



EFFECT OF INSTITUTIONAL PRESSURES ON ENVIRONMENTAL PERFORMANCE: THE ROLE OF ENVIRONMENTAL MANAGEMENT ACCOUNTING AND ENVIRONMENTAL MANAGEMENT STRATEGY

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ABSTRACT

This study examines the influence of Institutional Pressure (IP) on Environmental Performance (EP) and investigates the mediating roles of Environmental Management Strategy (EMS) and Environmental Management Accounting (EMA), while assessing the moderating role of Top Management Support (TMS). A quantitative research approach was adopted, and data was collected from 313 respondent from manufacturing firms operating in Pakistan. PLS-SEM using Smart PLS software was used to analyze the gathered data. The findings indicate that IP significantly influences EMS, while EMS significantly affects EMA and EMA positively contributes to EP. The sequential mediating effect of EMS and EMA between IP and EP is also significant. However, IP does not have a significant direct effect on EP, and TMS does not significantly moderate the relationship between IP and EMS. The originality of the study lies in integrating IP, EMS, EMA and EP within a sequential mediation framework while examining TMS as a contextual factor. The findings contribute to Institutional Theory by demonstrating that institutional pressures influence environmental outcomes primarily through internal organizational mechanisms.

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INTRODUCTION

International corporations often face institutional pressures (IP) stemming from environmental norms, market demands, societal expectation and regulatory bodies to drive corporations towards revising strategic frameworks and operational practices (Shui et al., 2025) and to enhance environmental performance (EP) (Rahman & Islam, 2023). Hence, the adoption of robust environmental management strategy (EMS) and implementation of latest environmental management accounting systems (EMA) becomes a necessity to navigate complex demands of IP with assistance of top management support (TMS) (Alawlah et al., 2026). The environmental challenges increasing intensity has transformed environmental sustainability from a voluntary corporate initiative into an important strategic and institutional concern (Gunaratne & Lee, 2019). Climate change, resource depletion, environmental degradation, increasing waste generation and pressure on natural resources have encouraged governments, consumers, investors and other stakeholders to demand more responsible corporate behavior (Caldera, Desha & Dawes, 2019). Consequently, organizations are increasingly required not only to comply with environmental regulations but also to validate measurable improvements in their EP (Bennett, James & Klinkers, 2017).

IP can generally be understood through three major dimensions: normative, coercive and mimetic pressures (Majid et al., 2020). According to the knowledge-based view (KBV), a company's success or failure depends

on its knowledge-based resources, that is, intangible (Bresciani et al., 2023).

To evaluate EP, this research used EMA, EMS, and TMS among other unseen assets. The integration of EMS and effective EMA is crucial, as knowledge management is essential to foster innovation and optimizing both internal and external knowledge sources (Tseng, Chang & Chen, 2021). An organization's response to IP and level of EP significantly depends on its capacity to effectively assimilate and deploy environmental knowledge, through robust EMA practices, that directly influence level of response to external pressures and its overall EP (Bresciani et al., 2023). Specifically, IP shown to positively correlate with the adoption of EMA practices and formulation of EMS (Alawlah et al., 2026).

However, IP does not necessarily translate directly into superior EP, thereby organizations may experience strong external pressure but differ considerably in how effectively they respond to that pressure (Khan & Patala, 2026). Hence, understanding the organizational mechanisms through which IP are transformed into environmental outcomes is particularly important. According to Yuning et al. (2024), EMS may represent one such mechanism because it enables organizations to translate external environmental expectations into formal objectives, policies, procedures and operational actions. A well-developed EMS is helps managers to identify and use the required data for environmental performance (Tashakor, Appuhami & Munir, 2019).

Similarly, EMA can strengthen the informational foundation required to implement environmental strategies effectively (Swalih, Ram & Tew, 2024). Traditional accounting systems may not adequately identify and allocate environmental expenses linked with energy consumption, material use, waste treatment, emissions and resource inefficiencies (Yuning et al., 2024). EMA addresses this limitation by generating environmental information that can support planning, cost control, investment decisions and performance evaluation. Schaltegger et al. (2008) argued that EMA is also thought to be a basic component of current business since it lets the company find, analyse, and put together many kinds of data. Thus, EMA can serve as an important organizational mechanism connecting environmental strategy with actual environmental outcomes.

The role of TMS is also important in determining how organizations respond to institutional demands (Wiredu et al., 2024). It is because senior management impact organizational priorities through

resource allocation, strategic decision-making, organizational communication and the establishment of environmental objectives (Farag, 2026); thereby, strong managerial support can provide the financial, technological and human resources required to develop environmental strategies and implement associated management systems (Fiorini et al., 2022). Nevertheless, the extent to which TMS changes the influence of institutional pressures on environmental strategy remains an important empirical question (Christ & Burritt, 2021).

