving current assets for the benefit of future generations (Ali et al., 2020). The triple bottom-line theory, devised by Elkington in 1977, focuses on the preservation of economic, social, and environmental resources. However, in corporate and commercial arenas, industrial dimensions are given more weight than environmental ones (Govindan et al., 2019). In the context of business and manufacturing, sustainability refers to meeting stakeholder demands (Nechi et al., 2020) while also considering the interests of future stakeholders. Piwowar-Sulej and Iqbal (2023) defined sustainability performance as organizational activities aligned with the long-term social and environmental aspects. Waheed and Zhang (2022) described sustainability performance in the framework of stakeholder theory, which fulfils short- and long-term targets by considering moral behaviour and CSR.

2.3 Green Intellectual Capital

The recently introduced concept of' Green Intellectual Capital' relates to environmental knowledge, which directs institutional intellect towards environmental security (Asiaei et al., 2022c). Chen (2008) defined GIC as a total portfolio of all types of intangible resources, links, knowledge, and skills concerning environmental aspects at the organizational and individual levels within a firm. In addition to GIC, firms must consider the environmental aspect as a crucial element of organizational success (Chaudhry & Chaudhry, 2022; Rehman et al., 2021). GIC is divided into three pillars: green human capital, green structural capital, and green relational capital.

GHC is a collection of employee capabilities, knowledge, creativity, experience, skills, and devotion to environmental preservation (Bag & Gupta, 2020; Chen, 2008). The implementation of eco-friendly practices for sustainability objectives is driven by GHC (Bag & Gupta, 2020; Yusliza et al., 2020). GRC refers to the intangible resources that an organization may attain through its links with partners, vendors, and clients. GRC helps build strong links with these groups and helps better understand their requirements. This information can be used to develop innovative products and services (Fan et al., 2021). Finally, Yusoff et al. (2019) referred to GSC as a company's culture, intellectual assets, and management style to include green innovation in its business activities. Additionally, the GSC is a firm's image and norms regarding ecological preservation (Astuti & Datrini, 2021).

By implementing GIC in business operations, firms can better utilize their environmental information to provide sustainable outcomes. It involves the following environmentally friendly supply chain processes: optimizing resource efficiency and mitigating waste that collectively foster sustainable performance (AL-Khatib & Shuhaiber, 2022). The GIC serves as a crucial element in deriving improved sustainable performance by offering the required knowledge and skill. For example, Hina et al. (2024) find that GIC components (i.e., GHC, GSC, and GRC) significantly affect the sustainable performance of Malaysian firms. Similarly, Boso et al. (2022) found that for environmental awareness in Ghana and ness in Ghana, employees rated in the improved sustainable performance of firms operating in Ghana. These outcomes underline the importance of GIC in promoting eco-friendly business practices and adopting green strategies as they face pressure from stakeholders. These efforts have resulted in superior competitive advantages and sustainable performance. From the above discussion, it can be proposed that

H1: GIC components **a)** GHC, **b)** GRC, and **c)** GSC significantly affect SBP.

2.4 Environmental Management Accounting

The EMA merges environmental and financial data to assist firms in regulating their economic and environmental performance. EMA is a technical strategy that fosters firm sustainability by regularly updating environmental expenses and effects. This encourages proactive environmental management by implementing sector-wise environmental methods that affect sustainability targets (Amir et al., 2023; Pramono et al., 2023). EMA is a method that improves environmental sustainability and proactivity to mitigate pollution mitigation (Ali et al., 2023). According to Saputra et al. (2023), the systematic implementation of environmental expenses in accounting processes through the EMA is necessary to gain a competitive advantage. To promote sustainability, the EMA provides comprehensive data related to resource utilization, environmental expenditures, and waste production. This information is beneficial for decision-makers to make better choices that will enhance sustainable performance.

The role of EMA in the context of sustainable performance is complex. This contributes to financial sustainability by tracking cost-saving methods using resource preservation and waste mitigation. Moreover, the EMA supports transparency and encourages firms to follow environmental regulations that can enhance stakeholder confidence and company image (Rahman et al., 2024). Through the incorporation of environmental components into business tactics, the EMA helps firms maintain equilibrium between ecological protection and economic development.

