Relationship between Environmental Management Accounting Sustainability: Case of SMEs

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ABSTRACT

Regulation compliance has become increasingly important as environmental concerns have grown, necessitating the establishment of internal accounting systems to back managerial decisions. Although environmental management accounting (EMA) has grown in importance as a decision-support tool for eco-efficiency, there is little awareness in the literature about its active use in supporting sustainable development. The association between EMA and environmental performance (EP) is uncertain due to inconsistencies in previous research. The particular mechanism by which EMA may change EP remains unknown. The purpose of this study is to look at small and medium-sized businesses (SMEs) in Gulf Cooperation Council (GCC) countries and investigate the relationship between Environmental Management Accounting (EMA) and Environmental Performance (EP), with a focus on the mediating function of green innovation. We surveyed 371 small and medium-sized enterprises (SMEs) in GCC nations using the PLS-SEM methodology and SmartPLS software. The statistical analysis results showed that EMA had a substantial and positive effect on EP. The role of GI as a partial mediator in the interaction between EP and EMA is critical. The study's findings significantly improve the existing literature on sustainability and provide important new insights.

Keywords: Green management accounting, Sustainability, Environmental performance, Reporting, Green innovation, SMEs

1. Introduction

Environmental challenges are becoming increasingly pertinent in both developed and developing nations, including GCC, and are attracting greater interest from specialists. Concerns over the strategic objectives and economic status of these nations, especially GCC, enhance their significance. Furthermore, pollution emanates from other sources, including the energy sector, other industries, and the conflict in GCC, resulting in severe social, economic, and ecological repercussions.

The countries in the Middle East and North Africa (MENA) region exhibit subpar environmental performance, as indicated by the SEDAC Environmental Performance Index study, which revealed their worse ranking compared to other nations. Countries in the MENA area that generate fossil fuels, including KSA, GCC, Sudan, Oman, Bahrain, Libya, Kuwait, Qatar, and the UAE, have the highest greenhouse gas emissions relative to other regions. Conversely, nations in the initial group, comprising, Egypt, Morocco, Algeria, Lebanon, Tunisia, Syria and Jordan, have commendable environmental performance [1]. GCC's strategic geopolitical location and its regional ramifications underscore the urgent necessity to address environmental issues promptly.

Many businesses generate a large amount of waste during the creation of their products. The production of this waste consumes a large amount of resources, including water, power, and raw materials [2]. According to Steinhäuser, Paula [3]enterprises must adhere to environmental norms in order to maintain a competitive advantage in the global market, as environmental regulation becomes more important and customers expect sustainable products. Developing management systems capable of detecting performance indicators is critical for addressing environmental concerns and capitalizing on sustainability prospects. Contemporary businesses increasingly rely on environmental policies to carry out operational responsibilities, highlighting the importance of management systems that can effectively balance economic and environmental concerns. Management accounting solutions, such as environmental management accounting, provide managers with important data to make decisions. Numerous controllable approaches are available to generate this data [4]. Enviromental management accounting (EMACC) approaches are excellent tools for businesses to communicate their ecologically responsible goals and outcomes, with highlighting the need to include environmental sustainability among multiple stakeholders [5]. Using ecological planning and management methodologies, a firm can use the Environmental Management Accounting (EMACC) system to identify, quantify, assess, and comprehend its environmental components [6].

According to [7] the specific mechanisms are unknown; however, most researchers believe that EMACC dramatically improves ENPR. Previous studies on ENPR[1] and EMACC approaches have yielded contradictory results [8], underscoring the need for further research. It is critical to investigate variables that may influence the association between EMACC behaviors and ENPR in order to understand how this correlation emerges and its potential consequences. EMACC measurements may directly or indirectly influence ENPR. This study adopts this paradigm to investigate if green innovation (GRINV) has a moderating effect.