The issue is particularly relevant in manufacturing and other environmentally sensitive sectors, where organizations face simultaneous regulatory, market and societal expectations (Tang & Zhou, 2022). The adoption of green technologies, environmental accounting practices and EMS can enable firms to address these competing requirements by integrating sustainability considerations into core business decisions. Consequently, EP should not be considered solely as an outcome of regulatory compliance; rather, it may reflect the effectiveness with which organizations convert institutional expectations into strategic and information-based management practices (Coglianese & Lazer, 2003). Additionally, this research emphasizes significance of leadership theory by placing TMS as a holistic moderator. It helps examine the level of influence that the moderator has over the whole structural pathway (Peltokorpi & Hasu, 2016). Furthermore, by applying the context of this framework in Pakistan, this study provides insight in to how coercive and normative pressures are internalized in developing economies, which offers a contrast to the research done within western, developed nations (Tashakor et al., 2019). Finally, this study provides significant practical guidance for corporate leaders' environmental managers and policy makers operating under IP and regulatory demands. Findings from similar context research suggest that simple adoption of EMA alone is insufficient to improve EP, whereas knowledge sharing practices between different departments can yield tangible results (Shui et al., 2025).

Against this background, the present study develops an integrated framework linking IP, EMS, EMA and EP, while examining TMS as a potential moderating factor. The study specifically considers whether IP directly influences EP and whether this influence is transmitted sequentially through EMS and EMA. By examining these relationships together, the study seeks to contribute to a more process-oriented understanding of environmental management within organizations.

This remaining study is divided into four sections. Section II explains the literature review and conceptual framework. Section II provides research methods, approach, design, population, sampling, data collection, measurement and PLS-SEM procedures. Section IV presents descriptive analysis, hypothesis testing, measurement and structural model assessments. Finally, Section V provides the key findings, research implications, recommendations, limitations and future research directions.

LITERATURE REVIEW

Institutional Pressures and Environmental Performance

According to institutional theory, organizations operate within an institutional environment where regulatory authorities, professional bodies, customers, competitors, suppliers, and wider society create pressures that influence organizational decisions and practices (Scott, 2008). IP are commonly categorized into coercive, normative, and mimetic pressures (Huynh, Nguyen & Vg, 2024). Caldera, Desha and Dawes (2019) identified three different IP in their work, coercive pressures that comes from rules and regulations from government bodies, enforcing accountability and compliance, governance mechanisms can be viewed as a form of coercive pressures. Normative pressure that comes from professional norms, expectations (Gottschalk & Hamerton, 2024), Environmental uncertainty reflects normative pressures that arise from evolving societal expectations and professional norms regarding environmental responsibility, pushing firms to proactively respond to sustainability challenges. Finally, Mimetic Pressure comes from imitation of competitors, corporations tend to copy successful sustainability practices (Gunarathne & Lee, 2019). EP refers to the extent to which an organization reduces its environmental impacts through efficient resource use, pollution prevention, waste reduction, compliance with environmental requirements, and adoption of environmentally responsible processes (Dieste et al., 2019). Manufacturing firms are particularly exposed to institutional environmental pressures because their operations often involve energy consumption, material use, emissions, wastewater, and waste generation. Chaudhry et al. (2020), in a study of manufacturing firms in Pakistan, found that coercive, mimetic, and normative institutional pressures significantly influenced firms' environmental performance. Similarly, IP have been

found to encourage firms to develop environmental strategies and adopt environmental management practices (Wiredu et al., 2024). Recent evidence also demonstrates that institutional pressures influence firms' environmental strategies, which subsequently contribute to improved environmental performance (Kong et al., 2022). Therefore, IP are expected to provide an external stimulus for firms to improve their EP. Accordingly, the following hypothesis is proposed:
H1: Institutional pressures have a positive effect on environmental performance.

Institutional Pressures and Environmental Management Systems

According to Khalili and Duecker (2013), EMS provides a structured framework through which organizations establish environmental policies, identify environmental aspects, set objectives, monitor environmental impacts, implement corrective actions, and continuously improve environmental performance. Rather than treating environmental activities as isolated initiatives, an EMS integrates environmental considerations into organizational processes and managerial decision-making (Steger, 2000). EMS implementation within a corporation is better defined as a long-term commitment to integrate ecological concerns in its core strategic, operational planning and to reduce environmental impact (Journeault, 2016). Arda, Bayraktar and Tatoglu (2019) suggested that environmental strategy plays a central role in shaping how corporations respond to environmental challenges and encourage firms to implement comprehensive environmental management systems, thereby strengthening their proactive stance toward environmental issues.

According to Watson et al. (2004), EMS are widely adopted for enhanced environmental responsibility and competitive positioning, it promotes practices such as waste reduction, process optimization, and product redesign to minimize environmental impact. However, prior research by (Huynh, Nguyen & Vg, 2024) highlights the limitation of EMS as a singular variable, EMS is not able to quantify environmental improvements and link them to financial outcomes, this can weaken managerial confidence and view it as a cost burden rather than a strategic Investment. Research by (Gunarathne & Lee, 2019; Christ & Burritt, 2021) addresses the limitation of EMS, findings suggest that adoption of EMA can be useful in gathering data on environmental costs, tracking environmental and financial performance while implementing EMS.

H2: Institutional pressures have a positive effect on environmental management systems.

