

Review Article

Investigating the Impact of Environmental Management Accounting Practices on Sustainability of Companies in High Impact Industries: A Look into the Current Evidence

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DOI: <https://doi.org/10.36348/sjbms.2026.v11i01.001> | Received: 06.11.2025 | Accepted: 12.01.2026 | Published: 14.01.2026

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Abstract

This study seeks to determine the impact that Environmental Management Accounting (EMA) has on the corporate sustainability using current evidence and literature developed by the academic community. It is inspired by the fact that, while organizations have implemented environment- conscious strategies geared towards ensuring that corporates play their role as responsible citizens especially in the war against global warming and environmental degradation, statistics depict an alarming rise in the volume of emissions and poor performance in other key indicators. Considering that EMA is one of the contemporary strategies organizations use to track operational performance and support responsible decision-making, this research seeks to answer the following questions.

- Does EMA impact sustainability in organizations operating within the high-impact industries such as petrochemical sector, Oil and Gas industry, and manufacturing industries?
- What mechanisms does EMA use to influence the level of corporate sustainability in the organization?

To answer the above questions, the research relied on secondary data documented in the existent literature. The results established a significant relationship between EMA and corporate sustainability and points to the fact that a myriad of external and organization-facing factors mediate this relationship.

Keywords: Environmental Management Accounting (EMA), Sustainability Reporting (SR), Corporate Sustainability.

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INTRODUCTION

The contemporary business landscape has undergone massive transformation, especially when it comes to how organizations and different stakeholders currently view performance. According to Pratiwi *et al.*, (2020), modern businesses are required to operate and assess their performance based on the tenets of sustainable development which requires that companies remain sensitive not only to profits, but also the impact they have on the environment. The underlying concern is that organizations could not be termed as being successful in their businesses, if they ignore the responsibility to preserve the environment for the sake of future generations.

In keeping with the aforementioned foundational ideologies that have dominated the modern world of organizational management, this research seeks to determine the impact of EMA on corporate sustainability, while also studying the mechanisms through which the cause-and-effect process takes place. These mechanisms incorporate undertakings that can enhance and optimize the processes of EMA such as sustainability reporting and organization's attributes. For example, organizations around the world are required to not only provide their annual reports, but also provide comprehensive evaluation of the sustainability efforts usually documented in the ESG reports. The publication of the ESG report has proved to have significant impact on the actual management of the organization, considering that such publications expose companies to closer focus and exposure to regulating bodies and other

Citation: Yazi Dabaq Aqeel Alonzei & Bilel Jarraya (2026). Investigating the Impact of Environmental Management Accounting Practices on Sustainability of Companies in High Impact Industries: A Look into the Current Evidence. *Saudi J Bus Manag Stud*, 11(1): 1-7.

stakeholders such as the investors. As such, the reports have become essential tools to promote operational credibility and hence raise the profile of the organization in question. It is therefore necessary to determine whether there are some studies that explore the mediating role of ESG reports in a relationship between EMA and sustainability performance.

The study specifically focuses on companies operating in the high-impact sectors such as manufacturing, petrochemical sector, Oil and Gas industry, and construction due to the understanding that the processing of crude oil and natural gas to produce industrial chemicals, construction activities, manufacturing processes among others are undoubtedly high-impact procedures that needs deliberate academic

attention to evaluate how they affect the economic and environmental state of the relevant regions and the world as a whole.

Using the Oil and Gas and the petrochemical sector as a good example in countries where such activities take place, once can visualize the fundamental impact involved. Take for instance, the GCC countries whose main source of income rely on the O&G and the petrochemical industries. In this context, whereas a number of countries in the GCC have made efforts to enhance their sustainability performance and environmental protection, a number of them are still struggling to achieve desirable results. Figure 1 is a graphical representation of the SDG scores as represented by Sadarara *et al.*, (2023).

