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Corporate environmental management and financial disclosure in Bangladesh

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Abstract
Purpose: This study evaluates EMA practices and proposes policies for broader adoption.
Method: In January 2022, Dhaka Stock Exchange (DSE)-listed companies were methodically analyzed. 61 manufacturing companies were selected from 181 after exclusion. Interviews, structured questionnaires, and 2020–2022 corporate annual reports were used to collect data. A multiple regression model calculated and assessed the Corporate Environmental Management Reporting Index (CEMRI), using total assets, sales, stock prices, and board size as independent variables.
Results: Sector-wise analyses showed differences in EMA adoption. In the textile industry, total sales and board size positively influence CEMRI, while stock price negatively but statistically insignificantly affects it. Total assets are positively associated with CEMRI in the pharmaceutical industry; however, other characteristics are negatively connected. CEMRI and financial indicators were slightly correlated in food and associated industries. Sales fell, while stock prices and assets rose in the ceramic industry. EMA reporting was most predictable in the fuel and power sectors, where total assets, revenue, and stock prices affected CEMRI.
Conclusions: This study highlights the uneven adoption of Environmental Management Accounting across manufacturing sectors in Bangladesh and underscores the need for stronger policies, regulatory frameworks, and corporate commitment to promote sustainable business practices.
Limitations: The study is limited to manufacturing enterprises and a specific timeframe (2020–2022), potentially affecting generalizability.
Contribution: The findings guide policymakers and managers to strengthen sustainable corporate accountability in Bangladesh.

Keywords: *Bangladesh, CEMRI, Dhaka Stock Exchange (DSE), Environmental Management Accounting (EMA)*

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1. Introduction

Several seminal international conferences have shaped worldwide dedication to sustainable development and environmental preservation. The 1972 Stockholm United Nations Conference on the Human Environment was the first large gathering of its kind. The main goal of this meeting was to protect and improve the human environment while mitigating its adverse effects. This led to the creation of a document titled "Universal Declaration on the Protection and Preservation of the Human Environment" (Chuang & Huang, 2018).

Rio de Janeiro hosted the second international meeting, the Earth Summit, twenty years later, in 1992. This gathering focused on sustainable development, adding 27 additional principles to those already established in the 1972 Stockholm Conference (Anthony Jr, 2019). The third conference,

Rio+20, which focused on sustainable development, was held in Rio de Janeiro in 2012, another 20 years after the first two. In keeping with the objectives of the Earth Summit 1992, this meeting drafted a declaration describing concrete plans to attain sustainability through social progress, economic expansion, and environmental preservation (Baah et al., 2021).

After these summits, the world community built upon the Millennium Development Goals (MDGs) and created the Sustainable Development Goals (SDGs). Environmental management is directly addressed by multiple Sustainable Development Goals (SDGs) out of the 17 total (Le, Nguyen, & Phan, 2019). These include SDG 6 (sanitation and clean water), SDG 7 (energy for all), SDG 8 (good employment and economic growth), SDG 9 (innovation and infrastructure), and SDG 12 (sustainable consumption and production). Industrial operations are a major cause of environmental degradation. Therefore, effective environmental management is essential for corporate responsibility (Aluonzi, Byamukama, Marus, & Charity, 2024; Zeng, Lee, & Lo, 2020). Environmental Management Accounting (EMA) is a subfield of accounting that aims to solve this problem by incorporating ecological and economic factors into business decisions (Scarpellini, Marín-Vinuesa, Aranda-Usón, & Portillo-Tarragona, 2020).

The International Federation of Accountants defines Environmental Management Accounting (EMA) as the process of managing economic and environmental performance through the development and implementation of applicable accounting procedures and systems (Danso, Adomako, Amankwah-Amoah, Owusu-Agyei, & Konadu, 2019). The EMA's standard components are strategic environmental planning, benefit assessment, life-cycle costing, and full-cost accounting. According to Deb, Saha, and Rahman (2020), Environmental Reporting (ER) has become more important in corporate governance due to EMA. Regarding sustainable development, ER is crucial because it encourages openness regarding how industrial operations affect the environment (Ghauri, Grønhaug, & Strange, 2020).

Several national and international groups have endeavored to construct legal frameworks for environmental reporting, including the UNEP and UNCTAD, among others. Some of the most significant projects in this field include ISO 14001:2015 and the Global Reporting Initiative (GRI). A growing number of nations require companies to disclose their environmental performance. Companies are now required to report their environmental impact in several countries, including the United States, Netherlands, Norway, and Sweden, with Denmark being the pioneer. Evangelista and Durst (2015) note that public corporations in Canada are required to include a section in their annual reports discussing the impact of environmental legislation on their operations and finances.

