

Midocean University

College of Management

Project Management Specialization



**The impact of applying sustainability practices on the success of
environmental projects: a field study in renewable energy projects in
Riyadh**

Student name

Wedad Abdullah Mudayfin

251001536

Supervision/

Doctor Alfaisal Abdul Hamid Muhammad Hassan

Academic Year

2025

Declaration

I, the undersigned researcher, declare that the thesis entitled, “The Impact of Applying Sustainability Practices on the Success of Environmental Projects: A Field Study in Renewable Energy Projects in Riyadh” is an original piece of work and has not been submitted before. No part of the work has been considered for the acquisition of any level of academic degree in any institution.

This research has been found on the principles of academic integrity, for any and all information taken from other works has been cited according to the APA 7th Edition guidelines. I stand by the work and accept full responsibility for any inaccuracies which may arise in the text.

Dedication

To my cherished family:

Whose love, patience, and support has been my greatest motivation and my source of strength
during my entire life.

To my parents, who taught me the essence of wisdom and the meaning of hard work:

And to all supporters of the belief that sustainable growth and development is the way forward for
the advancement of mankind.

With profound respect and appreciation, this work is dedicated.

Acknowledgment

First and foremost, I would like to thank and give all of the glory to God for giving me the strength and willpower and directing me to successfully complete this research.

I would like to acknowledge my supervisor, who, during all phases of the study, is supportive and provides his/her untiring assistance, wise counsel, and orthogenetic criticism. His support and tremendous knowledge have helped a lot in wrapping this research work in the present form.

My profound appreciation goes to the faculty whose dedication to the advancement of knowledge and the maintenance of high standards of research have motivated me to tackle the problem with all the passion that I could muster.

Particular thanks go to all the participants in the renewable energy projects in Riyadh who kindly gave their time to complete the questionnaire and offer their professional views. Their input provided the basis for this study.

Lastly, I would like to acknowledge my family and friends whose undivided support, constant motivation, and faith in my potential has come a long way. This achievement would not have been made without their support and utmost understanding.

Contents

CHAPTER 1	10
INTRODUCTION:	11
.1.1 Study Background.....	11
.1.2 Importance of the study:	14
1.2.1. Theoretical significance:	14
1.2.2. Applied importance:	15
.1.3 Objectives of the study:	16
.1.4 Study Questions	16
.1.5 Study assignments:.....	17
.1.6 Study Form:	18
.1.7 Previous studies:	18
1.8. Research Gap:	26
.1.9 Theoretical premises of the study:	28
.1.10 Methodology and Research Methods:	32
.1.10.1 Sources of data collection.....	32
.1.10.2 Study Tools:	33
.1.11 Limitations of the study:	34
2. CHAPTER TWO:	35
LITERATURE REVIEWS	35

2.1.	Definition and Importance of Sustainability	35
2.1.1.	The Definitions and Frameworks.....	35
2.1.2.	Dimensions of Project Management: Environment, Economy, and Society	36
2.2.	Best Practices in Projects of an Environmental Nature	36
2.2.1.	Integration of Waste Management, Energy Efficiency, and Green Technologies.....	36
2.2.2.	Other Examples from Other Countries	37
2.3.	Success of Environmental Projects	37
2.3.1.	Success Indicators: Time, Cost, Quality, and Social Acceptance.....	37
2.4.	Studies Linking Sustainability and Project Success	38
2.5.	Issues to Be Researched and their Framework	39
2.6.	Conceptual Model.....	39
2.7.	Hypothesis Framework:	40
3.	CHAPTER THREE:	41
	RESEARCH METHODOLOGY.....	41
3.1.	Research Design.....	41
3.2.	Research philosophy and approach.....	42
3.3.	Population and sampling.....	42
3.3.1.	Population	42
3.3.2.	Sampling Technique	42
3.3.3.	Sample Size.....	43
3.4.	Data Collection Methods	43