Recent studies demonstrate that innovation and the implementation of EMACC are essential factors in improving ENPR [9, 10]. This enables businesses to mitigate their adverse environmental impacts, such as energy and water waste, by integrating EMACC with innovation [11]. The use of EMACC leads to heightened innovation in the production process, which improves firm performance. Utilizing the data supplied by EMACC can improve a company's performance and stimulate innovation inside the organization [12]. Businesses now have an unprecedented array of possibilities to improve their environmental performance through the use of "green" products. According to a

[1] Stand for Environmental Performance Reporting

market study, enterprises are under pressure to improve their operations through environmentally sustainable innovation, which requires advancements in the production process. "Sustainable GRINV" refers to the implementation of new management structures and practices in the manufacturing process to address environmental problems [8, 13]. Enhanced environmental practices frequently stem from market analysis of eco-friendly items [14]. Innovation in the production process is therefore essential. The enhanced ENPR is the outcome of the company's proactive application of EMACC, which fosters process innovation. However, prior studies have overlooked the essential importance of GRINV in enhancing ENPR through the transformation of EMACC practices. This study aims to investigate the impact of EMACC on ENPR, emphasizing the mediating role of GRINV to fill existing gaps in the literature.

2. Literature Review

2.1 Role of Environmental Performance in SME's

The fifth industrial revolution has brought about significant changes that require entrepreneurs, senior managers, small and medium-sized business (SME) owners, and strategists to design plans to overcome these challenges. Enterprises must prioritize strategic orientation to gain a competitive edge and increase performance [12]. According to the resource-based theory, strategic orientations can enhance firm performance by increasing access to critical resources such as capital, expertise, markets, and digital tools [15].

Recent strategic evaluations show that intangible assets, such as proactive dispositions and expertise, provide firms with larger benefits than material assets. This is the outcome of their assistance in analyzing competing methods and providing long-term benefits [16]. According to [17], organizations with greater access to data, connections, and technology are better able to learn from mistakes and recover from crises. The COVID-19 epidemic has primarily affected small and medium-sized firms (SMEs) globally. These businesses struggle to stay open amid crises due to a lack of financial resources [18]. Given the significant decrease in revenue, cash flow challenges, unemployment, and business closures caused by the pandemic[19] stakeholders must prioritize risk mitigation [20-22].

The process culminates in the recommendation of strategies to promote innovation and creativity in order to improve and direct the performance of the firm [23]. Governments worldwide view innovation and strategic orientation in firms as essential to achieving their developmental objectives and goals [24, 25]. According to Chuang and Huang [26] and [27] enterprises with a strong strategic orientation, such as entrepreneurial, learning, or market orientation, can gain access to information about innovation policies and influence government policies and legislation to their advantage. Businesses frequently use political techniques to gain government support for their unique products. These companies will be able to efficiently use technology to build innovative products and services by combining regulatory support with competitive advantages. Businesses can gain and sustain a competitive advantage with government funding for R&D [28, 29].

2.2 Internal Control Environment and Environmental Management Systems

Environmental management systems (EMS) such as EMAS or ISO 14001 are excellent resources for SMEs, providing guidance for incrementally improving environmental performance and practices [8]. According to Thanh, Chamorro [30], an unbiased third party evaluates emergency medical services on a regular basis to ensure their effectiveness. While EMAS prioritizes credibility, openness, and performance results, ISO 14001 serves as a strategic Environmental Management System (EMS) that enhances internal processes and procedures to enhance performance outcomes [31]. Almanack of 1911. Unlike ISO 14001, which focuses on increasing organizational effectiveness and efficiency, EMAS promotes public responsibility by requiring environmental performance reporting (Bracke et al., 2008). Environmental Management Systems (EMS) enhance environmental performance by adhering to certification standards through accounting and control systems. According to Rennings and Rammer [13], implementing an EMS allows firms to improve operational management and better supervise workers.

Implementing an EMS at the interface of business and society impacts internal management accounting practices. An Environmental Management System (EMS) is a set of processes that enables a company to reduce its environmental impact while increasing operational efficiency. It entails a continual cycle of planning, executing, reviewing, and improving processes and activities to achieve corporate and environmental goals. As a result, management accounting approaches are critical for environmental management in EMS [8]. According to Nakasone [11], environmental management accounting, which encompasses life-cycle costing and materiality evaluation, is an operational tool, while environmental system support (EMS) is a strategic instrument for firm-field interaction. To ensure the achievement of performance outcomes, we are establishing a Sustainability Control System (SCS) that incorporates monitoring tools at both the strategic and operational levels [32]. Corporations regularly use Environmental Management Systems (EMS) to increase income by increasing environmental standards and lowering operational expenses [33].

In recent decades, the rapid growth of the global population and industrial activity has made environmental degradation a major problem [34]. Numerous notable institutions are becoming increasingly concerned about environmental issues, particularly climate change. This includes governments, non-governmental organizations, suppliers, investors, and customers. As a result, many people have asked firms to reduce their negative environmental impacts ([35]. To achieve a significant transformation, organizations must shift their mentality and implement new management standards, technology, and procedures.