Environmental Management Systems and Environmental Management Accounting

EMS and EMA are closely connected organizational mechanisms (Imtiaz Ferdous, Adams & Boyce, 2019). While an EMS establishes the organizational structure and procedures for managing environmental issues, EMA provides financial and non-financial information necessary for environmental decision-making (Elhossade, Abdo & Mas'ud, 2021). EMA incorporates both monetary and physical environmental information, including environmental costs, material consumption, energy use, waste, emissions, and resource flows (Burritt & Saka, 2006). Such information helps managers identify environmental inefficiencies and incorporate environmental considerations into operational and strategic decisions (Burritt, Hahn & Schaltegger, 2002). An effective EMS requires reliable environmental information. Organizations cannot adequately monitor environmental objectives or evaluate the effectiveness of environmental initiatives without appropriate information about environmental costs and resource flows (Elhossade, Abdo & Mas'ud, 2021). EMA can therefore complement an EMS by providing the information required to identify environmental impacts, assess environmental costs, evaluate alternatives, and monitor improvements. In this sense, the implementation of an EMS can create an organizational environment in which EMA practices become more relevant and useful (Steger, 2000).

Wang, Wang and Wang (2019) found that IP significantly influenced EMA implementation, demonstrating that environmental management practices are influenced by organizational and institutional conditions. Similarly, Chaudhry et al. (2020) found that institutional pressures enhanced EMA implementation, which subsequently contributed to environmental performance in Pakistani manufacturing firms. The relationship can also be explained through organizational learning and information requirements. When a firm establishes formal environmental objectives and monitoring mechanisms, managers require information to evaluate whether these objectives are being achieved. EMA provides this information by identifying environmental costs and physical flows and by integrating environmental considerations into management accounting systems (Jasch, 2003). Consequently, firms with stronger environmental

management systems are expected to make greater use of environmental management accounting information. Therefore, the following hypothesis is proposed:

H3: Environmental management systems have a positive effect on environmental management accounting.

Environmental Management Accounting and Environmental Performance

The corporations utilize EMA as a critical accounting tool utilized for integrating environmental considerations into organizational decision making, planning and control purposes, compelling firms towards adoption of transparent and accountable environment practices (Lee & Schaltegger, 2018; Schaltegger et al., 2017). Prior research proposes that EMA plays a crucial role in enhancing corporations' eco-efficiency and supporting development by utilizing environmental considerations and strategies into accounting practices (Swalih et al., 2024). This involves the application of tools and techniques aimed at measuring, analyzing, and reporting environmental costs and benefits in order to make better decisions on EP (Macarulla et al., 2023).

The scope of EP includes several outcomes, such as decreasing pollution, reducing resource usage, eco-efficiency enhancement, and creation of environmentally sustainable goods and services (Gupta & Gupta, 2021). Ma et al. (2022) states in their paper that EP is a multi-conceptual construct, which is used to examine an organization's internal process in mitigating ecological degradation through the strategic adoption of green initiatives. As seen from the above literature review, the importance of incorporating environmental factors in business activities is crucial to ensure sustainable results (Lee et al., 2024). Furthermore, the degree to which TMS knowledge about environmental protection is transformed into the formation of environmental policy depends largely on existing social and institutional pressures (Chang et al., 2022).

According to Wiredu, et al. (2024), companies are compelled through IP to adopt strategies that support societal norms and promote green environment, leading to improved EP. Similar to Ma et al. (2022) and Nguyen et al. (2023) introduces EP as a multi-dimensional variable as well that measures ability of organizations to operate in an environmentally stable manner, it can be influenced by both internal and external pressures. Thus, reaching higher EP levels involves more than mere external pressures and necessitates an internal fit, wherein the strategy,

structure, and leadership of the organization are aligned toward sustainable achievements. Based on this theoretical and empirical reasoning, the following hypothesis is proposed:

H4: Environmental management accounting has a positive effect on environmental performance.

Mediating Role of Environmental Management Systems and Environmental Management Accounting s

The preceding arguments suggest that IP may influence EP both directly and through organizational mechanisms (Reitzig & Puranam, 2009). IP provide the external motivation for firms to respond to environmental expectations, whereas EMS and EMA provide the internal mechanisms through which these expectations can be translated into environmental outcomes (Hasan, Waghule & Hasan, 2024). The sequential mediation perspective is particularly relevant because EMS and EMA perform complementary functions. IP can encourage organizations to establish formal environmental management systems (Alnaim & Metwally, 2024). Once an EMS is established, organizations require systematic environmental information to monitor environmental objectives, evaluate environmental impacts, and support continuous improvement (Khurshid et al., 2025). EMA fulfills this information requirement by providing monetary and physical environmental information. EMA can then facilitate better environmental decisions and ultimately improve environmental performance. This argument is consistent with the logic of institutional theory. Organizations respond to institutional expectations by adopting structures and practices that are viewed as legitimate and appropriate within their environment (DiMaggio & Powell, 1983). However, the adoption of formal structures alone does not necessarily guarantee improved environmental outcomes. The organizational structures must be supported by appropriate information systems and managerial decision-making mechanisms (Wang et al., 2019). An EMS establishes the organizational framework, while EMA provides information that allows managers to operationalize and monitor environmental objectives. Chaudhry et al. (2020), using data from manufacturing firms in Pakistan, demonstrated that institutional pressures significantly influence EMA implementation and that EMA subsequently contributes to environmental performance. Thus, it can be argued that institutional pressures alone may not fully explain variations in

environmental performance. Rather, external institutional expectations are translated into environmental outcomes through internal organizational systems and information-based management practices. Accordingly, EMS is expected to represent the first stage of the mechanism, followed by EMA, which ultimately contributes to improved environmental performance. **H5:** Environmental management systems and environmental management accounting sequentially mediate the relationship between institutional pressures and environmental performance.