3.4.1. Primary Data	43
3.4.2. Secondary Data	43
3.5. Instrument Development.....	43
3.6. Validity and Reliability of the Instrument	45
3.6.1. Content Validity.....	45
3.6.2. Reliability Testing.....	45
3.7. Data Analysis Techniques.....	46
3.7.1. Descriptive Analysis	46
3.7.2. Correlation Analysis	46
3.7.3. Regression Analysis.....	46
3.7.4. Hypothesis Testing Criteria	46
3.8. Ethical Considerations	47
.4 CHAPTER FOUR:.....	48
DATA ANALYSIS AND RESULTS.....	48
4.1. Introduction.....	48
4.2. Demographic Characteristics of Respondents	48
4.2.1. 4Descriptive Statistics for Each Questionnaire Item	53
5. CHAPTER FIVE:	66
DISCUSSION	66
5.1. Discussion of Major Findings.....	66
5.1.1. Environmental Sustainability and Project Success	66

5.1.2. Economic Sustainability and Project Success.....	67
5.1.3. Social sustainability and project advancement	68
5.1.4. Integrated Sustainability Practices and Overall Project Success	69
5.2. Study Contributions	70
5.2.1. Contributions to Theory	70
5.2.2. Practical Implications.....	70
5.2.3. Policy Implications	70
5.3. Limitations of The Study	71
5.4. Future Research Suggestions	71
6. CHAPTER SIX:.....	73
CONCLUSION AND RECOMMENDATIONS	73
6.1. Summary of the Study	73
6.2. Major Findings.....	74
6.3. Practical Suggestions	75
6.4. For the Government and Other Policymakers	76
6.5. Policy Implications	76
6.6. Recommendations for Further Research.....	77
Conclusions.....	77
References:.....	79
APPENDIX A: QUESTIONNAIRE.....	81

Abstract

Sustainable practices impact the success of environmental projects, especially renewable energy projects in Riyadh, Saudi Arabia, and how the environmental, economic, and social pillars of sustainability affect the project success factors in terms of its time, cost, quality, and community acceptance.

A quantitative descriptive-analytical research method was used, and primary data collection was achieved through the use of a structured questionnaire solicited from 235 participants in Riyadh, Saudi Arabia, working in the renewables energy projects' sector. Respondents in all three dimensions of sustainability, ie. the environmental, economic, social, and project success indicators. The SPSS package was used to conduct a descriptive and correlational analysis along with regression analysis.

The SPSS analysis revealed that the practices of sustaining the environment and the resources in renewable energy projects were the most practiced, and the environmental dimension of project success scales had the greatest positive impact, followed by economic and social. The best performing projects, in terms of efficiency, stakeholder satisfaction, and viability, were those that incorporated green technologies, effective waste management systems, and sustainable procurement policies.

The study affirms sustainability as an ethical mandate as well as a key driver of a project's success. It further integrates itself with the aims of the Saudi Vision 2030 focusing on the protection of the environment, adoption of clean energy, and sustainable economic expansion. There is a detailed analysis of how project managers and policymakers can advance the nexus of sustainability with capacity development, sustainability-centered performance metrics, and various frameworks at the national tier.

Keywords: Sustainability, Renewable Energy, Project Success, Environmental Management, Economic Viability, Social Responsibility, Saudi Vision 2030.

CHAPTER 1

INTRODUCTION:

Sustainability practices are playing a growing role in shaping the future of societies and economies around the world, reflecting the commitment of individuals and organizations to conserve natural resources and reduce adverse environmental impacts. At its core, sustainability is based on the principle of meeting the needs of the present without compromising the ability of future generations to meet their needs, a concept that requires a profound change in production and consumption patterns, as well as in environmental, economic and social policies. These practices include a wide range of activities aimed at reducing carbon emissions, managing natural resources wisely, promoting energy efficiency, supporting a circular economy, and adopting responsible behaviors by individuals and communities. (Al-Mutairi, 2021)