Current accounting systems identify Environmental Management Accounting (EMACC) as an important tool for organizations to implement environmental policies and analyze operational efficacy. Significant papers from the International Federation of Accountants provide useful advice. The Chartered Institute of Management Accountants (CIMA, 2019), a professional organisation in the United Kingdom, published a thought leadership paper that highlights the critical role of EMACC in a company's sustainability. It combines traditional, introspective management accounting and environmental management practices. According to Ignat, Timofte [10] managers can use data from

Environmental Management Accounting (EMACC) to improve the planning, decision-making, and regulation of their organizations' environmental impacts and policies. The EMACC collects physical data on impacts and resources, as well as financial data on expenditures and revenue [36]. Numerous studies, such as Xie, Huo [37] and González and Mendoza [38], have shown that this category of data can improve overall business performance, reduce environmental expenses, and promote long-term revenue and profit potential. Environmental Management Accounting (EMACC) is a type of management accounting that, like traditional techniques, assesses both past and future performance.

2.3 Relationship Between Firm Performance Environmental Management Accounting

To manage firms' operational and environmental operations, EMACC requires the creation and implementation of an adequate accounting system (IFAC, 2005). According to Jasch [39], environmental management accounting encompasses a wide range of financial, non-financial, and planning activities that aid in the development, implementation, evaluation, and maintenance of environmental policies. Companies can use it for decision-making, regulation, and strategy as they pursue their environmental objectives [24]. Burritt and Saka [40] contend that Environmental Management Accounting (EMACC) primarily guides decision-making within the framework of diverse environmental initiatives. By addressing environmental costs and responsibilities, EMACC can reduce the ecological impact of corporate actions. EMACC accomplishes this by reviewing studies by [41, 42] among others. Other potential effects include reduced material waste and increased manufacturing efficiency [43]. Environmental management assessment (EMACC) proponents argue that it provides a framework for businesses to assess their current situation, identify significant environmental challenges, and discover opportunities for improving resource utilization or markets for environmentally beneficial products, thereby improving overall business performance [44]

2.4 Relationship Between Firm-Level Accountability And Environmental Management Accounting

EMACC has emerged as a crucial instrument for firms aiming to tackle sustainability challenges and promote environmental accountability. The Sustainable Development Goals (SDGs) and the shift towards a low-carbon or circular economy have sparked research interest that extends beyond the realm of accounting literature [1, 45]. Al-Hakimi, Goaill [46] assert that incorporating environmental services is a distinctive technique that has garnered attention. In his Al-Hyari, Al-Weshah [47] highlighted the significance of accounting practices that incorporate environmental factors when assessing the transformative potential of environmental responsibility. Tiwari and Khan [48] contends that corporations may hesitate to disclose the financial ramifications of their environmental challenges, despite the growing integration of environmental management into corporate social responsibility (CSR). To attain their sustainability goals, governmental organizations are progressively adopting sustainability audits and reports [49].

Memon, Yong An [50] discovered no significant relationship between reputation and specific tax acts while investigating the impact of business tax legislation on reputation within the context of corporate social responsibility. Al Koliby, Mohd Suki [51] discuss the application of accounting ideas

to key issues such as climate change and human rights, as well as management accounting and sustainability reporting. They emphasize the necessity of sustainability accounting and responsibility, with the ultimate goal of establishing low-carbon, sustainable communities [29]. Hernádi [42] examines the use of social responsibility accounting as a tool for assessing and managing the effects of corporate action. [52] investigated the spread of EMACC innovations among firms in Indonesia, the Philippines, and Vietnam. The study emphasizes the significance of small, multidisciplinary findings in promoting the adoption of more sustainable industrial practices. Fleischman and Schuele [41] conducted study on the use of Environmental Management Accounting (EMACC) in educational settings to encourage the adoption of sustainable manufacturing practices. They highlighted the potential benefits of cleaner production for businesses in terms of efficiency, consistency, and adequacy. They underline the importance of understanding the data necessary for each strategy and determining how EMACC may help achieve those goals.

2.6 Research Hypothesis:

Based upon the review of the literature following hypotheses are formulated.

H1. EMACC is positively associated with ENPR.

H2. EMACC is positively associated with GRINV.