Moderating Role of Top Management Support

Although IP can encourage firms to adopt environmental practices, the extent to which these pressures are converted into actual organizational practices may depend on internal managerial conditions. TMS is particularly important because environmental initiatives generally require organizational resources, managerial attention, employee involvement, training, and long-term commitment. Senior managers determine strategic priorities and influence the allocation of financial and human resources required for environmental initiatives. Based on Liu et al. (2025) and Swalih, Ram and Tew (2024), TMS plays an essential role in embedding EMA into any corporate framework. IP from external forces play an important part in influencing the perspective of top management regarding EP, in which case, EPs encourage management to share common environmental values and practices, thus strengthening the commitment to sustainable activities (Chang et al., 2022). TMS's commitment to environmental sustainability can be seen in terms of practical activities in an organization, like resource allocation and policies formation, which is very important in implementing EMS (Wiredu et al., 2024). Nevertheless, institutional theory alone cannot explain the differences in organizations' reactions because there are always discrepancies in organizational responses despite facing similar pressures from outside (Mady et al., 2023). Therefore, organizations' interpretation of external pressure should also be considered in explaining such phenomena. In other words, this paper hypothesizes that IP affects EP indirectly through the corporate environmental response strategy (Kong et al., 2022). Wang et al. (2019) found that top management support influenced the relationship between institutional pressures and EMA implementation. TMS is therefore expected to

strengthen the effect of institutional pressures on environmental management systems. When institutional demands are accompanied by strong managerial commitment, firms are more likely to translate external environmental expectations into formal environmental policies, objectives, monitoring systems, and continuous improvement activities. In contrast, where managerial support is weak, institutional pressures may result in symbolic compliance rather than substantive environmental management. Accordingly, the following hypothesis is proposed:

H6: Top management support positively moderates the relationship between institutional pressures and environmental management systems, such that the relationship is stronger when top management support is high.

Conceptual Framework

This study presents an integrative model to explore the impact of IP on EP using internal organizational dynamics. Based on Institutional theory, firms usually react to pressures from regulation, competition, and society by developing systems and processes that increase their legitimacy and help achieve sustainable results (Alnaim & Metwally, 2024). In this context, IP are expected to drive the adoption of EMS as a result of organizational response. EMS provides strategic direction for sustainability initiatives. However, its effectiveness depends on the availability of supporting systems. EMA plays a critical role by generating relevant financial and environmental information to support decision-making and performance evaluation (Asiaei et al., 2025)

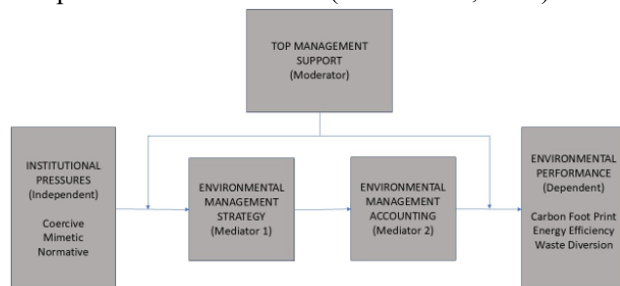


Figure 1: Conceptual Framework

RESEARCH METHODOLOGY

The current study makes use of the deductive quantitative methodology in research. This type of research methodology would be the right choice because the aim of the study is not discovery of new phenomena but to test an already existing theoretical framework through empirical evidence, specifically in terms of institutional theory. This research uses a

cross-sectional research design based on survey research, whereby data is collected to analyze the mediational effects between IP, EMS, EMA, EP, and TMS.

The population consists of manufacturing firms operating in textile, automobile, and chemical sectors located in Lahore, Faisalabad, and Rawalpindi, registered with respective Chambers of Commerce. The selection of the manufacturing sector was driven by its resource-intensive nature coupled with intense monitoring by the relevant environmental agencies and coercive and normative pressures imposed by the international exporting market. The unit of analysis is the individual employee/manager working in manufacturing firms. Respondents were selected based on their involvement in organizational environmental management, strategy, accounting, or decision-making, enabling them to provide informed responses regarding IP, EMS, EMA, TMS, and EP. Primary source of data collection was gathered through a structured and self-administered questionnaire. Institutional pressure was measured by using 6-items scale (Phan and Baird, 2015; Jalaludin, Sulaiman & Nazli Nik., 2011). This scale was used by (Gunarathne & Lee, 2021) and they reported reliability valued at 0.987. Environmental Management Strategy was measured by using 4-items scale (Wijethilake, 2017; Latan et al. 2018). This scale was used by (Gunarathne & Lee, 2021) and they reported reliability valued at 0.981. Environmental Management Accounting was measured by using 5-items scale (Wang et al., 2019; Ferreira et al., 2010). This scale was used by (Bresciani et al., 2023) and they reported reliability valued at 0.910. Top Management Support was measured by using 4-items scale (Wang et al., 2019). This scale was used by (Bresciani et al., 2023) and they reported reliability valued at 0.987. Finally, Environmental Performance was measured by using 3-items scale (Laosirihongthong, Adebaniin & Choon Tan, 2013). This scale was used by (Bresciani et al., 2023) and they reported reliability valued at 0.915.