Hadj (2020) notes that environmental protection in Bangladesh is firmly established by statutes such as the Bangladesh Environment Conservation Act (1995). Nevertheless, the Income Tax Ordinance (1984), Securities and Exchange Commission Rules (1987), Bangladesh Financial Reporting Standards, and Bangladesh Accounting Standards do not compel environmental accounting disclosures. This disparity highlights the importance of EMA in promoting corporate responsibility and ecological preservation (Hair, Risher, Sarstedt, & Ringle, 2019; Mondal, Akter, & Polas, 2023).

As a result of its rapid industrialization, the already densely populated nation of Bangladesh is confronted with formidable environmental threats (Iredele, Tankiso, & Adelowotan, 2020; Kansara, 2023). The percentage of GDP attributable to industry increased from 30.42% in 2014–15 to 31.54% in 2015–16 was the percentage of GDP attributable to industry (Bangladesh Bureau of Statistics). In 2015–16, manufacturing contributed 21.01% of GDP, up from 20.16% the year before. Corporate sectors have garnered much attention in the country's Five-Year Plans and Vision 2021 framework, which makes sense considering the emphasis on industrialization for economic growth and poverty reduction (Gunarathne, Lee, & Hitigala Kaluarachchilage, 2021; Latif, Mahmood, Tze San, Mohd Said, & Bakhsh, 2020).

Industrialization has increased environmental risks in Bangladesh, notwithstanding its positive effects on the economy. The lack of proper effluent treatment facilities for many businesses, such as those

dealing with textiles, tanneries, chemicals, and shipbreaking, results in significant pollution (Jermsittiparsert, Somjai, & Toopgajank, 2020). A total of 1,176 manufacturing facilities around the nation have been identified by the Department of Environment (DoE) as significant sources of pollution. Extensive environmental deterioration has occurred because of the unregulated discharge of industrial waste into water bodies, which poses significant risks to public health and biodiversity (Mondal, Akter, Moni, & Polas, 2023; Niu, Chang, Yang, & Wang, 2017).

Businesses in Bangladesh are not very forthcoming about their effects on the environment, since no laws require them to do so. There is a lack of corporate responsibility, and stakeholders cannot make educated judgments because of the environmental data missing from financial reports. However, environmental reporting is becoming an increasingly voluntary practice for businesses worldwide, and some nations have even made it required. Environmental reporting is still in its early stages in Bangladesh, with no rules for consistent reporting (Kansara, 2022; Sari, Pratadina, Anugerah, Kamaliah, & Sanusi, 2021).

To address this issue, corporate sectors must be guided by a structured EMA framework to incorporate environmental factors into their financial reports. Improving corporate transparency and contributing to sustainable economic growth can be achieved by raising awareness and applying standardized EMA procedures (Yang Spencer, Adams, & Yapa, 2013). This study intends to fill this void by investigating how EMA is being used and what benefits it could bring to Bangladesh's business sector, hoping to bolster the country's efforts to achieve environmental sustainability.

1.1 Objective

The primary objective of this study is to assess the corporate Environmental Management Accounting (EMA) system in Bangladesh, evaluating its current status and potential for implementation in corporate sectors. Given the increasing environmental concerns arising from business activities and the global shift toward corporate environmentalism, this study aims to bridge the knowledge gap in EMA and promote sustainable business practices.

Specific Objectives:

1. **Review of Existing Literature and Standards**
   a. Identify and analyze the existing literature, guidelines, codes, and standards related to corporate Environmental Management Accounting (EMA) at national and international levels.
2. **Development of Conceptual and Implementation Frameworks**
   a. Establish a theoretical and practical framework for EMA to aid corporate organizations in integrating environmental management into their accounting and operational strategies.
3. **Evaluation of Corporate EMA Practices in Bangladesh**
   a. Assess the current practices of corporate EMA in Bangladesh based on the developed framework and identify gaps in awareness and implementation among business organizations.
4. **Identification of Key Implementation Factors**
   a. Examine the critical factors influencing EMA adoption and execution in the corporate sector, including regulatory compliance, managerial commitment, and financial feasibility.
5. **Policy Recommendations for EMA Implementation**
   a. Policy suggestions are provided to facilitate the effective implementation of the EMA in Bangladesh, ensuring alignment with national sustainability strategies, global environmental policies, and long-term corporate sustainability goals.

Through these objectives, this study aims to highlight the significance of EMA in protecting the environment from industrial activities, supporting Bangladesh's National Sustainable Development Strategy (NSDS), promoting eco-friendly products and services, enhancing corporate efficiency, and ensuring global competitiveness in international trade. These findings will serve as valuable resources for policymakers, corporate managers, and stakeholders striving for sustainable business practices.