EMA, alongside GIC, supports firms in methodologically managing and utilizing their green knowledge and expertise, which is beneficial for integrating effective sustainability initiatives, improving resource efficiency, and attaining greater sustainability performance (Zuhdi et al., 2024). The literature reveals a significant effect of EMA on the sustainability performance of firms. For example, Wicaksono and Tarisa (2022) Found out that EMA significantly enhances sustainability performance as a moderator between firm value and competitive advantage. Asiaei et al. (2022b) suggest that the EMA promotes stakeholder participation and innovation. In addition, EMA is a significant mediator between GIC and environmental performance. Bresciani et al. (2023) stated the importance of EMA in the improvement of environmental management, which, in turn, fosters environmental performance. Based on the above discussion, we can hypothesize that

H2: EMA is significantly related to SBP.

H3: EMA mediates the relationship between GIC components**: a)** GHC, **b)** GRC, and **c)** GSC and SBP.

2.5 Stakeholder Pressure

In addition to EMA, stakeholder pressure has a significant impact on environmental performance. According to Freeman et al. (2018), a stakeholder can be a person or group that can influence or be influenced by the attainment of organizational goals. The stakeholder theory asserts that businesses should broaden their horizon of fulfilling the interests of shareholders to multiple stakeholders (Mahajan et al., 2023). Stakeholder pressure is said to be the driving force behind environmental policy implementations. Stakeholder pressure arises from the need for accountability and transparency in organizational operations, growing consciousness of environmental issues, and legal requirements. Stakeholder pressure has attracted firms to follow sustainability practices on a wide scale (Alherimi et al., 2024).

Stakeholder pressure makes firms responsible for the environment (Tetteh et al., 2024). It promotes the adoption and integration of EMA to precisely trace environmental expenses and savings. Stakeholders strictly demand transparency from firms in their sustainability disclosures, which is made possible through the comprehensive and credible data offered by the EMA. Firms facing such pressure tend to tie their objectives to sustainability objectives (Bello-Pintado et al., 2023). EMA offers appropriate data to support this relationship. Stakeholder pressure not only fosters the incorporation of EMA, but also strengthens green innovation and energy conservation, which results in a boost in firm performance (Gerged et al., 2024; Rahman et al., 2024). To achieve sustainable development, firms operating in MSMEs face stakeholder pressure, which encourages them to adopt EMA (Latifah & Soewarno, 2023; van Der Poll, 2022). Thus, it can be hypothesized that

H4: SP moderates the relationship between EMA and SBP.

Figure 1. Presenting the framework of the study and hypothetical paths.

