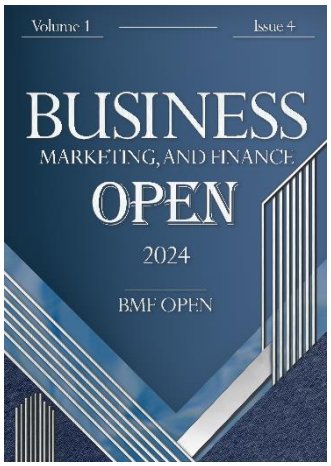
Examining the Impact of Economic Development Indicators on Reducing the Adverse Environmental Effects of Corporate Activities



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Abstract: Environmental issues facing society have become so extensive that governments alone cannot effectively address them. Taxation and regulatory measures to limit negative impacts, as well as incentive policies for activities with positive effects, are among the strategies adopted by governments in this regard. The purpose of this study is to examine the impact of economic development indicators on reducing the adverse environmental effects of corporate activities. The statistical population of the study includes senior executives, middle managers within relevant organizational domains, university professors, and informed economic actors. Given its objectives, this research falls under the category of applied studies. In terms of its methodological approach, it is classified as a descriptive and survey-based exploratory study conducted in both qualitative and quantitative sections. The results indicate that in the economic growth model, strategies influence outcomes, with a path coefficient of 0.841. The t-statistic for this relationship was reported as significant at a 95% confidence level (P-Value ≤ 0.05). Accordingly, the null hypothesis of the study is rejected, and the alternative hypothesis is confirmed, meaning that strategies have a positive and significant impact on outcomes. Therefore, based on the study's findings, economic development indicators in the environmental domain assist managers in the proper implementation and efficient management of financial and physical resources, identifying cost-reduction opportunities, and making better decisions. Additionally, from an external perspective, this technique provides valuable information to stakeholders, such as shareholders, creditors, analysts, and environmental organizations, in both financial and environmental contexts.

Keywords: Economic Indicators, Development, Environmental, Corporations

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1. Introduction

The term "environmental accounting" has numerous meanings and applications, which can be used in relation to national income accounting, financial accounting, or internal management accounting. National income accounting is a macroeconomic measure. Green Gross Domestic Product (GDP) is an example that, by incorporating the costs of environmental depletion and degradation, has been repeatedly used as a key measure of economic well-being [1]. In this domain, environmental accounting is referred to as natural resource accounting [2-4].

Financial accounting is employed for the estimation and public reporting of environmental liabilities and significant environmental costs from a financial perspective, based on generally accepted principles. Management accounting, on the other hand, is the process of identifying, collecting, and analyzing environmental information, primarily dealing with internal objectives. Unlike financial accounting, which is guided and controlled by generally

accepted accounting principles, management accounting systems and methods can be tailored to meet the professional needs of managers [5, 6].

Environmental accounting can be defined as the process of preparing and recording information for financial statement users (both inside and outside the organization) regarding the impact of an organization's activities on communities and the environment (past, present, and future) (Javadipour, 2018). In 1975, the Accounting Standards Board published Statement No. 5, titled "Accounting for Contingencies," to assist in recognizing environmental liabilities. This standard required that potential environmental damages be reported in financial statements if their occurrence was probable and the amount of loss was reasonably estimable. Environmental damage liabilities were identified as contingent losses. However, due to future uncertainties in estimating these damages, various companies and industries adopted different approaches to their estimation, leading to a lack of uniform compliance with the guideline. Consequently, the need for revising and drafting a new guideline was recognized [7].

Organizations aim to eliminate their negative impact on society. Focusing on green human resource management and integrating environmentally friendly practices into HR activities is a step toward enhancing corporate social responsibility [8, 9]. One of the defined social responsibilities of organizations is addressing environmental concerns. An organization is responsible as an economic and competitive entity toward society and strives to fulfill its duties to ensure its survival and sustainability. This requires the organization to establish specific conditions and take actions in this regard. Some of these conditions and actions are implemented within the organization through green human resource management activities to raise awareness and empower employees regarding environmental issues [10]. Green human resource management activities contribute to enhancing corporate social responsibility [11].

