The Relationship Between the Environmental Impacts of Corporate Activities and Economic Development Indicators in Desert and Gulf Regions of the Country

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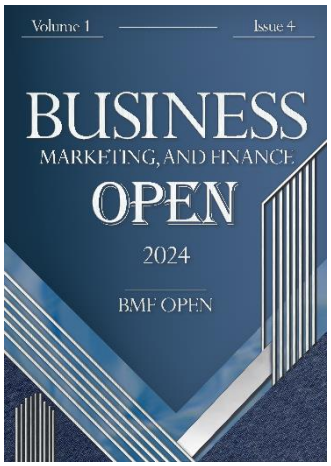

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Abstract: The present study aims to explore the relationship between outputs in the environmental management accounting system of companies and economic development indicators in the desert and Gulf regions of the country. This research is classified as applied research and, in terms of methodology, is descriptive and exploratory, conducted in both qualitative and quantitative phases. In the first phase (qualitative), the study was exploratory in nature, using qualitative data. In the second phase (quantitative), it was explanatory with regard to its objective, applied in terms of its results, and utilized quantitative data. The statistical population consisted of senior managers, middle managers within relevant domains, university professors, and informed economic actors. The research was conducted during 2021–2023. In the qualitative section, data were analyzed and scrutinized. The outcome of this process was six main components forming a paradigmatic model of economic growth based on management accounting and environmental accounting indicators in desert and Gulf regions. Subsequently, the subcategories associated with each main component were explained separately. In the quantitative section, a survey was conducted using a sample of 415 participants, from which 384 complete and error-free questionnaires were selected. In addition to descriptive statistics, findings from structural equation modeling (SEM) demonstrated the final model and the extent to which it could be generalized. Interviews were conducted with various individuals related to the research topic. Among the 16 interviewees, 4 were women, and 12 were men, with service experience ranging from 10 to 21 years in the target population. The findings indicated that causal conditions significantly influenced the central phenomenon, which in turn affected strategies. Similarly, intervening and contextual conditions had a meaningful impact on strategies, and strategies significantly influenced outcomes. Additionally, a significant relationship was found between the environmental impacts of corporate activities and economic development indicators in both the desert and Gulf regions. The environmental impacts of corporate activities on economic development indicators were more intense in the Gulf regions compared to the desert regions. The application of growth-oriented environmental management accounting techniques in companies can mitigate the adverse environmental impacts of corporate activities on economic development indicators. However, these techniques do not exhibit differing effects on the relationship between environmental impacts and economic development indicators across the two regions.

Keywords: Environmental Accounting, Management Accounting Indicators, Economic Growth, Desert and Gulf Regions

1. Introduction

The intricate relationship between human activity and the environment has become a focal point of global concern. This interplay is marked by extensive human intervention in natural ecosystems, which has jeopardized ecological balance and threatened the very existence of life on Earth. Environmental degradation, ranging from the depletion of natural resources to the extinction of species and pervasive pollution, has triggered responses from international organizations and environmental NGOs. These entities have sought to address these challenges through conservation initiatives, sustainable resource management strategies, and the establishment of supportive legal frameworks and agreements [1, 2].

The term "environment" encompasses a multidisciplinary concept that includes biological, physical, and chemical factors influencing an individual or a species. It refers to the natural surroundings of Earth, including air, water, atmosphere, rocks, plants, and other elements that interact with human life. Contemporary definitions of the environment are increasingly linked to human activities, emphasizing the mutual influence between humans and their ecological surroundings [3, 4].

Amid growing environmental challenges, there has been a significant global emphasis on environmental preservation, as evidenced by stringent environmental regulations in many countries. Governments actively seek innovative solutions to curb environmental degradation, underscoring the necessity of independent environmental management systems. As a key component of managerial information systems, accounting has emerged as a vital tool in providing environmental data to support decision-making processes [5-7].

Environmental accounting focuses on the economic dimensions of environmental issues. It integrates environmental considerations into traditional accounting systems, thus enabling various stakeholders to make decisions that align with the principles of sustainable development. Environmental accounting spans multiple applications, from natural resource accounting at a macro level to managerial, financial, and industrial accounting at micro levels (Meyer, 2018).