1.1. Study Background

Sustainability practices start at simple levels such as reducing the use of single-use plastics, recycling, and rationalizing water and energy consumption, but extend to broader policies implemented by governments and institutions. For example, the transition to renewable energy – such as solar and wind – requires strategic investments aimed at reducing dependence on fossil fuels, thereby reducing the carbon footprint. Sustainable urban planning is also an effective tool to reduce congestion and pollution, by designing smart cities that encourage the use of environmentally friendly transportation. Providing green spaces that contribute to the ecological balance and improve the quality of life. (Al-Hawamleh, 2024)

In the economic context, sustainability practices force a rethinking of supply chains and production systems, so that companies rely on recycled materials, reduce waste, and rely on transparency in their environmental and social reporting. Sustainable investments – which consider environmental, social and governance (ESG) standards – are also increasingly being

the focus of interest from investors seeking balanced financial returns with a positive impact on the environment and society. This, in turn, puts increasing pressure on companies to adopt a more approach. Responsibility and sustainability in its daily business. (Abu Huwaidi, 2020)

From the social side, sustainability practices are linked to environmental justice and equal distribution of resources. Sustainability is not just about the environment, but also empowering communities, providing decent jobs, and supporting education, health and gender equality. Here, it is important to involve all segments of society in sustainability efforts, whether through environmental education, or through voluntary and community initiatives, to ensure a real shift towards a sustainable lifestyle that reflects the shared values of justice, responsibility and solidarity. (Al-Mutairi, 2021)

Environmental projects are one of the main pillars of achieving sustainable development, as they represent a practical and concrete response to the growing environmental challenges facing the world, such as climate change, natural resource degradation, biodiversity loss, and air, water and soil pollution. The importance of these projects comes from their ability to combine scientific knowledge, modern technologies, and societal efforts in order to improve the environment and protect it from degradation, thus contributing to enhancing the quality of life for both present and future generations. Environmental projects are not just about reforming It also seeks to prevent and build new models of development that are efficient, responsible and respectful of environmental balances. (Al-Hawamleh, 2024)

Environmental projects cover multiple areas, such as reforestation, waste treatment, cleaning water bodies, restoring damaged ecosystems, switching to clean energy sources, and developing organic agriculture. These projects are implemented at varying levels, from small-scale community initiatives to ambitious national plans adopted by Governments or international organizations. Every environmental project has interrelated environmental,

social and economic dimensions, with objectives not only protecting nature, but also to improve livelihoods, creating jobs, spreading environmental awareness among the population, and promoting a sense of collective responsibility towards land and resources. (Abu Huwaidi, 2020)

One of the most prominent features of successful environmental projects is that they are based on community participation, sustainable planning, and reliance on scientific solutions and modern technologies. For example, many environmental projects leverage technology to monitor air and water quality, identify sources of pollution, and predict environmental disasters, contributing to effective and rapid decision-making. Environmental research also guides these projects towards best practices, based on reliable evidence and field experience, which enhances their ability to continue and achieve a positive long-term impact.

The application of sustainability practices is one of the essential factors that directly contribute to the success and continuity of environmental projects, as these practices not only reduce the environmental impact of projects, but also enhance their efficiency, increase their economic and social returns, and expand their positive impact on communities and the environment alike. When environmental projects are built on sustainability principles, they are managed in a way that balances human needs with the conservation of natural resources, ensuring that these projects are able to achieve their goals without depleting or damaging the environment in the long term. (Al-Mutairi, 2021)

One of the most prominent positive effects of applying sustainability practices to environmental projects is their ability to improve the efficiency of the use of resources, whether hydro, energy, or raw materials. These practices encourage waste reduction, recycling and reuse, which reduces operational expenses and enhances the effectiveness of the project in achieving its environmental objectives at a lower cost. For example, in waste

management projects, the application of the circular economy principle contributes to the transformation of waste into reusable resources, reducing dependence on landfills, prolonging the life cycle of materials, and relieving pressure on the natural environment. The adoption of environmentally friendly technologies in the implementation of projects contributes to reducing harmful emissions and achieving a sustainable positive environmental impact. (Abu Huwaidi, 2020)