Recent studies have extensively explored the role of environmental management accounting (EMA), green human resource management (GHRM), and corporate environmental strategies in promoting sustainability and innovation within organizations. Several researchers emphasize the significance of EMA in improving environmental and financial performance [12, 13]. In the petrochemical and metal industries in Iran, EMA has been identified as a critical tool for mitigating environmental damage and enhancing corporate accountability [12]. The prioritization of EMA components in these industries suggests that environmental outcomes hold the highest rank, followed by customer environmental collaboration and internal environmental management. Similarly, the integration of EMA with accounting management systems has been found to enhance corporate governance, transparency, and decision-making efficiency [14, 15]. Moreover, environmental uncertainty, senior management commitment, and strategic legitimacy have been recognized as essential drivers of EMA adoption [12]. In addition to EMA, GHRM practices have been found to significantly influence pro-environmental behaviors among employees, particularly through green training, green performance management, and sustainable hiring practices [13]. However, individual green values and service culture moderate these relationships differently, suggesting that contextual factors shape the effectiveness of GHRM initiatives. Further supporting this argument, studies indicate that GHRM not only enhances employee environmental behavior but also contributes to overall corporate environmental performance (Saidi Aghilabadi et al., 2019). Additionally, environmental strategy, uncertainty, and management commitment play a pivotal role in shaping corporate environmental performance, with EMA acting as a key enabler (Keshavarz, 2019). These findings align with global research demonstrating that EMA fosters innovation in production processes, both directly and indirectly through managerial accounting techniques [16]. Moreover, green innovation serves as a mediating factor between green supply chain management and environmental performance [17, 18]. Studies also reveal that corporate social responsibility (CSR) dimensions

influence environmental innovation differently, particularly in developing versus developed countries, with government support playing a crucial role in enhancing corporate governance's impact on collaborative innovation [19-21]. Finally, liberal democratic economic policies indicate that economic inequality influences electoral competition and political success [18, 22], further underscoring the interconnectedness of economic, environmental, and governance factors in shaping corporate sustainability.

Therefore, the aim of this study is to examine the impact of economic development indicators on reducing the adverse environmental effects of corporate activities.

2. Methodology

This study consists of two primary stages for data collection. The first stage involves qualitative data collection, while the second stage focuses on quantitative data collection.

In the initial step, an extensive review of library resources, including books, articles, and internal and external reports, was conducted. Ultimately, to extract the outputs of the environmental management accounting system and economic development indicators at the corporate level (through a comparative analysis in desert and gulf regions of the country), the grounded theory method and interviews were utilized. The grounded theory approach encompasses data collected from interviews and observations, as well as interactions, meetings, newspaper articles, and other sources.

Accordingly, after reviewing the literature and examining various theories and models related to the research topic, economic development indicators at the corporate level were identified in the first phase through the selection of experts and conducting semi-structured and targeted interviews. The collected data from these interviews were analyzed using the grounded theory methodology.

In the second stage, in-depth and semi-structured interviews were conducted based on the literature, models, existing factors, and other relevant aspects of the subject. Through the grounded theory approach, coding was carried out in three phases (open coding, axial coding, and selective coding), resulting in a list of factors involved in the process of identifying economic development indicators at the corporate level. The propositions, research process, and hypotheses were also formulated in this stage.

Subsequently, data collection for hypothesis testing was conducted through a survey in the statistical population using a questionnaire. In the next step, confirmatory factor analysis and structural equation modeling were performed based on the collected data using PLS and SPSS software. Finally, conclusions were drawn based on hypothesis testing results, and necessary recommendations and solutions were presented.

The preliminary study phase focused on problem identification, defining research concerns, and conducting preliminary interviews to refine the research problem and formulate research questions. This phase incorporates the researcher’s creativity, intuitive perspective, work and social experiences, and interactions with interviewees.

In the context of the present study, considering the researcher's experiences in academia and the workplace, as well as identifying certain interactions and meanings related to the studied phenomenon, the emerging research question was: How can the process of economic growth be explained based on management accounting and environmental accounting indicators?

The implementation of the outlined steps, from research proposal approval to study completion (July 2022), was carried out over an extended period. This research employed a mixed-methods approach, where the conceptual research model and the economic growth framework based on management accounting and environmental

accounting indicators were initially developed through qualitative analysis and subsequently validated through quantitative analysis.

Considering the research objective (developing an economic growth model based on management accounting and environmental accounting indicators), the statistical population includes senior executives, middle managers in relevant organizational domains, university professors, and informed economic actors.

After completing the coding and categorization process and formulating the grounded theory framework—effectively shaping the research model—a questionnaire was designed based on the derived model. This questionnaire was used to finalize the conceptual research framework and determine the components and a model for measuring and assigning coefficients to each component using structural equation modeling for validation. The statistical population for the quantitative section was considered unlimited.

To increase the questionnaire response rate, 420 questionnaires were distributed. Ultimately, to determine the sample size, Cochran's formula for an infinite population was applied, and 384 completed questionnaires were selected for analysis.

3. Findings

As shown in Table 1, all factor loading values exceed 0.7, indicating that the measurement model is homogeneous and the factor loadings are acceptable.