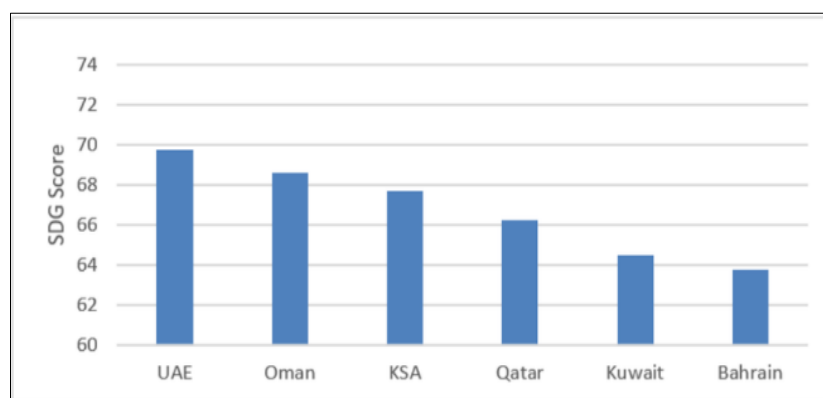


Figure 1: SDG scores for various GCC countries (Sadarara *et al.*, 2023)

This is an indication that, as per the SDG scores, countries such as Qatar, Kuwait, and Bahrain are just slightly above average when it comes to managing their sustainability operations. Using a different metric, Table

1 below provides data regarding the country by country ranking among the countries of the world as prepared in the Environmental Performance Index (EPI).

Table 1: EPI ranking of the GCC countries based on environmental performance (Sadarara *et al.*, 2023).

(GCC) Countries	Ranking at the Level of Countries of the World
United Arab Emirates	53
Oman	54
Qatar	79
Kuwait	92
Saudi Arabia	106
Bahrain	151

Using the above ranking, it is clear that countries such as Bahrain, Kuwait, and Saudi Arabia have been ranked poorly. For instance, Bahrain is ranked at the 151st position out the 176 countries in the world. The critical issue regarding environmental activities is that the pollution experienced in a certain part of the world has an impact on the region and the entire globe since the water and air ecosystems are largely shared resources. As such, it is necessary for the research to focus on the high-impact industries that require proper optimization of resource utilization and emission

monitoring. For example, the construction industry is a major contributor of dust- caused pollution due to reliance on processes such as excavation and transportation. Taking this approach can help provide more impactful findings that can help regularize policies and improve environmental performance. Based on the above problems that have been identified and on the existing data and literature, the research seeks to achieve the following objectives.

i. To evaluate the effect of EMA practices on corporate sustainability of high-impact industries based on the current evidence.

The first objective is set to directly determine the relationship between EMA and corporate sustainability at least from the existing evidence. While pursuing this objective, the study seeks to understand how the various metrics of EMA impact the dimensions of corporate sustainability from the Triple Bottom Line (TBL) point of view.

ii. To determine the mechanisms through which EMA components influence corporate sustainability.

The research further focuses on determining the mechanisms through which EMA may influence corporate sustainability. In this case, the study focuses on determining the mediating role of various factors, including the market-focused, managerial, and regulatory aspects that could mediate the relationship in question. This determination is meant to provide key insights on whether factors such as managerial decisions, regulatory pressures, and company size can enhance the influence of EMA over the level of corporate sustainability. In keeping with the above understanding, therefore, three key research questions were formulated as follows;

- i. Does EMA impact corporate sustainability of organizations operate in high-impact industries?
- ii. What mechanisms does EMA use to influence the level of corporate sustainability in an organization?

Arising from the research questions were a number of research hypotheses which included the directly testable preconceptions of the research questions as follows.

- i. **H1:** There is a significant relationship between EMA and the dimension of corporate sustainability.
- ii. **H2:** EMA impacts corporate sustainability through a mechanism that incorporates a number of internal organizational factors such as the quality of reporting, company size, and the managerial decision as well as externally instigated aspects such as regulatory and stakeholders' pressures.