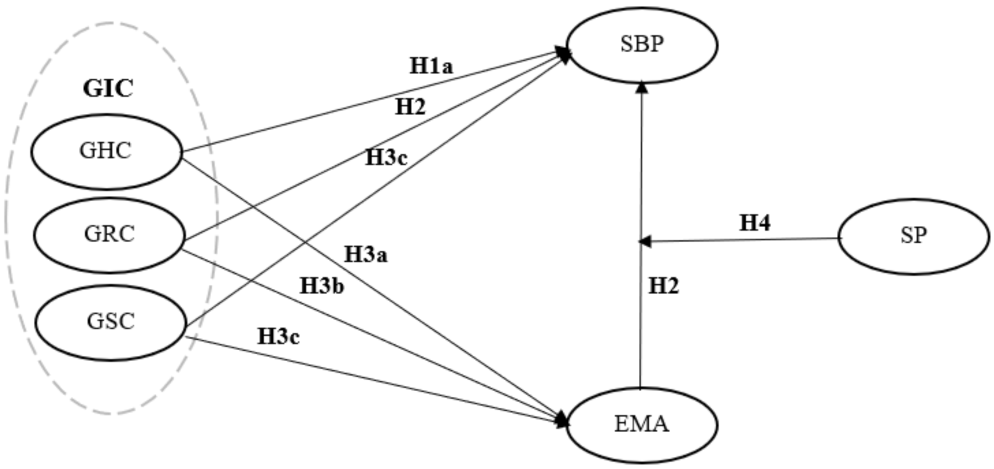

Figure 1. Framework of the study

3 METHODOLOGY

In the organizational arena, GIC is called a set of information, skills, intangible resources, and other resources (Chen, 2008). This study assessed the GIC as follows (Chang & Chen, 2012): Chen (2008) developed a questionnaire adopted by many previous researchers (Huang & Kung, 2011; Yusliza et al., 2020). The study measured GIC using three dimensions (GHC, GSC, and GRC on a 7-pointer Likert scale. Additionally, EMA is a technique used to enhance, examine, and implement financial and non-financial information, as well as boost a firm's green and economic performance (Solovida & Latan, 2017). This study measured EMA (Solovida & Latan, 2017) on a 7-pointer Likert scale, which was first established and verified by (Ferreira et al., 2010). Ferreira et al. (2010) state the criteria for the selection of EMA operations (Hansen & Mowen, 2005; IFAC, 2005), which are different from other general management accounting operations. Furthermore, this study determined stakeholder pressure using six items (Shubham et al., 2018). Finally, this study measured sustainable performance, which was taken from Laosirihongthong et al. (2013), Zhu et al. (2013) and Paulraj (2011) on a 5-pointer Likert scale.

This study employed structural equation modelling and the partial least squares approach to analyse the data collected. Structural equation modelling (SEM) is appropriate for studies because it demonstrates the link between several variables and nonabsorbable entities. This technique is beneficial (Hui & Zheng, 2010). SEM was established using a non-experimental research approach that included previously missed procedures for examining the hypotheses (Byrne, 2013). Moreover, SEM is a widely employed technique for analysing data in the context of the social sciences (Yuan et al., 2011). SEM-PLS or partial least squares are frequently utilized instead of SEM (Hair Jr et al., 2017).

Kim and Song (2010) claimed that PLS is a soft modelling analytical technique because it does not need any data to be on a particular unit of measurement, allowing for a small sample size of less than 100 samples. The PLS technique can be used for several reasons. First, PLS is an analytical method for data analysis depending on the residual distribution and the assumption that a sample does not need to be very large; that is, the sample can even be less than 100 for analysis. Second, because PLS can help make predictions, it can be used to examine theories that are still considered weak. Third, to attain algorithmic calculation efficiency, this technique allows an algorithm to be used in a series of OLS analyses. Finally, all the variables in the study model can be explained using PLS(Anagün, 2018). Based on previous research, PLS-SEM has been used in various areas, including competitive performance (Mikalef & Pateli, 2017), transportation (Papantoniou, 2018), management (Ajmal et al., 2022; Kanwal et al., 2023), education (Al-Mekhlafi et al., 2022; Al-Tahitah et al., 2021), and the construction sector (Al-Aidrous et al., 2022; Alawag et al., 2023; Mohammed et al., 2022).

4 RESULTS AND DISCUSSION

Table 1 presents the demographics of the targeted sample, that is, gender, age, experience, firm size, and industry type. The sample represented the majority of males (56.1 %), while women accounted for 43.9%. The majority of the participants were aged 25 to 35 years (45.7 %), while a minor portion of the sample was over the age of 45 years. Most of the respondents (42.7%) had experience in the field between 2 two five years, whereas only 6% of the sample had more than eight years of experience. The majority of the sample firms had 151 to 200 employees, with the Pharma industry capturing a larger portion of the sample (37.1 %).

Table 1: Demographics

Profile	Category	N	%
Gender	Male	222	56.1%
	Female	174	43.9%
Age	Less Than 25 Year	115	29.0%
	25 to 35 Years	181	45.7%
	35 to 45 Years	85	21.5%
	More Than 45 Years	15	3.8%
Experience	Less than 2 Year	70	17.7%
	2 to 5 Year	169	42.7%
	5 to 8 Year	119	30.1%
	More than 8 Year	38	9.6%
Firm Size	Less Than 50 Emp	12	3.0%
	51 To 100 Emp	88	22.2%
	151 To 200 Emp	25	6.3%
	151 To 200 Emp	188	47.5%
	More Than 200 Emp	83	21.0%
Industry Type	Food industry	31	7.8%
	Textile Industry	87	22.0%
	Paper Industry	50	12.6%
	Pharma Industry	147	37.1%
	Other Industry	81	20.5%

Table 2 shows the factor loadings and convergent validity of the measurement model. Convergent and discriminant analyses were performed to assess the study's model (Hair et al., 2006). Data reliability depends on the AVE value; that is, the Average Variance Extracted should be greater than 0.50 for data reliance. Table 2 reveals that the AVE ranges from 0.568 to 0.702, which is above 0.50. However, the convergent reliability metric, CR – Composite Reliability, should be greater than 0.70. The CR values in Table 2 range from 0.923 to 0.962 which surpasses 0.70 and proves the data reliability. Cronbach's alpha of each construct must exceed 0.70 to quantify the co-efficient reliability. The Alpha values for EMA = 0.958, GHSC = 0.917, GRC = 0.961, GSC = 0.935, SBP = 0.952, and SP = 0.916; all these values are greater than 0.70, which validates the reliability of the construct. Every value in the table, that is, Alpha, CR, and AVE, satisfies the criteria determined for data reliability. Table 2 shows that each reliability measure has both convergent and discriminant validity with AVE at more than 0.50, CR at more than 0.70, and Alpha being more than 0.70 (Fornell & Larcker, 1981).