H3. GRINV is positively related to ENPR.

H4. GRINV significantly mediates between EMACC and ENPR.

3. Research Design

Based upon the scope research and review of literature following research model is proposed.

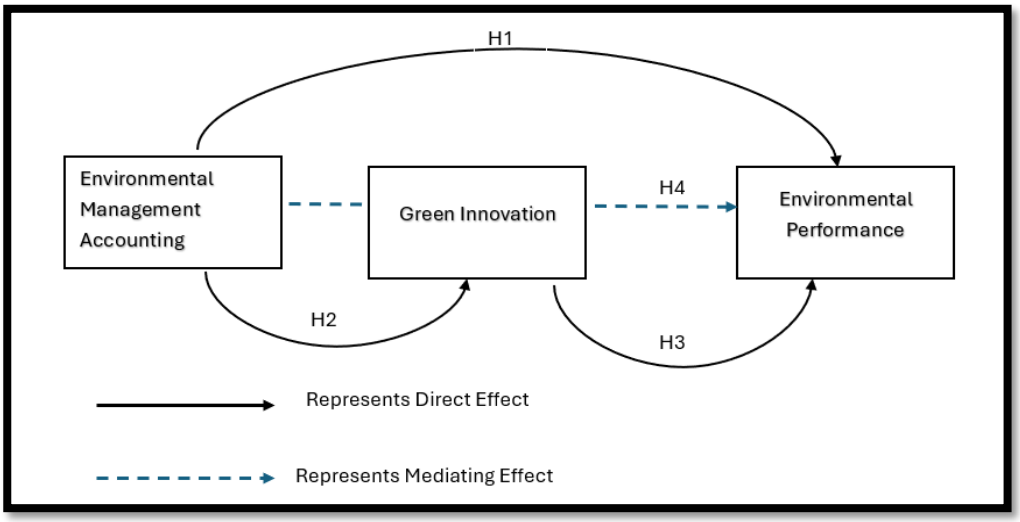

Figure 1. Research Model

Source: Authors own

3.1 Sample and Data Collection

We adopted a quantitative survey approach, using data collected from managers and owners of small and medium-sized enterprises (SMEs) in the Gulf region as the unit of analysis for the study. The study targets a diverse array of manufacturing sectors, including food and beverage, packaging, furniture, polymers, textiles, petrochemicals, and chemicals. The study employed "employee count" and sales data to classify SMEs [53]. Employing the fundamental random sampling method, the database of SMEs across several industrial sectors was extracted from different official government databases. The present study relied on the perspectives of managers from manufacturing SMEs in the GCC, who requested anonymity to ensure the highest degree of confidentiality for all provided information. Due to the absence of human participants in this social science study, ethical approval was not required. Consequently, ethical approval was unnecessary for this study.

The GCC manufacturing industry includes around 2,106 small and medium-sized firms (SMEs). We estimated a preliminary sample size of 325 using the methods described in >>>73]. We adjusted the baseline sample size to 550 to reduce potential non-response and mistakes in this research. We distributed the survey link via email and WhatsApp, instructing participants to respond to 550 questions using an electronic survey method. We collected a total of 389 surveys, following repeated reminders via email and phone. We maintained 371 valid responses after removing 18 incomplete surveys during data preparation for analysis. This yields a response rate of 74% for the initial sample size, much higher than the response rates reported in earlier studies. Consider Xie, Huo [37] as an example. We collected the data for this study over two months, from August to September 2023.

Table 1. Descriptive Statistics

Gender		
	No. of participants	% of Sample
Men	328	88%
Women	43	12%
Employment type		
Part time employment	302	81%
Full time	69	19%
AGE		
18-24	42	11%
25-35	102	27%
36-50	131	35%
50 and above	96	26%
Business Experience		
less than 3 years	36	10%
4 to 8	191	51%
9 to 15	103	28%
above 15	41	11%
education Level		

Middle School	29	8%
High School	128	35%
Undergraduate degree	98	26%
Master's or above	72	19%
Profession certification/Training	44	12%

Source: Present Research

The study's participants are overwhelmingly male, which is not surprising given the study's context and regional cultural dynamics. However, there are encouraging signs that women are also participating in business activities at the grassroots level. Another interesting demographic is the fact that 81% of the participants are already employed and view their entrepreneurial activities as secondary sources of income. The legal environment dictates that all foreigners must have a local business partner, and most SMEs primarily function as partnerships. Analysis of the participants' age groups is intriguing, revealing that almost all age groups engage in business activities. However, the majority of these entrepreneurs have less than 8 years of experience, indicating that they are relatively new to the region's legal requirements. Additionally, 81% of the participants view their business as their primary source of income, which is a significant consideration. Simultaneously, the majority of participants possess a high level of education, reflecting the overall trend of high educational attainment in the GCC region.