THEORETICAL FRAMEWORK

Previous research contains substantial literature regarding the impact of EMA on corporate sustainability. In essence, a number of theories explain key aspects of this study and its foundational tenets that make it particularly necessary and impactful to decision-makers, policy-makers, management, and other stakeholders. To start with, to start with, the

Social Responsibility Theory

Social Responsibility Theory manifests a lot of relevance to the key tenets and interests of this research. This theory argues that organizations have an obligation and responsibility to take care of the society as opposed to simply making profits without safeguarding resources for the sake of future generations. It posits that the

society is indeed a main stakeholder of businesses because it incorporates the customers, suppliers, and neighbors among others. As a result, businesses cannot work in isolation by disregarding the needs, aspirations, and the status of those that are in the society. Taking care of the environment, therefore, is an important way of giving back to the society and the community at large. In principle, the theory calls for organizations to address ethical, legal, economic, and philanthropic social obligations to the society and those it interacts with directly or indirectly. This theory guides the research in a fundamental way rationalizing the need for companies to enhance corporate sustainability whereby it focuses on energy conservation and emission reduction. One of the ways through which ethical and legal responsibilities can be achieved is through accurate and information ESG reporting where the stakeholders get an opportunity to evaluate the performance of the company not only economically, but also environmentally to promote transparency.

Institutional Theory

The second theory applied in this research is the institutional theory, which argues that organizations have to conform and adopt social norms and rules in order to get a certain level of legitimacy even if those activities are not profitable or economically beneficial to the shareholders. Whereas those social norms and rules are not necessarily profitable to the organization directly, they happen to enhance the legitimacy of the organization thus developing a certain level of similarity in terms of the organizational culture and behavior. Most of the organizations actually conform due to socio-cultural pressures applied by the society around them as opposed to legal and economic systems.

Agency Theory

In addition to this, the Adam Smith's Agency Theory is equally very crucial to this research as it seeks to evaluate and rationalize the responsibility that managers in a business setting have. The theorist addressed the fundamental risks associated with contracting people that do not necessarily own the business to run it. Adam argued that when owners manage a business, there is a higher level of care and attention due to the stakes involved. On the other hand, contracting managers might lead to negligence thus necessitating controls that could subvert these risks ensuring that one's performance is effectively evaluated and necessary actions taken. As such, the stakeholders are required to put pressure on the managers in order to ensure they operate and act professionally for the sake of profitability. EMA is a systematic approach through which the management is assessed and enabled to act responsibly in order to achieve the economic and environmental objectives of the business.

Legitimacy Theory

The research, further, draws from the legitimacy theory which requires businesses to

deliberately match the values systems of the settings and contexts in which they operate arguing that such conformity is necessary for success. It expects businesses to continuously adjust their operational policies and strategic approaches to ensure that substantial uniformity with the society is fully realized. This is especially important in the contemporary world where the various stakeholders, including customers, investors, and regulators have heightened concerns and knowledge regarding the sustainable practices conducted by the organization in question.

Signaling Theory

Lastly, the signaling theory is a concept of interest in this study because its foundational tenet focuses on the need for information which is meant to signal and deliver some messages to stakeholders. In this case, the accounting reports are meant to provide the shareholders, investors, and regulators with crucial information regarding the financial health of the company. In the same light, the ESG reports provide critical information in terms of the environmental

performance and other sustainability aspects. Proper ESG reports do not only signal to the community that the organization is interested in conserving the environment, but it also provides an opportunity for self-introspection among the various departments of the organization to determine the way forwards including how the weak areas could be strengthened and the performing aspects maintained. This theoretical framework, therefore, rationalizes the objectives of the research and guides the development of both the conceptual framework and structural model.

METHODS

In essence, the study conducted in this research is basically secondary research that relies on documented information to make its determinations about the relationship between EMA and corporate sustainability. The methodological approach is based on the research onion framework to determine the various components for the sake of rigor and replicability as shown in the figure below.