The application of sustainability practices also enhances the acceptance of the project in the local community, by considering social dimensions and including communities in the planning and implementation stages. Environmental projects that take into account the needs of local people and provide them with economic opportunities, such as employment, training or improving living conditions, often receive broad public support, reducing the likelihood of conflict or project resistance, and increasing the likelihood of its continuation and success. The sustainability of an environmental project is measured not only by its environmental impact, but also by its ability to create strong bonds. With the community and promoting social responsibility. (Al-Hawamleh, 2024)

Based on this, the problem of the study is to analyze the impact of the application of sustainability practices in their combined dimensions (environmental dimension - economic dimension - social dimension) on the success of environmental projects: a field study in renewable energy projects in Riyadh.

1.2. Importance of the study:

The importance of this study depends on its theoretical and practical contributions to the following

1.2.1. Theoretical significance:

This study contributes to enriching the scientific literature in the field of environmental project management, by addressing the relationship between the application

of sustainability practices and the success of these projects at various stages, especially in complex natural environments or suffering from increasing environmental pressures.

The study provides a contemporary theoretical framework that links the components of sustainability practices (such as resource efficiency, emission reduction, renewable energy technologies, and community engagement) with indicators of success of environmental projects such as achieving a positive environmental impact, controlling costs, raising the quality of implementation, and reducing deviations in timelines.

The study fills an existing knowledge gap in environmental and management research, especially in the Arab context, as many studies have not addressed the integrated relationship between sustainability practices and performance effectiveness in environmental project management, whether technically or organizationally.

Contribute to the development of quantitative and qualitative tools to assess the level of integration of sustainability practices into the environmental project management system, and to analyze the impact of this integration on improving operational efficiency and the quality of expected environmental and social outcomes.

1.2.2. Applied importance:

This study provides an important reference for decision-makers in government and private institutions working in the environmental field, by providing reliable indicators on the impact of applying sustainability practices on project performance, which contributes to the formulation of policies and operational practices that are more compatible with the requirements of sustainability and sustainable development.

Supports improving the quality of environmental project management on the ground by providing recommendations based on scientific findings that contribute to more integrated planning, reduce environmental and economic risks, and achieve greater efficiency in the use of available resources throughout the project life cycle.

It highlights the importance of training and qualifying administrative and technical cadres working in environmental projects, by highlighting the impact of sustainability practices such as waste management, clean energy, and natural resource governance on the success of the project and the achievement of its environmental and social goals.

The study highlights opportunities to achieve tangible financial and environmental savings by reducing waste, improving material and energy efficiency, and increasing the life span of rehabilitated environmental infrastructure or systems, which enhances project sustainability, contributes to improving resource investment in the long term, and increases the ability of organizations to implement successful environmental projects with tangible impact.

1.3. Objectives of the study:

The study aims to find out the impact of the application of sustainability practices in their combined dimensions represented in (environmental dimension - economic dimension - social dimension) on the success of environmental projects: a field study in renewable energy projects in Riyadh, and a set of sub-objectives branched from it:

- 1) Identify the level of the environmental dimension on the success of environmental projects by applying to renewable energy projects in Riyadh.
- 2) Identify the level of the economic dimension on the success of environmental projects by applying to renewable energy projects in Riyadh.
- 3) Identify the level of the social dimension on the success of environmental projects by applying to renewable energy projects in Riyadh.

1.4. Study Questions

studyt main question: What is the impact of the application of sustainability practices with their combined dimensions represented in (the environmental dimension - the economic dimension - the social dimension) on the success of environmental projects: a field

study in renewable energy projects in Riyadh, and several sub-questions branch out of it as follows:

- 1- To what extent does the environmental dimension contribute to the success of environmental projects by applying to renewable energy projects in Riyadh?
- 2- What is the impact of the economic dimension on the success of environmental projects by applying to renewable energy projects in Riyadh?
- 3- How does the social dimension affect the success of environmental projects by applying to renewable energy projects in Riyadh?