Table 1: Measurement Scales and Reliability

Variable	Definition	No. of Items	Sources / References
Institutional Pressure (IP)	The external coercive, normative, and mimetic pressures that encourage organizations to adopt environmentally responsible practices and comply with institutional expectations.	6	Phan & Baird (2015); Jalaludin et al. (2011); Gunarathne et al. (2021)

Environmental Management Strategy (EMS)	The degree to which an organization integrates environmental concerns into its strategic planning, operations, and environmental initiatives.	4	Wijethilake (2017); Latan et al. (2018); Gunarathne et al. (2021)
Environmental Management Accounting (EMA)	The use of accounting information to identify, measure, analyses, and manage environmental costs, resource use, and environmental-related decision-making.	5	Wang et al. (2019); Bresciani et al. (2023)
Top Management Support (TMS)	The commitment and support provided by senior management through resources, policies, leadership, and strategic attention to environmental management.	4	Wang et al. (2019); Bresciani et al. (2023)
Environmental Performance (EP)	The organization's ability to reduce environmental impacts and improve outcomes through pollution reduction, resource efficiency, waste management, and other environmental initiatives.	3	Laosirihongthong et al. (2013); Bresciani et al. (2023)

Given the complexity of the proposed research model, which incorporates multiple direct relationships, a sequential two-stage mediation process involving EMS and EMA, and a moderating effect of TMS, PLS-SEM was considered an appropriate analytical technique. PLS-SEM is particularly suitable for examining complex predictive models involving multiple constructs and simultaneous relationships (Hair et al., 2019). Accordingly, SmartPLS 4 was employed as the primary software for conducting the PLS-SEM analysis.

DATA ANALYSIS AND RESULTS

Demographic Characteristics

The demographic profile of the 313 respondents demonstrates adequate diversity in terms of industry, job role, experience, educational qualification, and company size (Annex-I). Textile and garments constituted the largest industry group (20.8%), followed by food and beverages (17.6%) and pharmaceuticals (14.4%). In terms of job role, Finance and Accounts represented the largest category (13.1%), followed by IT/Systems (11.2%) and Human Resources (10.9%). Most respondents had considerable industry experience, with 42.8% reporting more than four years and 38.7% reporting 1–3 years. Educationally, 48.2% held bachelor's degrees and 37.4% master's degrees. Regarding organizational size, medium-sized firms represented the largest group (34.8%), followed by large (27.5%) and small organizations (24.6%).

Descriptive Analysis

Descriptive analysis provides an initial understanding of respondents' perceptions concerning the understudied variables. The adapted questionnaire uses a five-point Likert scale, where a higher score indicates stronger agreement with the relevant statement. The mean values range from 3.58 to 3.81, indicating that respondents generally reported moderately high levels across all constructs. TMS recorded the highest mean (3.81), whereas EMA had the lowest (3.58). Standard deviations between 0.65 and 0.73 suggest moderate variability in responses. Skewness values are negative but relatively small, indicating a slight concentration of responses toward the higher end of the Likert scale. The kurtosis values are also within acceptable ranges as suggested by Kline (2015), suggesting no serious departure from a normal distribution.

Table 2: Descriptive Statistics (n = 313)

Construct	Mean	Std. Dev.	Skewness	Kurtosis
Institutional Pressure (IP)	3.62	0.71	-0.48	0.21
Environmental Management Strategy (EMS)	3.74	0.68	-0.57	0.36
Environmental Management Accounting (EMA)	3.58	0.73	-0.39	0.12
Top Management Support (TMS)	3.81	0.65	-0.63	0.48
Environmental Performance (EP)	3.69	0.70	-0.51	0.29

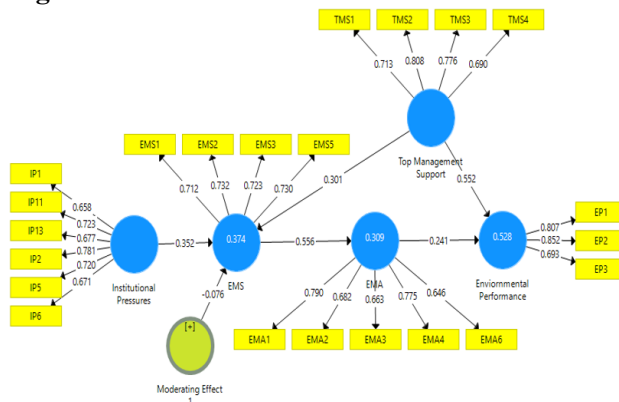
Measurement Model

Indicator Reliability. Indicator reliability is assessed using the outer loading of each questionnaire item on its respective construct. Generally, an outer loading of 0.60 or above is considered desirable because it indicates that the indicator shares substantial variance with its underlying construct. However, indicators with loadings between approximately 0.40 and 0.60 may sometimes be retained when their removal does not improve composite reliability or AVE substantially and when there is strong theoretical justification for retaining them. For this study, IP1–IP14 represent institutional pressure indicators, EMS1–EMS5 represent environmental management strategy, EMA indicators represent environmental management accounting, TMS1–TMS4 represent top management support and EP1–EP4 represent environmental performance. However, items EMA5, EMS4, EP4, TMS5, IP3, IP4, IP7, IP8, IP9, IP10, IP12, IP13 and IP14 were removed to increase indicator reliability. Table 3 presents the loadings range from 0.646 to 0.852, indicating generally acceptable indicator reliability. Most items exceed the recommended threshold of 0.60, while several items slightly below 0.60 remain acceptable where the overall construct reliability and validity are satisfactory.