One critical aspect of environmental accounting is the accurate costing of products, which is essential for avoiding cross-subsidization among production processes. For instance, in a factory with two production lines, one employing hazardous chemicals and the other operating without such risks, traditional accounting methods may inaccurately distribute environmental costs. This misallocation can result in distorted cost estimates, inappropriate pricing, and unfavorable competitive conditions. By adopting refined environmental costing methods, organizations can ensure accurate cost allocation, enhance competitiveness, and support sustainable practices [8, 9].

Environmental costs constitute a significant portion of total expenditures for manufacturing and service companies. Effective environmental performance management is essential for evaluating organizational success. By making informed business decisions, investing in eco-friendly technologies, and redesigning production processes, organizations can significantly reduce—or even eliminate—environmental costs. These measures, which often provide no direct value to the product, can contribute to societal benefits such as reduced pollution and improved public health [1, 10].

Furthermore, integrating environmental cost information into accounting systems fosters better environmental performance management. This integration creates opportunities for organizations to achieve a dual advantage:

financial success and environmental sustainability. Such advancements are particularly critical in the context of intensifying global competition and environmental constraints. Modern production systems are increasingly complex, making managerial decision-making more challenging. Environmental accounting serves as a strategic tool for providing actionable data to support decisions across all organizational levels. From cost analysis and investment evaluations to strategic planning, environmental accounting plays a pivotal role in fostering sustainable business practices [1, 11].

Management accounting extends its scope to address the negative impacts of organizational activities on society. One vital area of focus is the integration of "green" human resource management practices, which enhance corporate social responsibility (CSR) and contribute to environmental sustainability. Organizations are increasingly recognizing their dual responsibilities as economic entities and societal contributors. This recognition necessitates the implementation of targeted measures, including employee training and empowerment, to address environmental issues. Green HR practices, such as raising environmental awareness and empowering employees, not only bolster CSR initiatives but also enhance the organization's overall contribution to sustainable development [12].

The integration of environmental considerations into traditional accounting systems highlights the evolving role of management accounting in bridging the gap between environmental experts, accountants, and economists. By fostering collaboration among these groups, organizations can aim for improved financial and environmental performance. This study seeks to design a paradigmatic model that links the outputs of environmental management accounting systems with economic development indicators. Specifically, the research focuses on Gulf and desert regions, where unique environmental and economic challenges necessitate tailored approaches. The primary objective of this research is to propose a comprehensive framework that connects the outputs of companies' environmental management accounting systems with economic development indicators. This framework aims to facilitate sustainable practices in regions characterized by distinct environmental and economic conditions.

To address the study's objectives, several research questions and hypotheses are posed:

1. What is the relationship between environmental accounting outputs and economic development indicators in Gulf and desert regions?
2. How do environmental costs influence organizational performance in these regions?
3. Can environmental accounting mitigate the adverse impacts of organizational activities on economic development?

2. Methodology

This research employed a mixed-methods approach, encompassing both qualitative and quantitative phases to examine the relationship between environmental management accounting (EMA) outputs and economic development indicators in Gulf and desert regions. The qualitative phase began with an extensive review of existing literature, including books, academic articles, and internal and external reports, to identify relevant frameworks and theoretical models. In this phase, semi-structured interviews with experts, including senior and middle managers, university faculty members, and informed economic professionals, were conducted to extract key outputs from EMA systems and their linkage with economic development indicators. The qualitative sample was determined through theoretical sampling until data saturation, resulting in 16 interviews. Participants were selected via snowball sampling to ensure inclusion of individuals with relevant expertise.

For the quantitative phase, the study targeted a broader population of relevant professionals to validate the model developed in the qualitative phase. Using Cochran's formula for an unlimited population, a sample size of 384 respondents was determined. To account for non-responses, 420 questionnaires were distributed among the target population, ensuring the final analysis included 384 complete responses.

Data collection was conducted in two distinct phases. During the qualitative phase, semi-structured interviews served as the primary tool for data collection. These interviews were designed to explore the perceptions and experiences of participants regarding EMA outputs and economic development indicators. Each interview was conducted in a calm and controlled environment, with participants' consent for recording and note-taking. The interviews were guided by a flexible interview guide, allowing for probing questions based on respondents' answers. Observations and field notes were also utilized to complement the interview data.