Table 1. Results of Factor Loadings for Observable Variables

Variable	Dimensions	Items	First-Order Factor Loading	First-Order t-Statistic	First-Order P-Values	Second-Order Factor Loading	Second-Order t-Statistic	Second-Order P-Values
Strategies	Economic Conditions	Q44	0.853	34.148	0.000	0.861	42.548	0.000
		Q45	0.805	17.957	0.000			
		Q46	0.835	29.773	0.000			
		Q47	0.709	15.172	0.000			
	Stakeholder Participation	Q48	0.845	40.039	0.000	0.868	46.194	0.000
		Q49	0.802	26.278	0.000			
	Organizational Strategy	Q50	0.748	18.220	0.000	0.851	37.978	0.000
		Q51	0.848	31.444	0.000			
		Q52	0.869	44.984	0.000			
		Q53	0.755	17.627	0.000			
		Q54	0.685	13.487	0.000			
		Q55	0.724	11.109	0.000			

The results of examining the significance of the t-statistics in Table 1 show that all t-statistics values exceed 2.58, meaning that the relationship between the items and their respective latent variables is confirmed at the 99% confidence level.

Table 2. Cronbach's Alpha and Composite Reliability

Variable	Dimensions	Cronbach's Alpha	Composite Reliability
Strategies	Economic Conditions	0.813	0.878
	Stakeholder Participation	0.828	0.809
	Organizational Strategy	0.865	0.899

The results of Cronbach's alpha and composite reliability coefficients in Table 2 indicate that all latent variables have values greater than 0.7. Therefore, the reliability of the measurement instruments is confirmed based on these two indices.

Table 3. Average Variance Extracted (AVE)

Variable	Dimensions	Average Variance Extracted (AVE)
Strategies	Economic Conditions	0.644
	Stakeholder Participation	0.679
	Organizational Strategy	0.600

As shown in Table 3, the results of the Average Variance Extracted (AVE) for the latent variables indicate that all values exceed 0.5. Accordingly, the convergent validity of the measurement instruments is confirmed using the AVE index.

Table 4. Fornell-Larcker Test

Variable	Organizational Strategy	Economic Conditions	Stakeholder Participation
Organizational Strategy	0.774	-	-
Economic Conditions	0.704	0.802	-
Stakeholder Participation	0.563	0.605	0.824

According to the results in Table 4, the square root of the Average Variance Extracted (AVE) for each latent variable is greater than its highest correlation with any other latent variable. Based on this, the discriminant validity of the measurement model is confirmed using the Fornell-Larcker criterion.