Table 3: Outer Loadings

Items	EMA	EMS	EP	IP	TMS
EMA1	0.790				
EMA2	0.682				
EMA3	0.663				
EMA4	0.775				
EMA6	0.646				
EMS1		0.712			
EMS2		0.732			
EMS3		0.723			
EMS5		0.730			
EP1			0.807		
EP2			0.852		
EP3			0.693		
IP1				0.658	
IP11				0.723	
IP13				0.777	
IP2				0.781	
IP5				0.720	
IP6				0.671	
TMS1					0.713
TMS2					0.808
TMS3					0.776
TMS4					0.690

Figure 2: Measurement Model



Internal Consistency Reliability. Internal consistency evaluates whether the indicators belonging to a construct consistently measure the same underlying concept. Cronbach's alpha and composite reliability are commonly reported. A reliability coefficient of approximately 0.70 or above is generally considered acceptable for established constructs. Composite reliability is particularly appropriate in PLS-SEM because it takes into consideration the different outer loadings of indicators. Table 4 presents the reliability assessment of the five constructs using Cronbach's Alpha, rho_A, and Composite Reliability. The results demonstrate satisfactory internal consistency across all constructs, as all Cronbach's Alpha values exceed the recommended threshold of 0.70. Additionally, composite reliability values range between 0.815 and 0.856, substantially exceeding the recommended minimum of 0.70. Therefore, the measurement model demonstrates acceptable reliability, allowing the constructs to be used for subsequent analyses.

Table 4: Reliability Assessment

Construct	Cronbach's Alpha	rho_A	Composite Reliability
Institutional Pressure (IP)	0.800	0.809	0.856
Environmental Management Strategy (EMS)	0.701	0.704	0.815
Environmental Management Accounting (EMA)	0.758	0.773	0.838
Top Management Support (TMS)	0.737	0.746	0.835
Environmental Performance (EP)	0.791	0.798	0.828

Convergent Validity. Convergent validity is primarily assessed through outer loadings and the Average Variance Extracted (AVE). An AVE value of 0.50 or greater indicates that the construct explains at least 50% of the variance in its indicators. Therefore, each construct should ideally demonstrate $AVE \geq 0.50$. Table 5 suggests that the AVE values range from 0.501 to 0.619, with all constructs meeting or exceeding the recommended threshold of 0.50. Therefore, convergent validity is established for all five constructs, confirming that the measurement items adequately represent their underlying constructs.

Table 5: Convergent Validity

Construct	AVE	Recommended threshold
Institutional Pressure (IP)	0.501	≥ 0.50
Environmental Management Strategy (EMS)	0.524	≥ 0.50
Environmental Management Accounting (EMA)	0.510	≥ 0.50
Top Management Support (TMS)	0.560	≥ 0.50
Environmental Performance (EP)	0.619	≥ 0.50

Discriminant Validity. Discriminant validity is particularly important for the current study and is assessed using the Heterotrait-Monotrait ratio (HTMT). The HTMT approach is preferred because it is generally more sensitive than older approaches such as the Fornell-Larcker criterion (Hair et al., 2019). An HTMT value below approximately 0.85 or 0.90, depending on the theoretical similarity between constructs, generally indicates adequate discriminant validity. Table 6 presents the discriminant validity assessment among the five constructs. Since the values are below 0.85 which means that each construct or scale variable is empirically distinct from the other constructs in the model.

Table 6: Discriminant Validity

	EMA	EMS	EP	IP	TMS
Environmental Management Accounting (EMA)					
Environmental Management Strategy (EMS)	0.747				
Environmental Performance (EP)	0.776	0.761			
Institutional Pressure (IP)	0.756	0.708	0.724		
Top Management Support (TMS)	0.819	0.743	0.747	0.801	0.748

R-Squared (R^2)

In the present study, R^2 values were examined for the three key endogenous constructs: EMS, EMA and EP. EMS is primarily explained by IP, whereas EMA is explained by EMS. EP is subsequently explained by EMA and other predictors included in the structural model. These constructs represent the central stages through which external institutional expectations are proposed to influence organizational environmental outcomes.

Table 7: R-Squared

Construct	R Square	R Square Adjusted
EMS	0.309	0.302
EMA	0.374	0.354
EP	0.528	0.518

The R^2 results indicate the explanatory power of the structural model in predicting EMS, EMA, and EP. Institutional pressure significantly explains variation in EMS, while EMS demonstrates a strong contribution to EMA ($\beta = 0.556$, $p < 0.001$). EMA also positively influences environmental performance ($\beta = 0.241$, $p = 0.010$). The significant sequential mediation effect (IP $\rightarrow$ EMS $\rightarrow$ EMA $\rightarrow$ EP; $\beta = 0.196$, $p = 0.002$) further confirms that IP influence EP through organizational and accounting mechanisms. The difference between R^2 and Adjusted R^2 also provides information about model stability. A relatively small difference between the two measures would indicate that the explanatory power of the model is not substantially inflated by the number of predictors. This would provide evidence that the structural model remains relatively parsimonious.