The extent to which one construct differs rigorously from other constructs, based on empirical data, has discriminant validity. Relating the correlation across each variable and the square root of the average variance obtained from every construct yielded discriminant validity. The table 3 presents the results of the discriminant validity test using the HTMT criterion. Most of the HTMT values are below the recommended threshold of 0.85, indicating that the constructs are distinct from each other and have good discriminant validity. The only exception is the relationship between GHC and GSC, where the HTMT value is slightly above 0.85 (0.851), suggesting potential overlap between these two constructs. However, this slight excess may still be acceptable depending on the context. Overall, the constructs show good discriminant validity

Table 2. Factor Loading and Convergent Validity

Items	EMA	GHC	GRC	GSC	SBP	SP	Alpha	CR	AVE
EMA1	0.896						0.958	0.960	0.627
EMA2	0.891								
EMA3	0.886								
EMA4	0.895								
EMA5	0.937								
EMA6	0.950								
GHC1		0.809					0.917	0.923	0.656
GHC2		0.928							
GHC3		0.922							
GHC4		0.925							
GHC5		0.747							
GRC1			0.895				0.961	0.962	0.567
GRC2			0.898						
GRC3			0.960						
GRC4			0.950						
GRC5			0.949						
GSC1				0.976			0.935	0.937	0.713
GSC2				0.986					
GSC3				0.984					
GSC4				0.982					
GSC5				0.842					
SBP1					0.873		0.952	0.955	0.640
SBP2					0.873				
SBP3					0.922				
SBP4					0.956				
SBP5					0.957				
SP1						0.875	0.916	0.926	0.702
SP2						0.891			
SP3						0.807			
SP4						0.869			
SP5						0.792			
SP6						0.788			

Table 3. Discriminant Validity HTMT

Constructs	EMA	GHC	GSC	SBP	SP
EMA	-				
GHC	0.521	-			
GRC	0.486	0.807			
GSC	0.470	0.851	-		
SBP	0.550	0.496	0.494	-	
SP	0.085	0.131	0.114	0.336	-

Table 4 shows eight hypothetical models used to test the relationships among the study variables. There was a positive and insignificant relationship between GHC and SBP ($\beta = 0.050$ and $p = 0.394$). Similarly, GRC and SBP also revealed a positive and insignificant relationship, with β=0.057 and p=0.394, respectively. In contrast, GSC positively and significantly affected SBP, with β=0.168 and p=0.035. There was a positive and significant relationship between EMA and SBP, with values of β=0.358 and P =0.000. EMA significantly mediated the relationship between GHC and SBP, with a coefficient of 0.121 and a p-value of 0.000.

Table 4. Hypotheses Analysis

Hypothesis	Hypothetical Path	Estimates	SE	t-stat	p-value	Decisions
H1a	GHC -> SBP	0.050	0.059	0.852	0.394	Not Accepted
H1b	GRC -> SBP	0.057	0.067	0.852	0.394	Not Accepted
H1b	GSC -> SBP	0.168	0.080	2.112	0.035	Accepted
H2	EMA -> SBP	0.358	0.040	8.932	0.000	Accepted
H3a	GHC -> EMA -> SBP	0.121	0.028	4.255	0.000	Accepted
H3b	GRC -> EMA -> SBP	0.069	0.025	2.717	0.007	Accepted
H3c	GSC -> EMA -> SBP	0.006	0.028	0.213	0.832	Not Accepted
H4	SP x EMA -> SBP	0.171	0.038	4.512	0.000	Accepted

At the same pace, EMA was a significant mediator between GRC and SBP ($\beta = 0.069$, $p = 0.007$). EMA has an insignificant mediating effect on GSC and SBP, with a coefficient of 0.006 and a p-value of 0.832. Lastly, the interaction term SPxEMA had a significant impact on SBP, with $\beta=0.171$ and $p=0.000$. Figure 2. Presenting the structural model of the study.