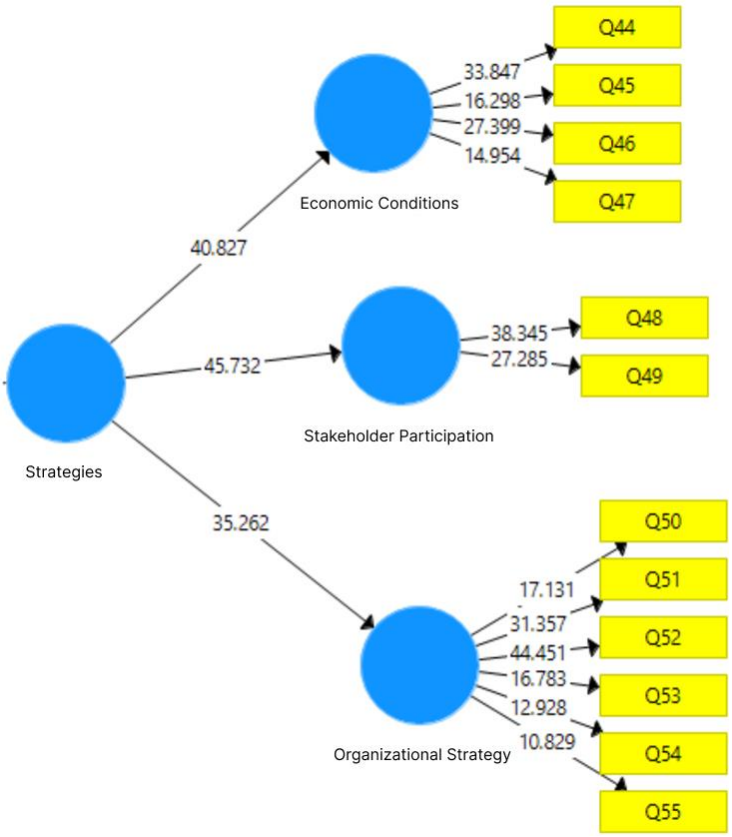

Figure 1. Model with t-values

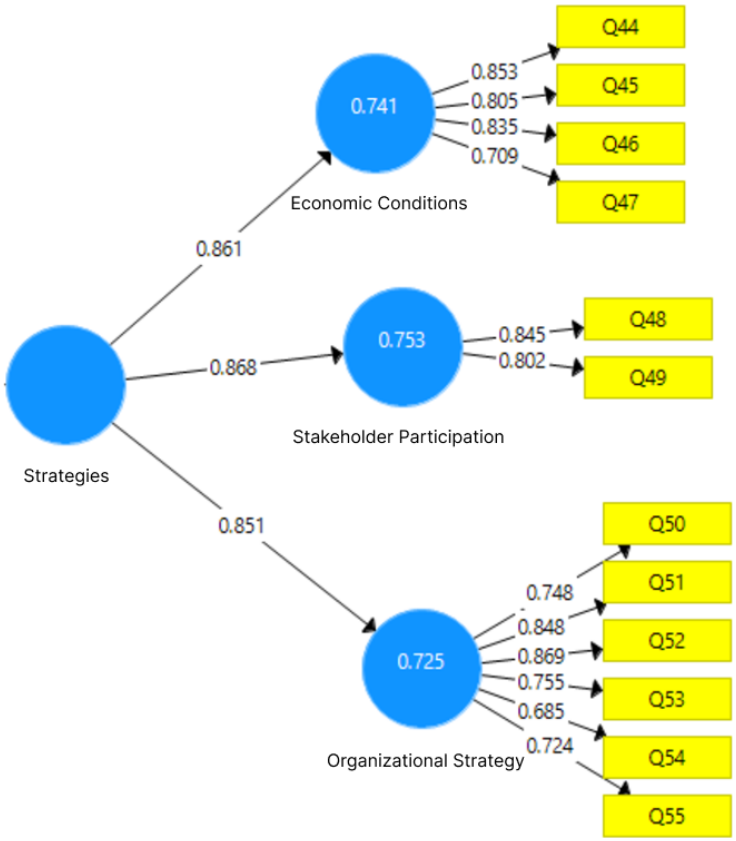

Figure 2. Model with factor loadings

4. Discussion and Conclusion

The findings of this study provide significant insights into the economic growth model by demonstrating the relationships between key variables. The results indicate that the central phenomenon significantly impacts strategies with a path coefficient of 0.893 and a t-statistic significant at the 95% confidence level (P-Value ≤ 0.05). This finding aligns with previous studies emphasizing the importance of strategic factors in shaping economic and environmental outcomes [13, 23]. The confirmation of this relationship suggests that companies need to integrate comprehensive environmental management accounting systems and strategic planning frameworks to enhance sustainability [24].

Furthermore, the results confirm that contextual conditions exert a positive and significant effect on strategies, with a path coefficient of 0.588 and a t-statistic at the 95% confidence level (P-Value ≤ 0.05). These findings are consistent with research highlighting the influence of economic and industrial environments on strategic decision-making and corporate social responsibility practices [15, 25]. This result underscores the necessity of a supportive regulatory and financial environment for the successful implementation of corporate environmental strategies.

Similarly, intervening conditions significantly influence strategies, with a path coefficient of 0.805 and a t-statistic significant at the 95% confidence level (P-Value ≤ 0.05). This finding is in line with previous studies that emphasize the role of external pressures, including governmental policies and stakeholder expectations, in shaping corporate environmental strategies [26]. The confirmation of this hypothesis suggests that organizations should actively engage with stakeholders, including policymakers and environmental advocacy groups, to align their strategic objectives with sustainable business practices [12].

Most importantly, the study demonstrates that strategies positively and significantly impact outcomes, with a path coefficient of 0.841 and a t-statistic at the 95% confidence level (P-Value ≤ 0.05). This result reinforces the argument that well-defined strategies enhance both financial and environmental performance, consistent with prior studies on environmental management and corporate sustainability [16, 27]. This relationship highlights the critical role of environmental management accounting in improving corporate accountability and transparency while ensuring sustainable economic growth [28].

This study provides empirical evidence supporting the relationship between economic development indicators and corporate environmental management strategies. The results confirm that the central phenomenon, contextual conditions, and intervening conditions all play a significant role in shaping corporate strategies. Moreover, well-implemented strategies directly contribute to improved outcomes, reinforcing the importance of structured environmental management accounting systems.

From a practical perspective, organizations can leverage these findings to refine their strategic planning processes and enhance their sustainability initiatives. By recognizing the influence of external conditions, firms can develop adaptive strategies that align with regulatory requirements and stakeholder expectations [29, 30]. Additionally, policymakers should consider these insights when designing policies that promote corporate sustainability and economic development.

Future research should explore the longitudinal effects of environmental management strategies on firm performance and investigate how technological innovations can further optimize economic and environmental outcomes [22, 31]. The integration of big data analytics and artificial intelligence in environmental management accounting could provide valuable opportunities for enhancing corporate sustainability and decision-making efficiency [32].

In summary, this study underscores the necessity of strategic environmental management in corporate sustainability and economic growth. By implementing effective environmental accounting frameworks and adaptive corporate strategies, organizations can not only enhance their financial performance but also contribute to global sustainability efforts, aligning economic growth with environmental responsibility.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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