2. Research Methodology

2.1 Methodology of the Study

The study employs a systematic approach to assess corporate Environmental Management Accounting (EMA) practices in Bangladesh. The methodology included defining the study population and sample, identifying data sources, employing content analysis, and utilizing statistical techniques for data analysis.

2.2 Population and Sample

This study considers all firms listed on the Dhaka Stock Exchange (DSE) as of January 2022. Of the 563 listed firms across 22 sectors, specific sectors such as Treasury Bonds (221), Mutual Funds (35), Corporate Bonds (2), and Debentures (8) were excluded due to their nature of issuance. Additionally, Financial Institutions, including banks (30), financial institutions (23), insurance (47), Travel & Leisure (4), and miscellaneous (12), were excluded as they are non-manufacturing sectors.

After these exclusions, the net study population comprised 181 firms. Due to budgetary and time constraints, a sample of 61 firms, representing more than 25% of the population, was selected for the study, while the standard sample size was 123.

2.3 Sources of Data and Data Collection

This study relies on both primary and secondary data sources.

1. **Primary Data:** Collected through structured questionnaires and interviews with key stakeholders.
2. **Secondary Data:** The primary secondary data source is the annual reports of the sampled firms. A content analysis method was employed to extract relevant data. Content analysis is "a technique of gathering data that consists of codifying qualitative information in anecdotal and literary form into categories in order to derive quantitative scales of varying levels of complexity."

2.3 Data Analysis

To analyze the data, the following steps were undertaken:

1. Constructing the Checklist for Secondary Data

A checklist was developed to examine the current EMA practices of the sampled firms. The study analyzed annual reports for two years (2020–2022), resulting in a total of 305 (5 × 61) reports reviewed. The checklist was developed based on relevant theories, literature, past studies, EMA codes, and guidelines, along with consultations with academicians and professionals.

2. Scoring the Items in the Checklist

A dichotomous (binary) approach was used for scoring. If an item was reported, it received a score of one (1); if it was not reported, it received a score of zero (0).

3. Calculation of the Corporate Environmental Management Reporting Index (CEMRI)

CEMRI was computed using the following formula:

$$\text{CEMRI} = \frac{Total\ Number\ of\ Items\ Actually\ Reported\ in\ the\ Annual\ Report}{Maximum\ Number\ of\ Items\ Expected\ to\ be\ reported\ in\ the\ Annual\ Report\ (75)}$$

2.4 Regression Analysis

A multiple regression model was used to analyze the data, where CEMRI served as the dependent variable and selected corporate-specific financial and non-financial characteristics acted as independent variables. The regression model is formulated as follows:

$$Y = \beta° + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta 4X4 + \varepsilon$$

$$\text{EMA Practices} = \beta° + \beta 1TA + \beta 2TS + \beta 3SP + \beta 4BS + \varepsilon$$

Where:
Y = EMA Practices (CEMRI)
TA = Total Assets of the company
TS = Total Sales of the company
SP = Stock Price

BS = Board Size is the intercept, and and are the regression coefficients.

This methodology ensures a comprehensive evaluation of EMA practices and contributes to a better understanding of corporate environmental accountability in Bangladesh.

2.5 Conceptual Framework of The Study

2.5.1 Definition of Environmental Management Accounting

Accounting, management, and environmental science combine in Environmental Management Accounting (EMA). Because it incorporates environmental costs and resource use into conventional accounting methods, it helps connect environmental issues with financial decision-making. Burritt (2005) asserts that EMA is vital for providing helpful information to stakeholders inside and outside of an organization, which in turn helps with the sustainable allocation of monetary and material resources.

2.5.2 Social Accounting

A company's social and environmental impacts can be measured by social accounting, which is also called social responsibility accounting. It includes various concepts such as environmental reporting, socio-economic accounting, and social audits. As an outgrowth of social accounting, EMA assists businesses in evaluating and disclosing their impact on the environment and has strong ties to CSR.

2.5.3 Environmental Accounting

Accounting for environmental impacts encompasses a wide range of practices aimed at quantifying and controlling expenses. In the 1970s, Norway was an early adopter of environmental accounting, a practice that would subsequently catch on to other developed nations (Shil & Iqbal, 2005). Environmental accounting has become an indispensable resource for governments and enterprises, facilitating well-informed sustainability and environmental preservation choices. When environmental data are integrated with traditional financial indicators, decisions are made better by uncovering hidden costs and long-term sustainability implications (Alewine & Stone, 2013).