In the quantitative phase, a structured questionnaire was developed based on the qualitative findings. The questionnaire incorporated elements of the proposed model and aimed to measure the relationship between EMA outputs and economic indicators. The survey included items designed to capture participants' perspectives on environmental accounting practices, economic performance, and the contextual variables affecting these relationships. Data from questionnaires were collected both in-person and online to maximize response rates.

The qualitative data were analyzed using grounded theory methodology, involving open, axial, and selective coding phases. During open coding, interview transcripts were thoroughly reviewed, and initial concepts were identified. Axial coding organized these concepts into categories, highlighting their relationships and contextual dimensions. Selective coding further refined these categories into a paradigmatic model comprising six core components related to EMA outputs and economic development indicators. Subcategories were detailed and analyzed to ensure comprehensive understanding.

Quantitative data were analyzed using descriptive statistics and structural equation modeling (SEM) to test the proposed model. Data analysis was conducted using PLS and SPSS software, with confirmatory factor analysis employed to assess the validity and reliability of the measurement scales. Relationships among variables were examined to determine the strength and direction of their associations.

The integration of qualitative and quantitative findings allowed for a comprehensive understanding of the phenomenon under study. The qualitative phase provided an in-depth exploration of key concepts and relationships, while the quantitative phase validated these findings and assessed their generalizability across a broader population. This mixed-methods approach ensured robust and actionable insights, contributing to the development of a comprehensive model linking EMA outputs with economic development indicators in Gulf and desert regions.

3. Findings

The results of the first-order factor analysis for the measurement of endogenous and exogenous variables indicated that all constructs demonstrated sufficient validity and reliability. Consequently, this section tests the overall structure of the conceptual model to determine whether the theoretical relationships hypothesized during the conceptual framework development stage are supported by the data. Three primary considerations are addressed in this analysis:

First, the signs (positive or negative) of the parameters related to the pathways between latent variables indicate whether the calculated parameters confirm the hypothesized directions of the relationships.

Second, the magnitude of the estimated parameters illustrates the strength of the predicted relationships. These parameters must be statistically significant, with absolute t-values exceeding 1.96.

Third, the multiple correlation coefficient (R^2) reflects the proportion of variance in each endogenous (dependent) latent variable explained by the exogenous (independent) latent variables. A higher R^2 indicates greater explanatory power of the model.