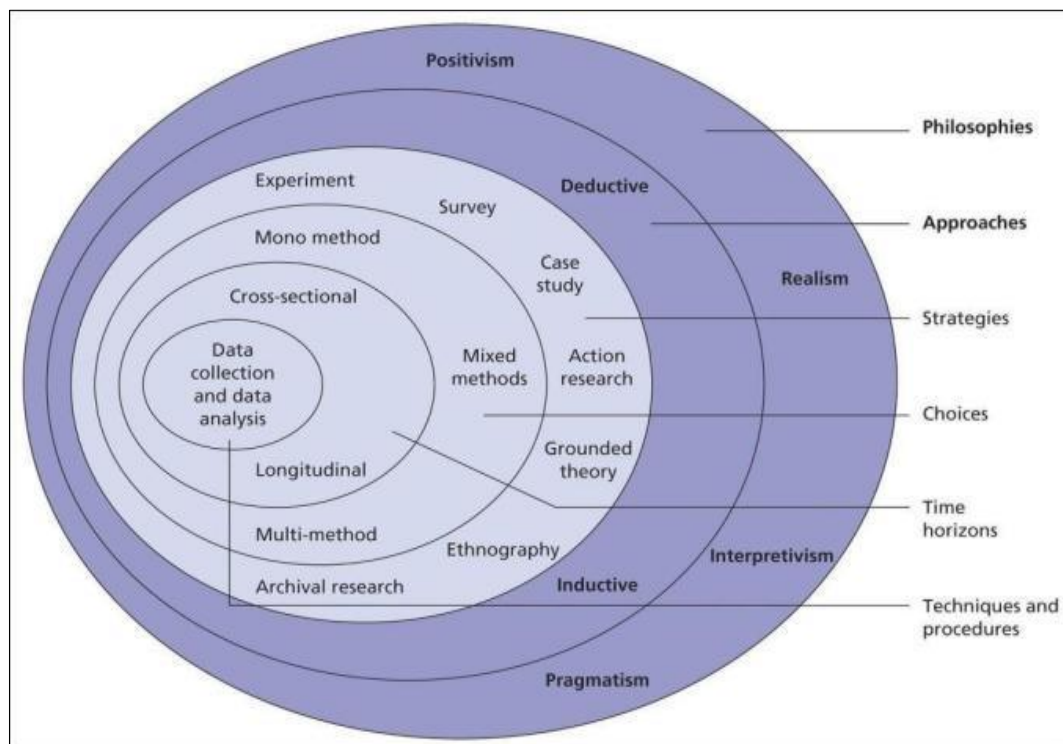


Figure 2: Research onion framework for methodology development (Saunders *et al.*, 2019)

Research Philosophy

In light of the outermost layer, the study applies a pragmatic research philosophy which essentially allows the use of both quantitative and qualitative data focuses on using quantitative methods to make key research determinations about a given phenomenon. The pragmatic research philosophy acts as a methodical compromise between the ideological standpoints of interpretivism and positivism. Positivism argues that the only reliable source of information is quantitative data. However, interpretivists argue that not all social

constructs can be quantified. Pragmatism, on the other hand, strikes a balance by adopting an objective stance, admitting different forms of data as far as the information contained therein answers the research questions. In keeping with this philosophy, the study will incorporate different articles including those that use either quantitative or qualitative information as far as the objective is to determine the relationship between EMA and corporate sustainability.

Research Approach

The research onion framework provides two core research approach that include the deductive and the inductive methods. This study adopts the deductive approach which starts with a preconceived hypothesis and proceed to collect data for the sake of determining whether the hypothesis should be rejected or accepted. The research specifically sets two key research hypotheses as indicated in the introductory section of this paper as demonstrated below.

- i. **H1:** There is a significant relationship between EMA and the dimension of corporate sustainability.
- ii. **H2:** EMA impacts corporate sustainability through a mechanism that incorporates a number of internal organizational factors such as the quality of reporting, company size, and the managerial decision as well as externally instigated aspects such as regulatory and stakeholders' pressures.

The analysis of the literature and the existing evidence in this study provides an opportunity to determine whether the two hypotheses should be rejected or accepted.

Research Strategy and Choice

The research onion framework provides a number of research strategies to apply which include case study, experimental, survey, and grounded theory among others. In this case, the archival research strategy was used where documented secondary articles published in credible journals were used as the source of information to determine the nature of the relationship between EMA and corporate sustainability. Relying on the documented research provides an opportunity to rely on a wide range of data considering that the majority of the studies chosen had conducted primary research to

study the relationship. With the diverse data, the implications and recommendations made in this study are considered to be significantly reliable for managers, regulators, and the interested stakeholders.