2.5.4 Conventional Accounting

There are three main parts of conventional accounting: monetary, financial, and regulatory accounting. Financial accounting guarantees that companies reveal their environmental liabilities and expenditures according to predetermined standards, whereas monetary accounting is more concerned with monitoring environmental expenses inside internal operations. However, tax accounting and banking regulation compliance are parts of regulatory accounting that impact financial reporting on environmental expenses (Schaltegger, Hahn, & Burritt, 2000).

2.5.5 Ecological Accounting

Ecological Accounting can be classified into three categories:
Internal Ecological Accounting: Helps management track ecological metrics within an organization using physical units of measurement.
External Ecological Accounting – Provides environmental data to external stakeholders such as investors, regulatory bodies, and NGOs.
Regulatory Ecological Accounting – Ensures compliance with environmental regulations and standards (Schaltegger & Burritt, 2017).

2.5.6 Environmental Management Accounting

The EMA focuses on sustainable business practices, which have developed as a subfield of C-suite environmental accounting. It was developed to incorporate monetary and non-monetary environmental data to overcome the shortcomings of traditional management accounting. According to Shil and Iqbal (2005) and Wu, Yang, and Zhou (2020), EMA is essential in assisting firms in coordinating their operational activities with environmental goals. EMA mainly offers two types of data:

1. The consumption of materials, energy consumption, trash production, and emissions are all examples of non-monetary environmental statistics.

2. The costs of pollution treatment, tax breaks for environmentally friendly projects, and the price tag on meeting all of the rules and regulations are all part of the monetary environmental dataset (Burritt, Hahn, & Schaltegger, 2002).
3. The usefulness of EMA in business decision making is enhanced by integrating it with technological improvements. Technological advancements have made it easier for companies to balance their environmental and financial objectives by streamlining data gathering, processing, and reporting. Schaltegger and Burritt (2017) state that EMA's involvement in management technology goes beyond conventional accounting practices by integrating techniques that prioritize sustainability.

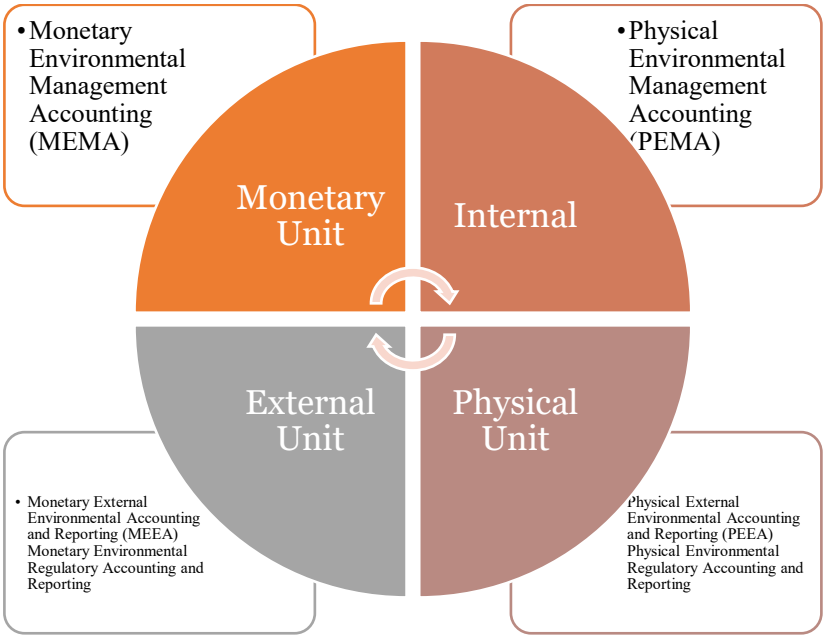

Figure 1. Types of Environmental Accounting.

3. Results and discussions

3.1 Textile Industry

To comprehend the connection between the Corporate Environmental Management and Reporting Index (CEMRI) and critical independent variables, the textile industry—a substantial part of the Dhaka Stock Exchange (DSE)—was studied. Twenty textile companies were chosen for this study from a pool of forty-eight. The effects of independent variables on CEMRI were examined using descriptive statistics and regression analysis. The correlation between CEMRI and the explanatory variables (TS, BS, and SP) was investigated using the regression model. The independent variables accounted for 93.3% of the variance in CEMRI, as indicated by the R-squared value of 0.933. After controlling for the number of predictors, the model explained 73.2% of the variance in CEMRI, as indicated by the adjusted R-squared value of 0.732. Based on the coefficient values, the multiple regression equation for the textile industry is derived as follows:

$$CEMRI = -56.354 + 0.001(TS) + 5.028(BS) - 0.083(SP)$$

This equation suggests that Total Sales and Board Size have a positive influence on CEMRI, while Share Price has a negative influence. However, the individual impacts were not statistically significant, highlighting the need for further analysis with a larger sample size or additional variables.