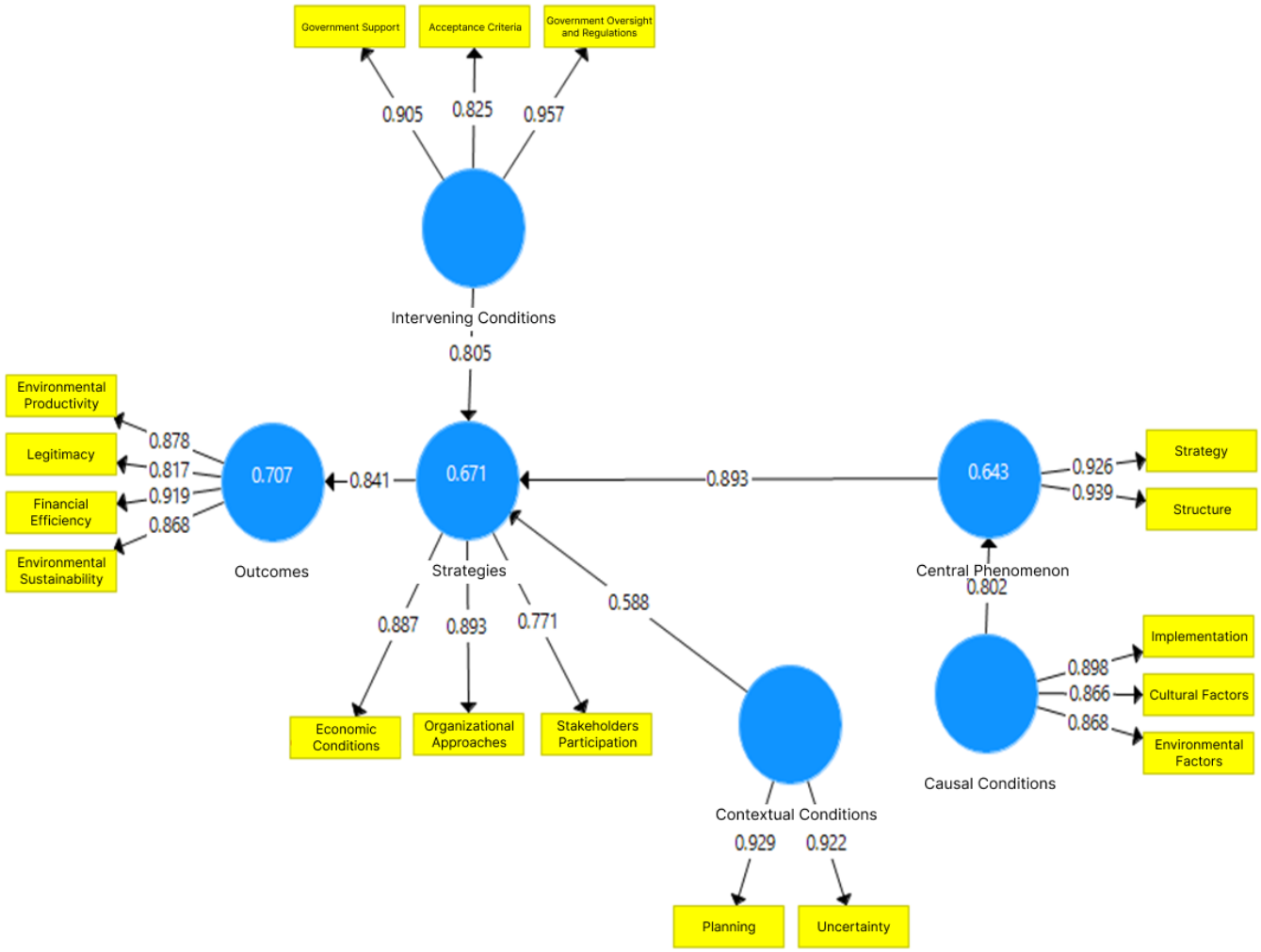

Figure 1. Path Coefficients and Determination Coefficients

The coefficients for the relationships between variables reflect the extent to which independent variables influence the dependent variables. Path coefficients range between -1 and +1, with higher positive values indicating stronger impacts of independent variables on dependent variables.

The determination coefficient (R^2) represents the proportion of variance in the dependent variable explained by the independent variables. However, one limitation of the determination coefficient is its tendency to overestimate model success while under-accounting for the number of independent variables and sample size. For this reason, some researchers prefer the adjusted determination coefficient.

Table 1. The Results f the Determination Coefficients

Variable	Determination Coefficient (R^2)	Adjusted R^2
Strategies	0.671	0.668
Central Phenomenon	0.643	0.642

Outcomes	0.707	0.706

The adjusted determination coefficient shows that over 71% of the variance in outcomes is explained by the variables examined in the study, while the remaining variance is attributable to factors not included in the model.

Significance of Path Coefficients

One key indicator for confirming relationships in the structural model is the significance of path coefficients. The significance of these coefficients complements the magnitude and direction of the beta coefficients in the model. If the obtained t-value exceeds the critical value at the desired confidence level, the relationship or hypothesis is confirmed. At confidence levels of 90%, 95%, and 99%, the minimum t-values are 1.64, 1.96, and 2.58, respectively.