Structural Model

Following confirmation of the reliability and validity of the measurement model, the structural model is assessed. The structural model focuses on the relationships between the latent variables and directly addresses the hypotheses developed in Chapter 2. The model therefore incorporates direct effects, sequential mediation and moderation. However, before interpreting the structural relationships, collinearity should be assessed using variance inflation factor (VIF). Excessive multicollinearity can distort path estimates, thereby VIF values should therefore be reviewed for the predictor constructs.

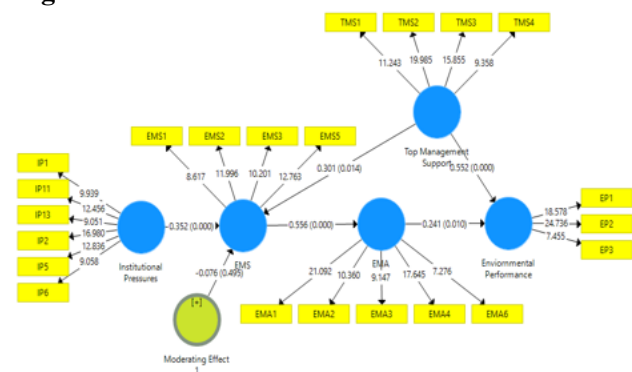
Table 8: VIF Values

Construct	VIF Value
EMA	1.618
IP	1.662
TMS	1.835
EMS	1.000

Hypothesis Testing

The hypothesis testing analysis evaluates the direction and strength of the hypothesized relationships through the path coefficient (β), while the t-value and p-value determine statistical significance. The results indicate that four of the six hypotheses are supported. Institutional pressure significantly affects environmental management

strategy, environmental management strategy significantly affects environmental management accounting, and environmental management accounting significantly affects environmental performance. Furthermore, the sequential indirect relationship between institutional pressure and environmental performance through environmental management strategy and environmental management accounting is significant. In contrast, the direct relationship between institutional pressure and environmental performance and the moderating effect of top management support are not statistically significant.

Figure 3: Structural Model

H1: IP have a positive significant effect on EP.

The path coefficient for IP $\rightarrow$ EP is $\beta = 0.047$, with a t-value of 1.758 and $p = 0.079$. Although the coefficient is positive, the p-value exceeds the 0.05 threshold, however the threshold is acceptable at 0.10 level of significance. Therefore, the relationship is not statistically significant and H1 is rejected at 0.05 level of significance. This finding suggests that IP alone may not automatically translate into improved EP. Organizations may experience regulatory, normative and competitive pressures without these pressures directly producing measurable environmental improvements. Instead, organizations may first need to translate such pressures into internal strategies, systems and management practices. The finding is consistent with Pham et al. (2023), who examined 253 Vietnamese manufacturing SMEs and found that coercive, normative and mimetic institutional pressures did not have a direct effect on environmental performance, although they indirectly improved performance through environmental management practices. The result nevertheless contrasts with Chaudhry et al. (2020), who found that coercive, mimetic and normative pressures were significant drivers of environmental performance among Pakistani manufacturing firms. Likewise, Delmas and Toffel (2004) showed that stakeholder and institutional pressures influence firms' environmental management practices. These differences may reflect variations in industry, institutional environment and the mechanisms through which pressure is converted into environmental outcomes.

H2: IP have a positive significant effect on EMS.

The relationship between IP and EMS is positive and significant ($\beta = 0.352$, $t = 3.570$, $p = 0.000$). Therefore, H2 is accepted/supported. The positive coefficient indicates that stronger IP are associated with greater development and implementation of EMS. The finding is consistent with institutional theory, which proposes that organisations adapt their structures and strategies to conform to expectations established by regulators, stakeholders, professional groups and competitors. Gunarathne et al. (2021) found statistically significant evidence that the institutional environment positively affects environmental management strategies. Similarly, research on European EMAS-certified organisations found that institutional pressures, particularly mimetic and normative pressures, stimulate environmental management and strategic responses.

H3: EMS positively influences EMA.

The path from EMS $\rightarrow$ EMA is $\beta = 0.556$, with a t-value of 6.807 and $p = 0.000$. This is the strongest direct relationship among the principal relationships tested in the model. The results therefore provide strong evidence that organisations with stronger environmental management strategies are more likely to implement environmental management accounting practices. The finding is strongly consistent with Gunarathne et al. (2021), who specifically investigated how environmental management strategy is translated into organisational outcomes through EMA. Their results indicate that environmental strategy is positively associated with performance and that EMA plays an important mediating role. Similarly, Latan et al. (2018) examined environmental strategy, top management commitment and environmental uncertainty and highlighted the role of EMA in translating environmental management orientation into environmental performance.

H4: EMA has a positive significant effect on EP.

The path coefficient for EMA $\rightarrow$ EP is $\beta = 0.241$, with a t-value of 2.603 and $p = 0.010$. Since the p-value is below 0.05, the relationship is statistically significant and positive. Accordingly, H4 is supported. This finding is consistent with a substantial body of empirical literature. Hasan, Waghule and Hasan (2024) found a positive direct relationship between EMA and environmental performance among 299 manufacturing SMEs, while also identifying an important role for top management support. Chaudhry et al. (2020) similarly found that implementation of EMA

contributes to environmental performance and mediates the relationship between institutional pressures and performance. Likewise, Latan et al. (2018) identified EMA as an important mechanism linking environmental strategy and corporate environmental performance.