3.2 Pharmaceutical Industry

To investigate the connection between CEMRI and some independent factors, we looked at the pharmaceutical business, a significant part of the Dhaka Stock Exchange (DSE). We were able to conveniently select 15 of the 28 pharmaceutical companies from this list for this study. A combination of descriptive statistics and regression analysis was used to assess how the independent variables affected CEMRI. Evaluating the connection between CEMRI and some explanatory variables (BS, SP,

TA, and TS) was the goal of developing the regression model. Based on these coefficients, the multiple regression model for the pharmaceutical industry is as follows:

CEMRI = 96.858 - 0.002(TS) + 0.002(TA) - 4.952(BS) - 0.007(SP)

This equation suggests that Total Assets have a positive influence on CEMRI, while Total Sales, Board Size, and Share Price have a negative influence. However, the results were not statistically significant, and the perfect fit of the model indicated potential issues with the data or model specification.

3.3 Food and Allied Industries

The food and allied industries, a significant sector in the Dhaka Stock Exchange (DSE), were analyzed to examine the relationship between the Corporate Environmental Management and Reporting Index (CEMRI) and the selected independent variables. Of the 18 listed companies in this sector, 10 were randomly selected as the sample for this study. Descriptive statistics and regression analyses were conducted to evaluate the impact of the independent variables on CEMRI.

1. Constant: 6.104 (p = 0.863), indicating the baseline value of CEMRI when all independent variables were zero.
2. Total Sales (TS) Coefficient = -0.016 (p = 0.574), suggesting a negative but statistically insignificant relationship with CEMRI.
3. Share Price (SP): Coefficient = 0.000 (p = 0.999), indicating no relationship with CEMRI.
4. Total Assets (TA): Coefficient = 0.008 (p = 0.318), showing a positive but statistically insignificant relationship with CEMRI.

Based on these coefficients, the multiple regression model for the food and allied industries is as follows:

CEMRI = 6.104 - 0.016(TS) + 0.000(SP) + 0.008(TA)

This equation suggests that Total Assets have a positive influence on CEMRI, while Total Sales have a negative influence. However, the results are not statistically significant, and Board Size (BS) does not appear in the equation because of its constant value across the sample.

3.4 Ceramic Industries

This study aimed to analyze the ceramic industry, a niche sector in the Dhaka Stock Exchange (DSE), and determine the relationship between the Corporate Environmental Management and Reporting Index (CEMRI) and certain independent variables. Three of the five ceramic companies were chosen for this study, and descriptive statistics and regression analysis were used to assess the impact of these variables on CEMRI. The results showed that the independent variables explained 87.9% of the variance in CEMRI (R-squared value of 0.879). After adjusting for the number of predictors, the model explained 51.6% of the variance in the CEMRI scores (R-squared value of 0.516). The results from the ANOVA test indicated that the F-statistic was 2.424, with a significance level of 0.434. Overall, the results indicate that the ceramic industry is a niche sector in the DSE. Based on the coefficients, the regression equation is formulated as

CEMRI = -164.517 - 0.009(TS) + 1.068(SP) + 0.018(TA)

This equation indicates that

1. Total Sales (TS) has a negative but insignificant effect on CEMRI.
2. Share Price (SP) has a positive effect, though statistically insignificant.
3. Total Assets (TA) also shows a positive but weak impact on CEMRI.

The regression model suggests that while Total Assets and Share Price have a positive influence on CEMRI, their statistical insignificance indicates that other factors may better explain variations in environmental reporting in ceramic industries.

3.5 Fuel and Power

This study investigates the connection between the Corporate Environmental Management and Reporting Index (CEMRI) and certain independent variables in the fuel and power industry, a vital part of the Dhaka Stock Exchange (DSE). Of the 18 listed companies in this industry, 10 were selected as the sample for this study. The effects of independent variables on CEMRI were examined using descriptive statistics and regression analysis. Considered here are BS, CEMRI, SP, TA, and TS, which represent Board Size, Corporate Earnings Per Share, and Total Sales, respectively. A regression model was used to analyze the connection between CEMRI and the independent variables (TA, SP, and TS). With an R-squared value of 0.977, the independent factors account for 97.7 per cent of the variation in CEMRI. The adjusted R-squared value of 0.907 suggests that the model explains 90.7% of the variance in CEMRI after adjusting for the number of predictors. With a significance level of 0.193, the F-statistic from the ANOVA test was 14.051. Perhaps because of the small sample size, the results show that the model does not meet the conventional criteria for statistical significance (e.g., $p < 0.05$). Based on the coefficients, the multiple regression model for the fuel and power industries is as follows:

$$CEMRI = -73.293 - 0.025(TS) + 0.040(SP) + 0.015(TA)$$

This equation indicates that

1. The regression model indicates that all coefficients are significant.
2. Board size (BS) has no correlation with CEMRI and was therefore excluded from the model.
3. The explanatory variables collectively explained 97.7% of the variability in CEMRI, making the model highly predictive for the fuel and power industry.