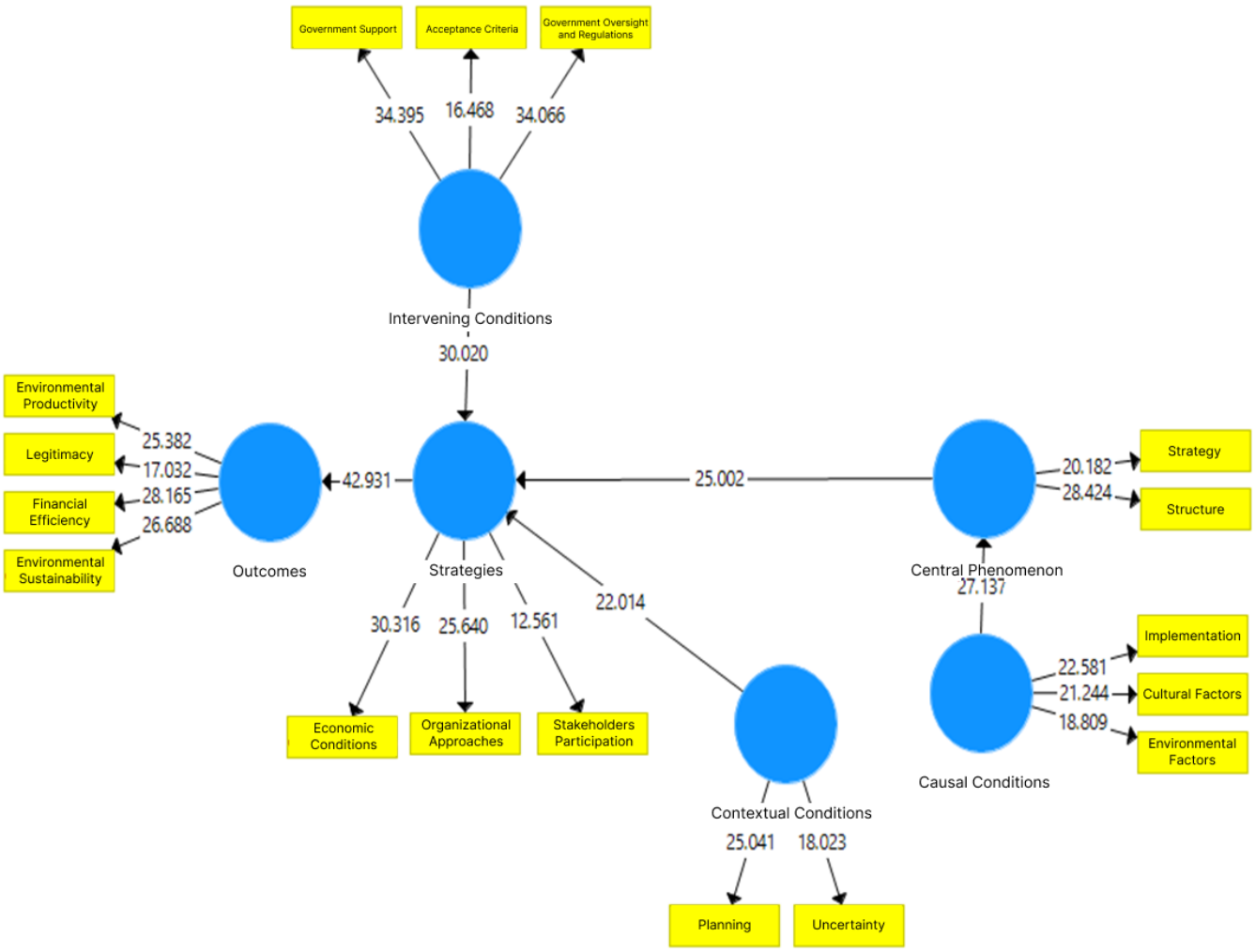

Figure 2. Significance Levels of Path Coefficients

The results depicted in this figure are discussed in the following sections.

Another criterion for evaluating the structural model is its predictive power, assessed using the redundancy index. This index measures the model's ability to predict reflective indicators of endogenous latent variables. The most widely recognized measure of this ability is the Q^2 statistic, which requires that the model predict the indicators of endogenous latent variables. Positive Q^2 values indicate adequate model quality. Threshold values of 0.02, 0.15, and 0.35 are considered weak, moderate, and strong predictive power, respectively.

Table 2. Model Predictive Power

Variable	Predictive Power (Q^2)
Strategies	0.454
Central Phenomenon	0.533
Outcomes	0.505

The results demonstrate strong predictive power for the model, as confirmed by the visual representation in the accompanying figures.

The standardized root mean square residual (SRMR) provides an additional measure of model fit, with a maximum acceptable value of 0.08. The SRMR value obtained in this study was 0.059, indicating a satisfactory model fit. Therefore, the overall model adequacy is confirmed.

Hypothesis 1: In the economic growth model, causal factors influence the central phenomenon.