1.5. Study assignments:

To achieve the objectives of the study and answer its questions, the researcher can rely on the theoretical framework related to the study, and based on the results of previous studies, the following hypotheses have been formulated:

The first main hypothesis: There is no statistically significant impact of the application of sustainability practices in their combined dimensions represented in (environmental dimension - economic dimension - social dimension) on the success of environmental projects: a field study in renewable energy projects in Riyadh.

From this hypothesis emerge the following three sub-hypotheses:

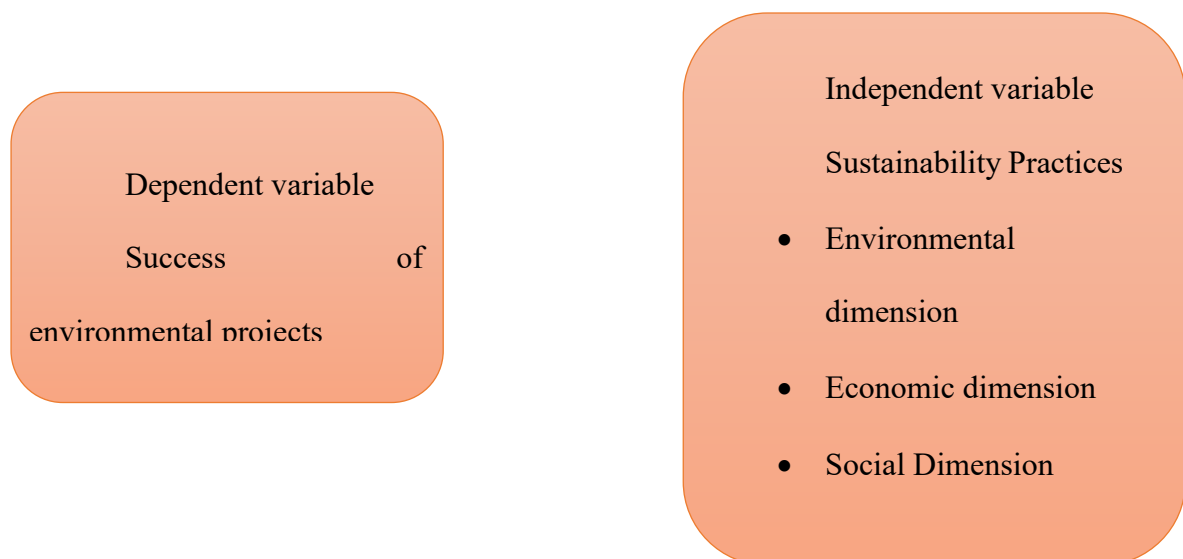
- There is no statistically significant impact of the application of the environmental dimension on the success of environmental projects by applying to renewable energy projects in Riyadh.
- There is no statistically significant impact of the application of the economic dimension on the success of environmental projects by applying to renewable energy projects in Riyadh.

- There is no statistically significant impact of the application of the social dimension on the success of environmental projects by applying to renewable energy projects in Riyadh.

1.6. Study Form:

Independent variable: sustainability practices with their combined dimensions represented in (environmental dimension - economic dimension - social dimension).

Dependent variable: the success of environmental projects.



1.7. Previous studies:

Studies on sustainability practices

A study (Al-Mutairi, 2021), entitled The Impact of Internal Control on Disclosure of Sustainability Practices in Kuwaiti Joint Stock Industrial Companies: The Intermediary Role of Enterprise Resource Planning Systems

The study aimed to reveal the impact of internal control in its dimensions (internal control objectives, internal control system procedures, characteristics of the internal control system, legislation related to internal control) in disclosing sustainability practices, and to

study the role of resource planning systems as an intermediate variable. The study population included (62) Kuwaiti shareholding industrial companies, where the researcher distributed the questionnaires randomly to the internal auditors working in those companies, and the number of questionnaires distributed reached (345) questionnaires, and the number of recovered and valid for statistical analysis reached (310) times the study sample. To prove or deny the hypotheses of the study, the descriptive and analytical approach method was used to describe the variables related to internal control and disclosure of sustainability practices and corporate resource planning systems, and regression analysis was used to analyze and measure the impact and the relationship between internal control variables as independent variables and disclosure of sustainability practices as a dependent variable and company resource planning systems as an intermediate variable.