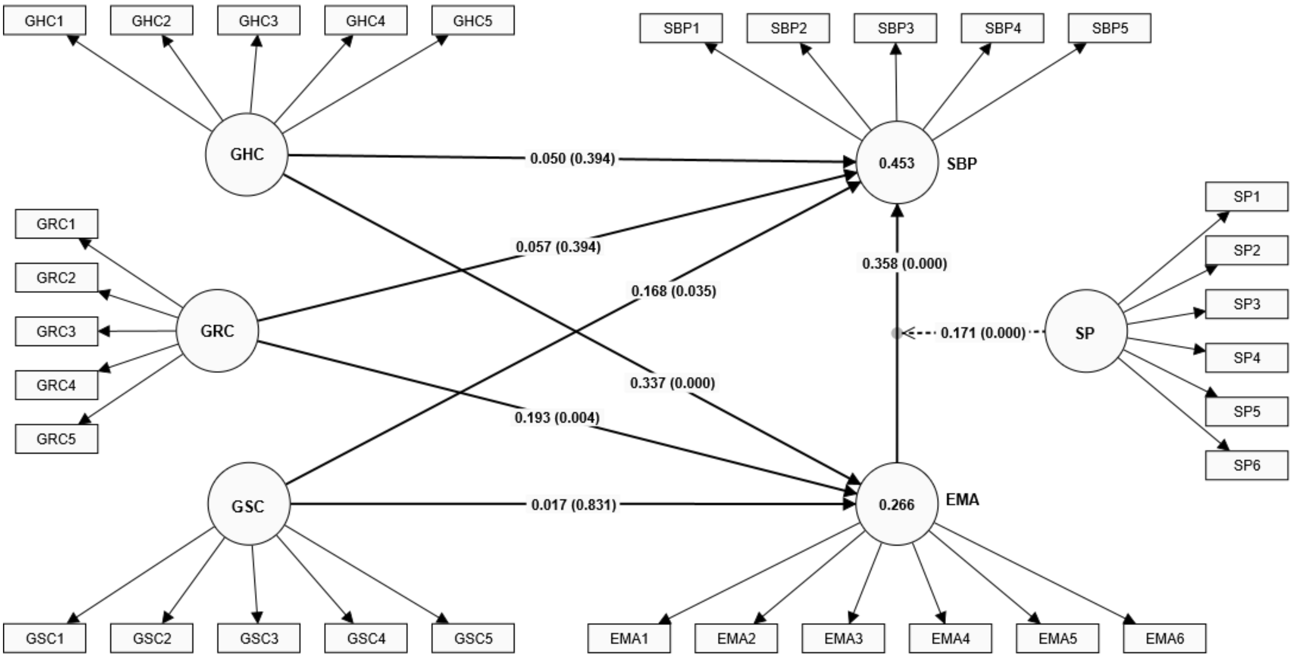

Figure 2. Analysis of the structural model

Table 5: Model fit and prediction.

Model Fit	Saturated model	Estimated model
SRMR	0.043	0.043
NFI	0.975	0.975
Predicts	Q^2predict	RMSE
EMA	0.257	0.866
SBP	0.326	0.825

Table 5 presents the fitness and predictive powers of the model. The SRMR value should be lower than 0.06 for a good fit model. In the current study, SRMR = 0.043, which is lower than 0.06, validating a good model fit. In addition, NFI needs to be ≥ 0.8, and Table 5 shows the estimated NFI value of 0.975, which is greater than 0.8, proving that the model is a good fit.

4.1 Discussion on hypotheses

This study analyzed the impact of green intellectual capital on sustainability, the mediating impact of environmental management accounting, and the moderating impact of stakeholder pressure on sustainable performance. For H1a, the results revealed an insignificant impact of GHC on SBP, consistent with (Agyabeng-Mensah & Tang, 2021; Rehman et al., 2021). This implies that firms face a deficiency in resources for the development of human capital. Additionally, firms lack appropriate channels and frameworks for the effective translation of environmental skills and knowledge into sustainable outcomes. Similarly, for H2a, GRC has a positive and insignificant relationship with SBP, which rejects this hypothesis (Malik et al., 2024; Rehman et al., 2021). Green relational capital may not be sufficient to achieve superior sustainable performance. Hence, H2b is rejected. As for H3c, the GSC has a positive and significant impact on the sustainable performance of firms, which is the same as the results provided by (Hina et al., 2024; Yusliza et al., 2020). This result indicates that green structural capital provides firms with the structure required to promote sustainability programs. These include ecological regulations, processes, and technologies that enhance sustainable performance favorably. Concerning H2, EMA was positively and significantly related to SBP, consistent with the findings of previous studies (Appannan et al., 2023; Gunarathne et al., 2021). The results highlight the importance of management accounting systems that provide firms with data on environmental costs and rewards that encourage them to make effective decisions for improved sustainability.