For the research choice, Saunders *et al.*, (2019) provide a number of possibilities, including the quantitative, qualitative, and mixed methods. The choice that a researcher uses is determined by the research philosophy adopted. In this scenario, the research embraces the pragmatic research philosophy, which allows both quantitative and qualitative methods. The articles selected for the research will be considered as far as they focus on the objectives aligned with the goals of the research. As such, the study adopts a mixed-methods research design, incorporating both quantitative and qualitative methods.

Time Horizon

The research adopts a longitudinal time horizon which enables a study to use sources and data from a range of years for a lengthy timeline. The research articles to be considered were taken from a range of years as opposed from one specific year. This implies that the study depends on the findings of multiple studies drawn from different point in time. As such, this enhanced the credibility of the study showing a range of results from a diverse timeline.

Data Collection and Analysis

The data collection process was designed in such a manner to ensure that only credible articles and research studies were used for data collection. The exclusion and inclusion criteria were a shown in the table below.

Inclusion Factor	Specifics
Year of Publication	2020-2026
Relevance (search by various keywords)	<ul style="list-style-type: none"> Relationship between EMA and corporate sustainability Relationship between EMA and environmental performance Relationship between EMA and sustainable development of an organization
Geographical scope	Globally
Publication Type	<ul style="list-style-type: none"> Must be peer- reviewed articles to enhance statistical credibility Either qualitative or quantitative Does not include blogs, news, and commentaries

RESULTS

As indicated earlier, the main focus of this study is to answer the following research questions.

- i. Does EMA impact corporate sustainability of organizations operate in high-impact industries?
- ii. What mechanisms does EMA use to influence the level of corporate sustainability in an organization?

Having analyzed various studies containing research regarding the relationship between EMA and

sustainability, the following findings were established as discussed.

Impact of EMA on Sustainability

In essence, a myriad of research studies has been conducted to determine the impact of EMA and corporate sustainability around the world. From this literature, the role of EMA is clear regarding how it impacts and influence corporate sustainability. Researchers indicate that EMA provide detailed information to ensure that the management makes informed decisions about energy use and waste

management approaches, thus ensuring that environmental information is used in the internal management systems. In that regard, research shows that the integration of EMA in the internal operational systems helps in the process of lowering the consumption of energy by avoiding wastage, emission reduction, and management of the release of greenhouse gases (Pratiwi *et al.*, 2020). Rahmawati and Amri (2024) establishes that, in instances where the resources are many and the environmental costs are essentially hidden in the overheads, EMA ensures that proper management is achieved in order to significantly reduce the emissions and optimize resource utilization especially when it comes to energy use. While Pratiwi (2020) finds a significant relationship between EMA and corporate sustainability, questions arise when it comes to the methodological limitations associated with focusing on a small number of companies, specifically 20, in the same country – Indonesia. However, whereas there is a key limitation in regard to the geographical reach, the researchers focused on an extensive number of high impact industries which included mining, textile and apparel industry, construction, and energy. In principle, the context-related factors associated to Indonesia might have fundamentally vital noise that could lead to inaccurate results and hence misguiding implications and recommendations.

Rahmawati and Amri (2024) conducted research among companies listed in the stock exchange and ones operating across borders to determine the impact that EMA has on the sustainable results of a business. The research found that there was a significant relationship between the two variables. Importantly, the study determined that EMA positively impacts the level of carbon emissions and the efficiency of energy use in the company. However, they found that EMA was not able to affect green product innovation. This research applies an extensive and rigorous framework that seeks to draw data from organizations that work from different regions of the world since they are essentially multinationals.