The study reached several results, the most important of which are that the areas of internal control, which included legislation related to internal control, internal control procedures, characteristics of the internal control system and the objectives of internal control, were combined with an average degree of evaluation by the internal auditors working in Kuwaiti shareholding industrial companies, and that the company's resource planning systems and disclosure of sustainability practices were to a medium degree, and there was an impact of internal control in its combined dimensions in the disclosure of sustainability practices in Kuwaiti shareholding industrial companies.

There was also an impact of the internal control dimensions on the company's resource planning systems, and the impact of the ERP system on the disclosure of sustainability practices in Kuwaiti shareholding industrial companies, and the ERP systems improved the impact of the internal control dimensions in the disclosure of sustainability practices. The study recommended that those concerned with internal control ensure the proper implementation of internal control procedures and work to update them, and

encourage industrial companies to participate in sustainability projects and initiatives through incentives that can be provided by the state and thus the possibility of increasing the disclosure of sustainability practices, and urged Kuwaiti legislators to develop legislation related to internal control and the need to oblige it due to its importance and impact on the disclosure of sustainability practices.

A study (Abu Huwaidi, 2020), entitled The Impact of Audit Committee Characteristics on the Level of Disclosure of Sustainability Practices in Jordanian Commercial Banks

This study aimed to clarify the impact of the characteristics of the audit committee on the level of disclosure of sustainability practices in Jordanian commercial banks for the period 2014-2018, where the study used the descriptive analytical method, and the study sample consisted of 13 Jordanian banks listed on the Amman Stock Exchange

The researcher used the independence of the audit committee, the size of the audit committee, the experience of the members of the audit committee, and the number of meetings of the audit committee as independent variables, and each of: the elements of sustainability (environmental, social, and economic) as a dependent variable, and the results of the multiple regression analysis showed a positive relationship with statistical significance for the independence of the audit committee, the size of the audit committee, the experience of the members of the audit committee, and the number of meetings of the audit committee at the level of disclosure of sustainability practices, and the study was based on a number of recommendations, the most important of which were: The ASE should prepare a special index to classify listed companies according to the field of transparency and adequate disclosure of sustainability activities in separate reports from financial reports

Al-Haroub, 2020 study, entitled “Sustainability Practices in Construction Project Management in the West Bank / Palestine”

Energy consumption is one of the most important challenges facing Jordan, due to the scarcity of domestic resources and the high demand for energy. Energy consumption in the city of Amman has increased in recent years. The household sector accounts for 21.5% of total energy consumption and the residential sector accounts for 45.5%, which is the largest share. Although some studies have looked at energy saving in the residential sector few have put forward the idea of high-rise green buildings. Therefore, this research addresses Reaching an environmental design in the Jordanian residential sector by evaluating a project with environmental building specifications and standards in Jordan. Energy performance and annual cost will be calculated by the Energy Plus program The method to be used is the method of description and analysis. This research will help to identify modern design methods that in turn will contribute to the implementation of projects of an environmental nature. Several alternatives have been proposed to reduce energy consumption in this project such as the use of heat insulation with high efficiency, shading of the façade by means of horizontal sun breakers, and the installation of solar panels. The result showed that the total energy consumption in the case study is 19291.89 GJ, while the total energy consumption improved was 17620.58 GJ, which reduced energy consumption by 1671.31 GJ, and with the installation of solar panels, the total annual energy consumption decreased to 14679.90 reducing the total energy bill by 27.15%

Study Al-Kubaisi, 2022), entitled Developing a Green Rating System for Existing Buildings in Jordan: Green Building Assessment Tool for Jordanian Context

Sustainable Development (SD) aims to meet the needs of current generations without affecting the ability of future generations to meet their own needs Since the past decades, several initiatives have been established to encourage the construction sector to support the sustainable development agenda. This study aims to investigate practices that affect the sustainable management of construction projects (CPM) in the West Bank. Data collected

using a mixed methodology Quantitative data were collected through 73 questionnaires, and qualitative data was collected through 11 semi-structured interviews with experts from the field of construction project management in the West Bank. The data was analyzed using the PLS methodology.