3.2 Measurement

The researchers employed a survey questionnaire to gather data for the validation of the suggested model. Two specialists, one skilled in Arabic and the other in English, verified the translated questionnaire, given that Arabic was the native language of the respondents. A multilingual expert subsequently retranslated the final Arabic version into English, the original language, to rectify issues and ensure consistency. We created the scales for this investigation using relevant prior research. Kindly see the appendix for a comprehensive list of all variables and their associated measuring devices. We updated all variables and indicators from prior research to ensure the construct validity and reliability of the study. The GRINV test comprised three items from diverse sources [37], while the EMACC measure utilized four items from [12]. Bresciani, Rehman [54] assert that they evaluate three elements to assess ENPR.

3.3 Common Method Variance

The data in this study were self-collected, so it has the same common method variance (CMV) as earlier studies [54]. Siemsen, Roth [55] described the "Harman's one-factor" test, which we used to detect CMV. The results show that the solitary component does not meet the 50% threshold, explaining just 40% of the variance. There are no worries about CMV in this study. Furthermore, Wolf, Harrington [56] suggested a new method that uses the variance inflation factor (VIF) to identify CMV and Smart-PLS for assessing collinearity. According to Fuller et al.'s analysis, the VIF levels were below the 3 thresholds. As a result, the data provide no reason to be sceptical about the existence of CMV.

4. Results and Discussion

This research evaluated the proposed model using Partial Least Squares-Structural Equation Modelling (PLS-SEM) software. Corporate research often employs PLS-SEM due to its numerous advantages. Individuals scrutinize its reliability, especially when employing smaller samples. Unlike other methods that necessitate larger samples to yield credible results, PLS-SEM can generate accurate and important insights with fewer samples [57]. Moreover, PLS-SEM is highly advantageous for research focused on prediction. Predictive research often aims to identify and model relationships between variables in order to forecast outcomes. PLS-SEM is quite beneficial in this domain since it accommodates extensive models with multiple variables and interactions [58]. In intricate models with restricted sample sizes, PLS-SEM surpasses covariance-based SEM (CB-SEM). PLS-SEM's remarkable capacity to uncover and model interactions among variables may render it essential for comprehending and predicting organizational research outcomes. The PLS-SEM framework interrelates the "structural model" and the "measurement model".

4.1 Measurement Model

Hair, Sarstedt [59] conducted a two-step structural equation modelling (SEM) analysis of the study data. The initial phase of structural equation modelling (SEM) involves validating the reliability of the factors, while the subsequent phase involves hypothesis testing. Cronbach's alpha (α) and composite reliability (CR) both exceeded the established threshold of 0.70 in the reliability evaluation. The factor loading analysis indicated that the external factor loadings exceeded 0.70. Table 2 demonstrates convergent validity, as the average variance extracted (AVE) values surpass 0.5. Table 3 presents the study's findings on discriminant validity, indicating a hetero-trait mono-trait (HTMT) ratio of 0.90 [60].

Table 2. Reliability, and convergent validity

Construct	Item	Factor Loading	α	CR	AVE
EMACC	EMACC-1	0.751	0.726	0.755	0.712
	EMACC-2	0.711			
	EMACC-3	0.730			
	EMACC-4	0.801			
GRINV	GrInv-1	0.700	0.715	0.691	0.790
	GrInv-2	0.740			
	GrInv-3	0.713			
ENPR	EnPr-1	0.705	0.731	0.688	0.701
	EnPr-1	0.756			
	EnPr-1	0.796			

AVE, average variance extracted; CR, composite reliability; α, Cronbach’s alpha;

EMACC, environmental management accounting; ENPR, environmental performance; GRINV, green innovation

Table 3. Results of Discriminant validity (Heterotrait-Monotrait)

Construct	EMACC	GRINV	ENPR
EMACC	1		
GRINV	0.427	1	
ENPR	0.496	0.41	1

Finally, we assessed the model's suitability for the collected data, and the RMSEA value (0.075) indicates that the measurement model fits the data satisfactorily, in accordance with Byrne >>>84].