Concerning H3a and H3b, EMA significantly mediated the association between GHC and SBP. Similarly, EMA significantly mediated the relationship between GRC and SBP, which is in agreement with the results provided by (Asiaei et al., 2022a; Gunarathne et al., 2021). In the context of sustainability, proper coordination between the GIC and strategic management tools, such as the EMA, is key to achieving a competitive advantage and boosting corporate performance. Moreover, it overcomes agency issues by forcing firms to maintain their operational accountability and transparency. In contrast, EMA has an insignificant mediating effect on the association between GSC and SBP (Asiaei et al., 2022a; Gunarathne et al., 2021), which rejects H3c. Finally, for H4, the interaction term SP × EMA had a significant moderating effect on SBP. The findings suggest that stakeholders pressurize firms to monitor and disclose their environmental effects truthfully, which also requires accountability and responsibility for their activities. The EMA assists businesses in satisfying their stakeholders by lowering expenses, enhancing resource efficiency, and mitigating waste and environmental threats, thus improving firms' sustainable performance.

5 CONCLUSION

This study examines the role of green capital dimensions (i.e., green relational capital, green human capital, and green structural capital) on the sustainable performance of firms operating in Pakistan. It also analyzes the mediating role of environmental management accounting in the relationship between green intellectual capital and sustainable performance. Furthermore, this study includes stakeholder pressure as a moderator of the relationship between environmental management accounting and sustainability performance. The study will analyze data collected using partial least squares structural equation modelling with the help of SmartPLS v.4.0.0 software. The study results provide valuable insights for scholars and industry professionals that will help them gain an in-depth understanding of fostering sustainable performance of firms and how to gain a competitive advantage in the industry.

This study has both theoretical and practical implications. This study complements the resource orchestration theory by emphasizing the role of GIC dimensions (i.e., GHC, GRC, and GSC) in support of sustainability. The findings revealed the insignificant impact of GHC and GRC on sustainable performance (Agyabeng-Mensah & Tang, 2021; Rehman et al., 2021), whereas GSC was significantly related to sustainable performance (Hina et al., 2024; Yusliza et al., 2020). that promotes the establishment of environment-related frameworks and policies. This study examines the positive and significant relationship between environmental management accounting and sustainable performance (Appannan et al., 2023; Gunarathne et al., 2021). Additionally, this study discovered the mediating role of EMA between GIC and SBP (Asiaei et al., 2022a; Gunarathne et al., 2021), which depicts the importance of combining financial and non-financial data for better sustainability-related decisions. This insight is in harmony with the resource orchestration theory, which highlights the effective utilization and coordination of organizational resources to gain a competitive edge and enhance performance. Finally, the study examined the moderating interaction of stakeholder pressure on the link between EMA and SBP, which was favorable and significant. This illustrates the vitality of stakeholders' demands for transparency and accountability.

This study has several practical implications for managers and professionals. The need to create strong environmental frameworks and technologies is depicted by the significant influence of GSC on sustainable performance.

Managers should provide support to build and enhance firms' structural capital. Second, the inclusion of the EMA underlines the combination of financial and nonfinancial information to make well-aware decisions. To optimize resource efficiency and mitigate detrimental environmental effects, firms must implement strong management systems to maintain environmental costs, waste creation, and resource utilization. Finally, the moderating role of stakeholder pressure encourages firms to interact with their stakeholders and fulfil their requirements while maintaining accounting and showing responsible behaviour towards sustainability policies. By complying with these requirements, firms can gain a competitive edge over rival firms and foster sustainable performance.

The present study has some limitations. This study collected data only from January 2024 to May 2024; hence, a longer period should be covered to validate the findings of this study. Second, the use of cross-sectional data limits causality between variables. Thus, longitudinal data can be collected to determine the relationships between the variables at different points in time. Lastly, the study only covered firms operating in Pakistan, which hinders the operationalization of the results due to legal, economic, and cultural aspects. Future researchers could explore diverse nations to match and approve these findings.

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