The results of the data analysis revealed 24 of the most important sustainable practices that are always implemented by engineers at each stage of construction projects in the West Bank, which are classified as follows: One sustainable practice classified under the start-up phase, eight sustainable practices under the design phase Seven sustainable practices under the tender phase, and eight sustainable practices in the implementation phase The most common practice that is considered during the construction project initiation phase in the West Bank is Include diverse representatives from project team functions (85.6%), and the most common practices taken during the design phase are: using standard dimensions in design specifications (90.6%), and adhering to legal requirements (90.3).

At the bidding stage, the most common practices are prevention of bribery and corruption (94.7%), transparent procurement procedures (94.7%) and contract documents and comprehensive specifications (92.2). Finally, the most sustainable practices adopted during the implementation phase are: compliance with the required specifications and quality level (89), and insurance for the construction site, workforce and equipment (89). The Path coefficient test showed Sustainable practices in the start-up phase had the greatest positive impact on the performance of Sustainable Management of Construction Projects (SCPMP), where they were $\beta = 0.308$.

The study also showed that the main obstacle to the implementation of sustainable management of construction projects in Palestine is the lack of interest of stakeholders in sustainability issues (87.8%), so it recommended raising awareness of sustainability in the Palestinian construction sector, especially at the level of decision-makers. This is also the

first study that draws a roadmap for institutions operating in the construction sector in the West Bank by providing a framework for the implementation of sustainable management of .construction projects in Palestine

Study (Al-Hazaimeh, 2023), entitled The Mediating Role Effect of Organizational Culture on the Relationship between Environmental Sustainability and Strategic Management Accounting Practices in the Jordanian Industrial Sector

This research focuses on studying the impact of the mediating role of organizational culture on the relationship between environmental sustainability and strategic management accounting practices in the Jordanian industrial sector.

To achieve the objectives of the study, the quantitative method was used in the study by distributing (256) questionnaires to the Jordanian industrial sector, and the number of questionnaires analyzed in the study was determined (180), moreover, the questionnaires were distributed to the following positions (financial manager, chief accountant, accountant, production manager, operations manager). Data analyzed using 26 Smart PLS and Spss software)

The study found several results, most notably: there is a statistically significant relationship between SMAPS and organizational culture in the Jordanian industrial sector, there is a statistically significant relationship between organizational culture and environmental sustainability in the Jordanian industrial sector, and there is no statistically significant relationship between SMAPS and environmental sustainability in the Jordanian industrial sector. Finally, there is an important mediating role for organizational culture in the relationship between environmental sustainability and SMAPS in the Jordanian industrial sector.

In light of these results, the study recommends the management of Jordanian industrial companies the need to increase attention to the application of modern SMAPS

because they provide more accurate and relevant information for decision-making, unlike traditional practices, and the researcher recommends studying this study using mixed, method because he expects the results to be much better

Keywords Environmental sustainability Strategic management accounting practices, organizational culture Jordanian industrial cutting, emergency theory.