4.2 Structural Model

We subsequently assessed the structural model using the criteria established by [60]. Hair, Hult [61] outlined the use of a t-statistic from the bootstrapping method to assess the significance of the model's pathways. Table 4 presents the results of the hypothesis testing. The findings indicated that all pathways had favourable, statistically significant relationships. The findings corroborate hypotheses H1, H2, and H3.

The immediate effects are as follows:

Table 4. Results of the direct effects

Path	B	t value	p-value	Decision
EMACC → GRINV	0.402	6.996	0.000	*H1. Supported*
EMACC → ENPR	0.380	5.881	0.000	*H2. Supported*
GRINV → ENPR	0.221	2.975	0.002	*H3. Supported*

Additionally, we implemented Preacher and Hayes' directives and implemented an indirect investigation to ascertain whether GRINV serves as an intermediary between EMACC and ENPR >>>87]. The PLS-SEM bootstrapping technique is recommended by [62] for mediation analysis. They suggest that the conventional "causal procedure" proposed by Baron and Kenny [63] be replaced with the bootstrapping techniques outlined by [64, 65]. This approach is more reliable.

Structural Equation Modelling (SEM) is the preferable method because it enables the simultaneous assessment of relationships among variables [66]. In addition to its direct impact (b = 0.059, t values = 1.975, p 0.05), Table 4 demonstrates that EMACC has a significant indirect impact on ENPR through GRINV. The results in Table 5 demonstrate that GRINV functions as a partial mediator between ENPR and EMACC. As a result, H4 is confirmed.

Table 5. Results of the indirect effects

Path	Indirect path			Direct path			Decision
	β	t-value	P-value	*β*	t value	p-value	
EMACC → GRINV → ENPR	0.059	1.975	0.009	0.401	5.896	0.000	*H4. Partial mediation*

4.3 Discussion of Results

The goal of this study is to look into the role of GRINV as a mediator between ENPR and EMACC practices. The findings indicate that EMACC has a beneficial impact on ENPR, which is consistent with other studies that found a similar positive connection, such as >>>53, 90]. To improve their environmental, social, and governance (ESG) performance, organizations may consider applying EMACC techniques. These findings are consistent with previous research suggesting a link between EMACC procedures and GRINV [67]. Furthermore, they demonstrate that EMACC techniques have a positive effect on GRINV.

The findings indicate that ENPR benefits from GRINV. The significant improvements in environmental performance that businesses that focus on GRINV may enjoy highlight the value of innovation in promoting sustainable practices. This is consistent with prior studies indicating a favorable relationship of this nature, such as [33, 68]. GRINV acts as a conduit between ENPR and EMACC. The findings indicate that EMACC methods indirectly and directly contribute to ENPR via ecological innovation. This link shows the need to combine EMACC with innovative strategies to achieve environmental sustainability goals.

The study's findings reveal multidisciplinary insights. EMACC research illustrates its interdisciplinary nature by drawing on knowledge in environmental sustainability, innovation management, and management accounting. We encourage researchers to apply concepts and approaches from various disciplines to enhance their understanding of how EMA fosters the development of sustainable business practices. Historical research There has been little research into the impact of GRINV and EMACC on ENPR. Our research contributes to our understanding of the direct and indirect effects of EMACC practices on ENPR, as demonstrated by industrialized SMEs in LDCs and the GCC. Our research predicts ENPR using EMACC and GRINV. The inclusion of GRINV dramatically alters EMA's impact on ENPR. Bresciani, Rehman [54] conducted a study that highlighted the advantages of EMACC approaches for assessing a company's ENPR from both an environmental and commercial standpoint. They lay the groundwork for the collection of more complete data in order to set effective environmental goals. Therefore, the results of this analysis provide substantial support for past research findings. The results show that firms utilizing EMACC procedures generate both GRINV and ENPR emissions. Green innovation increases environmental efficacy. EMACC techniques, which facilitate operational reinvention, can increase a company's environmental costs, productivity, and reputation as a sustainable or eco-friendly firm. In contrast to previous research that addressed the EMACC-ENPR association in both developed and developing

countries [54, 69], this study focused on the correlation between EMACC and ENPR in least developed countries, such as the GCC. The study's findings provide more support for the association between ENPR, GRINV, and EMACC procedures in various circumstances.