These findings suggest that financial indicators such as total assets (TA), total sales (TS), and share price (SP) have a substantial influence on corporate environmental management reporting in the fuel and power sectors.

3.6 Jute Industry

To investigate the connection between CEMRI and some independent factors, we looked at the jute industry, a historically important part of the Dhaka Stock Exchange (DSE). This study's sample consists of two listed jute enterprises. The effects of independent variables on CEMRI were examined using descriptive statistics and regression analysis. Considered here are BS, CEMRI, SP, TA, and TS, which represent Board Size, Corporate Earnings Per Share, and Total Sales, respectively. Notably, there is no variability in the Board Size (BS) variable, as it remains constant across all sampled organizations. CEMRI ranged from 27% to 45%, averaging 34.6%. Regression analysis was performed to investigate the connection between CEMRI, the dependent variable, and the independent variables SP, TS, and TA. A good fit was evident because the regression model accounted for 91.2% of the variation in CEMRI. With an R-squared value of 0.912, the independent factors accounted for 91.2% of the variation in CEMRI. An adjusted R-squared value of 0.649 indicated that the model adequately explained 64.9% of the variance in CEMRI after controlling for the number of predictors. The ANOVA test yielded an F-statistic of 3.468, statistically significant at the 0.371 level. Perhaps because of the limited sample size, the results show that the model does not meet the traditional criteria for statistical significance (e.g., $p < 0.05$). Based on these coefficients, the multiple regression model for the jute industry is as follows.

$$CEMRI = -26.854 + 0.000(TS) + 0.014(TA) - 0.102(SP)$$

This equation suggests that Total Assets have a positive influence on CEMRI, while Share Price has a negative influence. However, the results are not statistically significant, and Board Size (BS) does not appear in the equation because of its constant value across the sample.

3.7 Paper Industry

An analysis was conducted on the paper industry, a specific subset of the Dhaka Stock Exchange (DSE), to determine the nature of the link between CEMRI and certain independent factors. This study used

data from one of the two paper firms. A regression model was employed to investigate the relationship between CEMRI findings and the aforementioned independent variables. The independent factors accounted for 99.5% of the variance in CEMRI, as indicated by the R-squared value of 0.995. After accounting for the number of predictors, the model explained 98.1% of the variance in CEMRI, as indicated by the adjusted R-squared value of 0.981. The ANOVA test yielded an F-statistic of 70.312, which was statistically significant at the 0.087 level. The small sample size is probably due to the model's lack of statistical significance at conventional levels (e.g., $p < 0.05$).. Based on the coefficients, the multiple regression model for the paper industry is as follows:

CEMRI = 13.837 - 0.001(TS) + 0.004(TA) + 0.024(SP)

This equation suggests that total assets and share prices have a positive influence on CEMRI, while Total Sales have a negative influence. However, the results are not statistically significant, and Board Size (BS) does not appear in the equation because of its constant value across the sample.

3.8 Overall Analysis of Sampled Firms

Table 1. Industry-wise descriptive statistics of CEMRI.

Industry	Minimum (%)	Maximum (%)	Average (%)	Standard Deviation
Textile	60	76	67	8
Food and Allied	20	33	24	5
Pharmaceutical	35	59	46	9
Ceramic	30	60	46	11
Paper	20	25	21	2
Jute	27	45	34	7
Fuel and Power	20	35	27	6

The textile industry has the highest CEMRI, with an average of 67% and a range between 60% and 76%. The paper industry had the lowest average CEMRI (21%), suggesting the adoption of limited environmental management and reporting practices. Moreover, the ceramic industry showed the highest variability in CEMRI (standard deviation = 11), indicating significant differences in environmental practices among firms in this sector.

Table 2. Industry wise regression equation

Industry	Regression Equation	Comments
Textile	CEMRI = -56.354 + 0.001(TS) + 5.028(BS) - 0.83(SP)	Total Assets (TA) has no correlation with CEMRI.
Food and Allied	CEMRI = 6.14 - 0.16(TS) + 0.00(BS) + 0.083(SP)	Total Sales (TS) has no relationship with CEMRI.
Fuel and Power	CEMRI = -73.293 - 0.025(TS) + 0.40(SP) + 0.015(TA)	Board Size (BS) has no correlation with CEMRI.
Paper	CEMRI = 13.83 - 0.001(TS) + 0.004(TA) + 0.24(SP)	Board Size (BS) has no correlation with CEMRI.