The results of this hypothesis test indicated that the path coefficient for this relationship is 0.802. The t-statistic for this relationship was significant at a 95% confidence level (P-Value ≤ 0.05). Based on these findings, the null hypothesis is rejected, and the alternative hypothesis is accepted, indicating that causal factors have a positive and significant impact on the central phenomenon.

Hypothesis 2: In the economic growth model, the central phenomenon influences strategies.

The results of this hypothesis test indicated that the path coefficient for this relationship is 0.893. The t-statistic for this relationship was significant at a 95% confidence level (P-Value ≤ 0.05). Based on these findings, the null hypothesis is rejected, and the alternative hypothesis is accepted, indicating that the central phenomenon has a positive and significant impact on strategies.

Hypothesis 3: In the economic growth model, contextual conditions influence strategies.

The results of this hypothesis test indicated that the path coefficient for this relationship is 0.588. The t-statistic for this relationship was significant at a 95% confidence level (P-Value ≤ 0.05). Based on these findings, the null hypothesis is rejected, and the alternative hypothesis is accepted, indicating that contextual conditions have a positive and significant impact on strategies.

Hypothesis 4: In the economic growth model, intervening conditions influence strategies.

The results of this hypothesis test indicated that the path coefficient for this relationship is 0.805. The t-statistic for this relationship was significant at a 95% confidence level (P-Value ≤ 0.05). Based on these findings, the null hypothesis is rejected, and the alternative hypothesis is accepted, indicating that intervening conditions have a positive and significant impact on strategies.

Hypothesis 5: In the economic growth model, strategies influence outcomes.

The results of this hypothesis test indicated that the path coefficient for this relationship is 0.841. The t-statistic for this relationship was significant at a 95% confidence level (P-Value ≤ 0.05). Based on these findings, the null hypothesis is rejected, and the alternative hypothesis is accepted, indicating that strategies have a positive and significant impact on outcomes.

Hypothesis 6: There is a significant relationship between the environmental impacts of corporate activities and economic development indicators in the Gulf and desert regions.

The results of this hypothesis test indicated that the correlation coefficient for this relationship is 0.859, which is significant at a 95% confidence level (P-Value ≤ 0.05). Based on these findings, the null hypothesis is rejected, and

the alternative hypothesis is accepted, indicating a significant relationship between the environmental impacts of corporate activities and economic development indicators in the Gulf and desert regions.

4. Discussion and Conclusion

With the increasing importance of environmental issues in recent years, numerous studies have been conducted worldwide. In the field of accounting, this focus has given rise to a new branch known as environmental accounting. Despite the growing significance of voluntary disclosures by companies regarding environmental issues in developed countries, and in particular in desert and Gulf regions of our country, this topic has not received adequate attention. This study aims to determine the techniques for promoting environmental management accounting (EMA) that can be applied by companies to examine the relationship between the environmental impacts of corporate activities and economic development indicators in these two regions. The primary objective of this research is to present a model linking the outputs of EMA systems in companies to economic development indicators in the desert and Gulf regions.

In the first phase (qualitative), this study was exploratory in nature and employed qualitative data. In the second phase (quantitative), the research was explanatory in purpose and applied quantitative data. In the qualitative section, data were analyzed to identify six main categories of the paradigmatic model for economic growth based on EMA indicators in the desert and Gulf regions. Subcategories related to each main category were explained in detail. In the quantitative section, data were collected through questionnaires from a sample of 415 individuals, with 384 valid and complete responses. Descriptive statistics and findings from structural equation modeling were used to validate the final model and assess its generalizability.

Interviews were conducted with 16 participants, including 4 women and 12 men, all with 10 to 21 years of professional experience in the relevant field. The hypotheses were designed based on these interviews. Using a grounded theory approach, six key categories—central phenomenon, contextual conditions, causal conditions, intervening conditions, strategies, and outcomes—along with their subcomponents, were identified as critical factors influencing environmental accounting. Subsequently, the importance of these factors was prioritized using structural equation modeling.

The study employed structural equation modeling for data analysis due to the questionnaire-based nature of the information. Hypotheses were tested using the path coefficient model, and significance levels (t-statistics) from the estimated model were used to confirm or reject the hypotheses. The findings revealed that causal conditions significantly influence the central phenomenon, which in turn impacts strategies. Additionally, intervening and contextual conditions also significantly affect strategies, and strategies were found to have a significant impact on outcomes.