H5: EMS and EMA sequentially mediate the relationship between IP and EP.

The specific indirect pathway IP $\rightarrow$ EMS $\rightarrow$ EMA $\rightarrow$ EP has a positive coefficient of $\beta = 0.196$, with a t-value of 3.057 and $p = 0.002$. The p-value is below 0.05, demonstrating that the sequential indirect effect is statistically significant. Therefore, H5 is supported. This result provides one of the most important findings of the study because it explains why H1 was not supported. Institutional pressure does not appear to improve environmental performance directly. Instead, institutional pressures encourage organisations to establish environmental management strategies, these strategies stimulate EMA adoption, and EMA subsequently contributes to environmental performance. This finding is highly consistent with Pham et al. (2023), who found that institutional pressures improved environmental performance indirectly through environmental management practices while the direct relationship was insignificant. Similarly, Gunarathne et al. (2021) found that IP influence EMS and that EMA helps translate environmental strategy into performance outcomes. Finally, evidence on environmental management systems indicates that institutional pressures influence the comprehensiveness of environmental systems and that more comprehensive systems are associated with stronger environmental performance.

H6: TMS positively moderates the relationship between IP and EMS.

The interaction term IP $\times$ TMS $\rightarrow$ EMS has a coefficient of $\beta = -0.076$, with a t-value of 0.682 and $p = 0.495$. Since the p-value is substantially above 0.05, the moderation effect is statistically insignificant. Furthermore, the negative coefficient is inconsistent with the hypothesized positive moderating direction. Therefore, H6 is rejected. The result differs from Wang et al. (2019), who found that top management support positively moderated some relationships between institutional pressures and EMA implementation, particularly coercive and normative pressures. Similarly, the present finding does not necessarily imply that top management support is unimportant. Rather, it indicates that TMS does not significantly alter the specific IP–EMS

relationship in this sample. The influence of institutional pressure on strategy may be sufficiently strong through regulatory and stakeholder mechanisms that additional managerial support does not significantly change the relationship. Furthermore, top management support may have a direct effect on environmental practices or may moderate a different relationship, such as EMA–EP, rather than IP–EMS. This interpretation is also compatible with the broader literature, which shows that the effects of institutional pressures and managerial factors can vary according to the type of pressure and organizational context.

CONCLUSION

The study examined how institutional pressures influence environmental performance through EMS and EMA, while assessing the moderating role of TMS. The findings demonstrate that IP significantly influence EMS, which subsequently promotes EMA and environmental performance. The study also confirmed that IP alone do not directly improve EP, whereas confirming significant sequential mediation through EMS and EMA. However, TMS did not significantly moderate the institutional pressure–EMS relationship, suggesting its influence may operate through alternative pathways. The study supports institutional theory by showing that IP significantly influence EMS. However, their effect on EP is indirect, operating through EMS and EMA. For practitioners, the findings highlight the importance of developing environmental strategies and accounting systems that identify environmental costs, resource inefficiencies, and improvement opportunities. Policymakers should complement environmental regulations with technical guidance, incentives, training, and reporting frameworks to help organizations translate external institutional pressures into effective internal environmental practices and improved environmental performance. Future research should employ longitudinal designs to better establish causal relationships and examine organizational changes over time. Larger and geographically diverse samples could improve generalizability and enable comparisons across countries, industries, and organization sizes. Researchers should also incorporate objective EP indicators, including emissions, energy use, waste, and water consumption. Future studies could also examine alternative mediators such as environmental innovation, green culture, and green supply-chain management.

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ANNEX I: SUMMARY OF RESPONDENTS' DEMOGRAPHIC CHARACTERISTICS

Demographic Variable	Category	Frequency	Percent (%)
Industry Sector	Textile & Garments	65	20.8
	Food & Beverage	55	17.6
	Pharmaceutical	45	14.4
	Chemicals & Petrochemicals	42	13.4
	Automotive & Auto Parts	38	12.1
	Cement & Construction Materials	32	10.2
	Steel & Metal Products	21	6.7
	Electronics & Electrical Equipment	15	4.8
Job Role/Department	Finance & Accounts	41	13.1
	IT / Systems	35	11.2
	Human Resources	34	10.9
	Marketing & Sales	28	8.9
	Administration	25	8.0
	Environmental / EHS	25	8.0
	Audit & Taxation	22	7.0
	Management (Senior)	20	6.4
	Operations & Production	19	6.1
	Management (Middle)	17	5.4
	Data Analyst	15	4.8
	Engineering	15	4.8
	Customer Services	9	2.9
Industry Experience	Lecturer / Academic	8	2.6
	Less Than 1 Year	58	18.5
	1-3 Years	121	38.7
	More Than 4 Years	134	42.8
Educational Qualification	Bachelor's Degree	151	48.2
	Master's Degree	117	37.4
Company Size	Professional Certification (e.g., CPA, ACCA)	45	14.4
	Micro	41	13.1
	Small	77	24.6
	Medium	109	34.8
	Large	86	27.5
Total		313	100.0