Pharmaceutical	CEMRI is independent of explanatory variables.	No significant relationship between CEMRI and independent variables.
Ceramic	CEMRI = -164.517 - 0.009(TS) + 1.068(SP) + 0.018(TA)	Board Size (BS) has no impact on CEMRI.
Jute	CEMRI = -26.85 - 0.00(TS) + 0.40(SP) + 0.015(TA)	Board Size (BS) has no correlation with CEMRI.

The analysis revealed significant variations in environmental management and reporting practices across industries. The textile industry leads in CEMRI, whereas the paper industry lags. Regression analysis indicates that Board Size (BS) has no significant impact on CEMRI in any sector, while Total Sales (TS) and Total Assets (TA) show inconsistent relationships. These findings underscore the need for industry-specific strategies to improve environmental management and reporting practices and further research to identify additional factors influencing CEMRI.

3.9 Interpretation of Statistically Insignificant Variables

The regression analysis revealed that board size (BS) and other financial variables (e.g., total sales and total assets) had no statistically significant impact on CEMRI across all industries. While this may seem counterintuitive, several practical explanations have emerged.

Governance versus Environmental Accountability

The lack of correlation between board size and CEMRI suggests that corporate governance structures in Bangladesh are not yet aligned with environmental accountability. Unlike in developed economies (e.g., Norway, Sweden), where board oversight often mandates sustainability reporting (Kapiyangoda & Gooneratne, 2021), Bangladeshi boards may prioritize financial performance over environmental disclosures due to weak regulatory pressure (Kraus, Rehman, & García, 2020).

Practical Implications: Policymakers should revise corporate governance codes (e.g., SEC guidelines) to mandate environmental committees within boards, mirroring practices in ISO 14001-certified firms (Gunarathne et al., 2021).

3.10 Financial Metrics and Voluntary Reporting

The insignificance of total sales (TS) and total assets (TA) implies that the financial scale does not inherently drive EMA adoption. This contrasts with global trends, where larger firms typically disclose more due to stakeholder scrutiny (Omran, Zaid, & Dwekat, 2021). In Bangladesh, even large firms in the textile sector (average CEMRI: 67%) may lack internal EMA expertise or perceive reporting as a nonstrategic cost (Mandal & Bagchi, 2016).

Practical Implications: Capacity-building programs (e.g., training on GRI standards) should target CFOs and mid-level managers to integrate EMA into financial decision-making.

3.11 Sector-Specific Dynamics

Despite insignificant variables, the textile industry's higher CEMRI (67%) suggests that international supply chain pressures (e.g., EU buyer requirements) may outweigh internal governance or financial factors. Conversely, the paper industry's low CEMRI (20%) reflects domestic market isolation from such pressure (Rahman & Akhter, 2021).

Practical Implications: Sector-specific incentives (e.g., tax breaks for EMA adoption) could bridge this gap, particularly for industries with low global visibility (e.g., jute and ceramics).

The study's findings show the importance of Environmental Management Accounting (EMA) in corporate sustainability strategies. Based on the data, it is clear that different industries have vastly different levels of compliance with the Corporate Environmental Management Reporting Index

(CEMRI). For example, although 67% of the textile industry is fully compliant, only 20% of the paper industry is fully compliant. According to Christine, Yadiati, Afiah, and Fitrijanti (2019), there seems to be a correlation between the variation in environmental reporting and the fact that sectors such as pharmaceuticals and textiles have a greater environmental influence. Environmental disclosures are important to businesses, but overall compliance is still low. Thus, more enforcement and education are required (Gholami, Sulaiman, Ramayah, & Molla, 2013; Kansara, 2021).

Increasingly, people worldwide are starting to view environmental reporting as a crucial part of holding companies accountable. The United States, Canada, Norway, the Netherlands, and Sweden are among the countries that have passed laws requiring businesses to disclose their environmental impact (Kapiyangoda & Gooneratne, 2021). There is a lack of consistency and enforcement in reporting standards in Bangladesh because the legal framework, which includes the Financial Reporting Standard, Securities and Exchange Commission Rules, and Bangladesh Accounting Standard, does not require environmental disclosures. Environmental disclosures in the country are still voluntary; one possible reason is the lack of a formal regulatory framework (Kraus et al., 2020).

In addition, the regression analysis showed that different industries' CEMRIs are affected to different degrees by corporate-specific variables, such as TA, TS, BS, and SP (Somjai, Fongtanakit, & Laosillapacharoen, 2020). It is worth mentioning that across most businesses, board size had no discernible effect on EMA practices. This suggests that governance frameworks are not sufficient to ensure environmental accountability. It appears that financial performance is not the sole factor in determining the level of environmental reporting, since total sales and total assets exhibited poor or no link with CEMRI in specific industries (Omran et al., 2021).