A significant relationship was identified between the environmental impacts of corporate activities and economic development indicators in the desert and Gulf regions. Furthermore, the environmental impacts of corporate activities had a more substantial effect on economic development indicators in the Gulf region compared to the desert region. The application of EMA techniques in companies was shown to mitigate the adverse environmental impacts of corporate activities on economic development indicators. However, the use of these techniques did not demonstrate a significantly different impact on the relationship between environmental impacts and economic development indicators across the two regions.

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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References

[1] R. W. Benfield, "Impacts of Botanic Gardens: Economic, Social, Environmental, and Health," pp. 116-129, 2020, doi: 10.1079/9781789241761.0008.

[2] O. Denissova, "Evaluation of the Effectiveness of the "Green" Growth Policy Pursued at the Regional Level in the Republic of Kazakhstan," *Eurasian Journal of Economic and Business Studies,* vol. 67, no. 4, pp. 74-88, 2023, doi: 10.47703/ejebs.v67i4.302.

[3] J. Ding, Y. Bai, X. Yang, and Z. Gao, "Spatiotemporal Evolution of Water Resource Utilization and Economic Development in the Arid Region of China: A "Matching-Constraint" Perspective," *Sustainability,* vol. 14, no. 14, p. 8724, 2022, doi: 10.3390/su14148724.

[4] M. Basnukaev, "Ecological and Economic Indicators of Sustainable Development of Regions," *Bio Web of Conferences,* vol. 140, p. 02005, 2024, doi: 10.1051/bioconf/202414002005.

[5] Y. Cao *et al.*, "Impact of the Belt and Road Initiative on Economic-Social-Natural Ecological Niches and Their Coupling Coordination: Evidence From 11 Countries Along the Route," *Frontiers in Environmental Science,* vol. 10, 2022, doi: 10.3389/fenvs.2022.913928.

[6] F. Hakimi, "A Multi-Criteria Sustainability Assessment of Mediterranean Rainfed Farming Systems Using the IDEA Method: A Moroccan Case Study," *Caraka Tani Journal of Sustainable Agriculture,* vol. 38, no. 2, p. 339, 2023, doi: 10.20961/carakatani.v38i2.75853.

[7] Q. Hu, E. Han, W. Wang, X. Wang, and Z. Li, "The Interactive Relationship Between Water Environmental Pollution and the Quality of Economic Growth in China: An Empirical Research Based on the Dynamic Simultaneous Equations Model," *Journal of Computational Methods in Sciences and Engineering,* vol. 22, no. 1, pp. 77-87, 2022, doi: 10.3233/jcm-215614.

[8] A. Medhekar, "Economic Empowerment of Women, Millet Farming, and Sustainable Development," pp. 230-250, 2023, doi: 10.4018/978-1-6684-9819-4.ch012.

[9] J. Xue, Z. Huo, Q. Huang, F. Wang, J. Boll, and Z. Qu, "Assessing Sustainability of Agricultural Water Saving in an Arid Area With Shallow Groundwater," *Irrigation and Drainage,* vol. 68, no. 2, pp. 205-217, 2018, doi: 10.1002/ird.2295.

[10] P. Branduini, F. Zaina, F. Zavvari, and Y. N. Mazloumi, "Qanats as an Endangered Traditional Hydraulic Heritage. An Integrated Methodology for Documenting, Restoring and Reusing an Ancient Iranian," 2021, doi: 10.4995/arqueologica9.2021.12102.

[11] A. Albatayneh, "The Significance of Renewable Energy in a Water-Scarce World: A Case Study of Jordan," *Air Soil and Water Research,* vol. 17, 2024, doi: 10.1177/11786221241261827.

[12] B. Dahinine, A. Laghouag, W. Bensahel, M. Alsolami, and T. Guendouz, "Modelling the Combined Effect of Green Leadership and Human Resource Management in Moving to Green Supply Chain Performance Enhancement in Saudi Arabia," *Sustainability,* vol. 16, no. 10, p. 3953, 2024, doi: 10.3390/su16103953.