Hasan *et al.*, (2024), also, studied the role of EMA in the process of enhancing environmental performance with the general view of innovating for sustainable development. The research draws its rationale from the ideas that, whereas researchers have put immense efforts in studying EMA, the current body of literature is inconclusive in establishing the relationship between EMA and environmental performance of an organization. The researchers further established that the mechanisms through which the relationship takes place has not been studied sufficiently. As such, they included green innovation as the mediating variable to determine the relationship between the two with the aim of unearthing the mechanisms thorough which the relationship takes place. Using the resource-based view and innovation-driven approach to sustainability, the researchers validate EMA as a key tool

that can be used for strategic management of an organization to enhance the capacity of the organization to innovate and come up with improved systems for enhanced profitability. Here, the research establishes that EMA plays an important role in increasing the visibility of environmental costs and hence support better decision-making among the management team and other stakeholders, which then encourage them to make more investment in terms of environment-friendly technology and systems. The overriding argument is that EMA cannot singlehandedly enhance environmental performance without this information being used to bolster the process of organizational innovation.

EMA AND SUSTAINABILITY RELATIONSHIP MECHANISM

Further, the body of literature is particularly concerned about the mediating mechanism through which EMA affects corporate sustainability. Huynh and Nguyen (2020) focus on both external and internal factors that could mediate the relationship between EMA and sustainability whereby aspects such as market competition, market situation, and corporate governance are included in the research. This implies that the relationship is essentially affected by the readiness of the company in relation to these external factors and internal preparedness. Romero (2024), on the other hand, indicate that internal factors, including the innovativeness of the organization and the commitment of the management team have an impactful mediating role of the relationship between EMA and environmental performance. Wang *et al.*, (2022) conducted a systematic review aiming to bring together an extensive body of literature that study the relationship between EMA and sustainability performance. This research further reinforced the relationship between the two variables in question hence rationalizing the need for integrating EMA in the internal control systems in the organization's management.

CONCLUSION

This research focuses on determining the impact of EMA on the sustainability of an organization while still determining the mechanisms through which EMA impacts the corporate sustainability. The research finds that majority of the research studies conducted, most of which incorporated primary data, establishes a significant relationship between the two variables. This implies that integrating EMA in the internal systems of the organization helps the management and the stakeholders make environment-conscious decisions thus controlling the performance of the company on a need basis.

Importantly, the evaluation of various research studies show that a number of factors are involved in determining how EMA actually affects corporate sustainability. One of the key factors is the green innovation found to have a significant mediating factor in this relationship. Green innovation basically has a number of components, starting with the aspect of green

product innovation. This aspect ensures that the company develops products in a manner that reduces the overall impact on the environment. As a result, it recommends that organizations develop biodegradable and recyclable products to ensure that, when the remnants are disposed, they still decompose completely leaving no particles that can cause harm to marine and terrestrial animals.

It also requires that the product development process follows an eco-design with full understanding of the entire life-cycle perspective. Yet, it is necessary for the manufacturers to consider the energy consumption to ensure that minimal cost is incurred. This requires the EMA processes to be applied in order to ensure that optimization of the resource utilization and cost accounting is done for each raw material. In the contemporary world, this enhances customer trust and the credibility of the organization in the eyes of other stakeholders. The green product innovation is closely interrelated with the green process innovation which focuses on optimizing the process of production. In this regard, the consumption of resources and the minimization of the pollution are critical components to be considered. The contemporary organizations are required to leverage on the input of technology and digital processes to ensure that manufacturing uses optimal resources without affecting the overall production.

Besides green innovation, Pratiwi *et al.*, (2020) focused on the mediating role of the sustainability reporting with the aim of understanding whether ESG reports actually affect the correlation. In this case, the researchers established that sustainability reporting has the capacity to mediate the relations depending on the quality of reporting done. In essence, the sustainability reports provide the public with crucial information regarding resource utilization and the emissions. This implies that the company can suffer critical reputational damage in case they perform poorly compared to their competition. The regulatory bodies, therefore, need to enact policies that encourage companies to comprehensively report their sustainability efforts and performance with the view of ensuring that EMA components are integrated in the reporting. It is also essential to ensure that the aforementioned ESG reports use the Global Reporting Initiative (GRI) G4 guidelines, which provide a list of items that need to be reported.

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