Owing to its high environmental impact and global monitoring, textile production in Bangladesh experiences major external forces of compliance. The textile industry remains one of the primary polluters of water sources while requiring abundant resources because it faces major environmental performance reporting expectations from international buyers, regulatory bodies, and environmental organizations. Textile organizations must use EMA practices because external forces require environmental compliance and market retention. The paper industry operates under limited regulatory requirements because it remains smaller and has lower international market involvement. Lower levels of coercive pressure in the paper industry reduce companies' motivation to adopt environmental management system (EMA) practices.

Professional norms and industry standards shape organizational behavior through normative pressure forces. Professional bodies in the textile sector have advanced their environmental responsibility through their widespread associations, providing essential EMA implementation assistance to members. These organizations work to develop sustainable business norms that push businesses to use established best practices (Orajekwe & Ogbodo, 2023).

However, the paper industry lacks institutional support and industry-specific guidelines for environmental management. The industry faces challenges in adopting environmental management accounting practices because of weak normative pressure. Business organizations implement successful peer practices to achieve legitimacy while gaining advantages over competitors. The textile sector follows sustainable practices adopted by prominent firms that have received sustainability acknowledgement as other companies look up to them. Such mimetic practices enhance the industry-wide spread of EMA implementation.

Embracing environmental management practices is slower in the paper industry because it lacks comparable organizations that serve as industry leaders. The textile industry faces intense public scrutiny because of its significant environmental impact, which includes high water consumption and chemical waste emissions. High awareness of environmental management forces textile firms to implement EMA because it helps reduce their environmental effects while improving their image in public view. The sector remains under low public watch, which diminishes the need for the immediate

implementation of EMA practices. Most Bangladeshi textile businesses must integrate into global supply chain networks since they need to follow environmental standards to access markets. EMA adoption allows these firms to satisfy customer requirements while remaining competitive (Tukur, Shehu, Mammadi, & Sulaiman, 2019).

Paper companies serving domestic markets experience limited economic motivation to improve environmental performance, which causes EMA adoption rates to remain low. Institutional theory thoroughly explains Bangladesh's textile and paper industries' EMA adoption gap because it incorporates industry-specific aspects with three institutional pressures and sectoral characteristics. A unifying establishment exists to describe the differences in environmental management practices between sectors by examining fundamental industry factors.

This research adds to the growing body of evidence that industrialization in Bangladesh is hurting the environment. According to Rahman and Akhter (2021), several companies, including those dealing with clothing, textiles, medicines, and ship-breaking, do not take sufficient measures to prevent environmental pollution and destruction. More than 1,176 factories have been classified as contributing to environmental concerns by the Department of Environment (DoE). These problems are made worse because ETPs are not enforced and regulators are not monitoring things; therefore, stricter environmental laws and measures to hold corporations accountable are needed (Singh, Chen, Del Giudice, & El-Kassar, 2019).

Environmental reporting is becoming more popular worldwide. However, few Bangladeshi businesses have started using EMA (Mayndarto & Murwaningsari, 2021). According to Mandal and Bagchi (2016), sustainable business operations face obstacles owing to corporate managers' lack of knowledge and experience in environmental accounting. The findings highlight the need for institutional backing and regulatory adjustments to increase EMA usage in Bangladesh. To achieve sustainable industrial growth with minimal environmental hazards, policymakers, business leaders, and regulatory agencies must work together to create environmental disclosure rules that everyone must follow (Mohd Fuzi, Habidin, Janudin, & Ong, 2019).

5. Conclusion

In a country like Bangladesh, where industrialization is causing environmental threats to worsen alarmingly, the study shows how vital Environmental Management Accounting (EMA) is for ensuring that businesses stay green. While some Bangladeshi corporations have started using environmental reporting methods, the results show that overall compliance is still low, with a CEMRI of no more than 67% and as low as 20%. According to a study of several businesses, the paper industry has the lowest CEMRI, while the textile sector has the highest CEMRI. In most situations, board size does not substantially influence CEMRI, and financial variables, including total assets, total sales, board size, and stock prices, have a negligible impact across industries. There are environmental rules in Bangladesh, but they are not very well enforced, so companies do not really follow them. The report stressed the need for more stringent regulatory supervision, sector-specific EMA frameworks, and corporate awareness campaigns to improve environmental responsibility. These steps, when taken together, will assist businesses in incorporating EMA into their plans, which will benefit both the environment and economy of Bangladesh in the long run.

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