5. Conclusions, Practical Implications and Future Research

This study looked into the manufacturing sector of small and medium-sized firms (SMEs) in the Gulf Cooperation Council (GCC). The findings improve our understanding of sustainability and close a critical gap in the research. This research presents a fresh framework for understanding the EMACC-ENPR relationship, stressing GRINV's mediating role. This study's findings are consistent with those of the NRBV and support the links between EMACC, GRINV, and ENPR among SMEs in the GCC manufacturing sector. The findings show that EMACC improves ENPR by favorably impacting GRINV. GRINV mediates the relationship between ENPR and EMACC. While this work contributes to the current knowledge base, certain limitations necessitate further research. The motivation of this study was to investigate the role of GRINVs as mediators between ENPR and EMACC's indirect effects. Future studies should look into the kinetics and mechanics of the interaction between EMACC, innovation, and environmental consequences to develop comprehensive theoretical models that account for this relationship.

The discovery of GRINV as a mediator highlights the complexities of environmental management systems. Theoretical arguments look at how innovation strategies, regulatory frameworks, stakeholder impacts, management accounting systems, and the environment are all connected to show how different parts of a business affect each other. This study used a cross-sectional survey methodology to gather data from SMEs in the Gulf Cooperation Council (GCC). Small and medium-sized businesses (SMEs) in the GCC and other countries differ in industry, demographics, and other factors, making it impossible to extrapolate the study's conclusions to a larger population. Future research could focus on large firms, other industries, or even specific areas to delve deeper into the relationship between EMACC and ENPR in a variety of scenarios across developed and developing countries. The study's reliance on a three-item scale for quantification resulted in an inadequate assessment of the ENPR hypothesis. To replicate this study, future research should use a more thorough ENPR metric. The online data sampling via WhatsApp and email may have influenced the results' generalizability and accuracy in representing the population. This implies that future studies could employ alternative data collection methods like manual questionnaire administration. In the future, researchers may use both qualitative and quantitative approaches.

5.1 Practical Implications and Future Research

The study has the potential to assist managers and decision-makers in SMEs in improving ENPR performance by demonstrating the application of EMACC to raise GRINV. The analysis supports the proposed implementation of EMACC. Small and medium-sized firms should acknowledge the positive influence of EMACC on ENPR, as demonstrated in the study and previous studies. The strategic frameworks of environmental sustainability projects can benefit from EMACC approaches.

Systems and protocols must monitor, evaluate, and regulate environmental expenditures and performance indicators. GRINV's alignment with EMACC's efforts demonstrates its ability to contribute to environmental conservation and innovation. Small and medium-sized firms should foster a culture of sustainable innovation. Funding research to develop more sustainable technology, techniques, and goods is one way to accomplish this. This essay underlines the significance of GRINV for sustainable efforts and its positive impact on ENPR. GRINV projects allow businesses to measure the reduction in emissions and resource use. GRINV advises businesses on how to maximize sustainability outcomes by integrating EMACC with innovation, acting as an intermediary between EMACC and ENPR. Aligning EMACC protocols with innovation processes, as well as leveraging their synergies, is critical for ENPR advancement. Businesses may need to engage in capacity building and training in order to advance GRINV and use EMACC effectively. Employees will need information, training, and resources to participate in environmental innovation and use EMACC technology. Collaboration among suppliers, consumers, regulators, and business partners is essential for optimizing innovation activities and EMACC. Organizations can improve ENPR and value chain transformations by including stakeholders in sustainability initiatives and communicating best practices.

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Appendix 1: Questionier Items of present study

Environmental management accounting	
EMACC-1	Our accounting system tracks all physical inputs and outputs, such as energy, water, materials, waste, and emissions.
EMACC-2	Our company's accounting system may evaluate product inventories, product enhancement, and environmental impact.
EMACC-3	Our organization uses environmental performance targets for physical inputs and outputs.
EMACC-4	Our company's accounting approach can identify, appraise, and classify environmental expenses and obligations.
Green innovation	
GRINV-1	Our company modifies product designs to improve energy efficiency across operations.
GRINV-2	Our company creates and enhances sustainable packaging for new and existing products.
GRINV-3	Our company uses eco-friendly materials.
Environmental performance	
ENPR-1	Our company reduces air pollution.
ENPR-2	Our organization reduces air emissions.
ENPR-3	Our organization reduces its energy consumption.