Studies on the success of environmental projects

The Environmental Regulations Impact on the Economic Performance of Energy Sector Projects in Jordan

,Libya's construction industry is a key driver of the country's economic development but it faces significant challenges due to political instability, economic volatility, project management practices, and insufficient costs This article explores the current state of construction project management and cost management in Libya, using case studies of high-profile projects to highlight key issues and inefficiencies. The findings suggest that poor risk management, lack of skilled labor, and inconsistent government policies contribute to frequent delays and cost overruns. Emphasizes The article on the need to adopt internationally recognized project management frameworks such as Project Management) Knowledge SuitePMBOK),) Building Information ModelingBIM), and Lean Building to improve project outcomes. In addition, cost optimization strategies are discussed, such as) earned value managementEVM) and value engineering. The article also emphasizes the importance of government involvement in shaping the regulatory environment and promoting foreign investment as well as the need for capacity building programs to develop a skilled workforce Future research directions include exploring the adoption of advanced technologies, the relationship between political stability and project performance, and the .socio-economic impacts of construction projects on local communities

Abu Yahya's study, 2021, entitled Total Quality and Risk Management in Construction Projects in Jordan.

This study delves into the complex relationship between ecosystems and economic performance in Jordan's energy sector through a systematic descriptive analytical approach, examining the direct impacts of ecosystems on key economic metrics, including profitability, upfront costs, operational costs, effectiveness, efficiency and competitiveness of energy projects in Jordan. The data was thoroughly collected through detailed questionnaires submitted to senior management staff of major Jordanian energy companies, with subsequent statistical analysis using SPSS program.

The findings highlighted the pivotal role of ecosystems in shaping economic performance of energy projects.

Despite the upfront costs associated with compliance, these regulations drive operational efficiencies and promote long-term sustainability, ultimately enhancing the overall economic performance of the sector. The study also explores the delicate balance between environmental stewardship and meeting energy requirements, providing valuable insights to improve economic outcomes while adhering to environmental standards in Jordan's energy sector.

This research adds significant value to policy discussions by proposing amendments to the regulatory framework to support sustainable economic growth in the energy sector. It emphasizes the importance of innovative compliance strategies to mitigate costs and enhance the competitiveness of energy enterprises in global and regional markets. In conclusion, the thesis provides a comprehensive framework for understanding the economic impacts of Jordan's ecosystems, and provides actionable recommendations for policymakers, industry stakeholders, and academic researchers to enhance the sustainable energy landscape

Al-Harbi (2024) study, entitled The Impact of Strategic Project Management on the Success of Construction Projects in the Contracting Sector in Riyadh

This study aimed to determine the impact of strategic management on the performance of construction projects in Riyadh. The impact was examined across dimensions including environmental analysis, strategy formulation, strategy implementation, strategy evaluation, measurement against project efficiency, innovation adoption and sustainability. The research used a descriptive and analytical approach, with a review of relevant Arab and foreign references to lay the theoretical foundations. In addition, a field study was conducted by distributing questionnaires to construction project managers in Riyadh, Saudi Arabia. A total of 394 individuals participated in the study using the simple random sample method of data collection. The research yielded several key findings indicating a high level of success in construction projects, with a strong positive correlation between Saudi Arabia's strategic management. It was found that strategic project management explains 78.9% of changes in projects and project success in the Kingdom to project success, with a 1% increase in strategic project management associated with a 0.391% increase in the success of professional projects. However, the main hypothesis of the study turned out to be incorrect. Based on the results, recommendations were made, including the adoption of project management methods that integrate strategic aspects and encourage companies to implement continuous improvement of strategic project management practices to enhance long-term competitiveness.

1.8. Research Gap:

A review of the previous literature shows that the topic of sustainability has received increased attention in a number of studies that have addressed multiple aspects related to its applications and impacts in different institutional contexts. Some of these studies focused on the disclosure of sustainability practices, as in the case of Al-Mutairi's study (2021), which

examined the impact of internal control in its various dimensions on the disclosure of sustainability practices in joint stock industrial companies in Kuwait, with a focus on the mediating role of enterprise resource planning systems. Abu Huwaidi's study (2020) also examined the impact of audit committee characteristics on the level of disclosure of sustainability practices in Jordanian commercial banks, based on multiple criteria including independence, expertise, committee size and number of meetings. The results in both studies showed a statistically significant relationship between the elements of corporate governance and the level of disclosure of sustainability practices, reflecting a growing awareness of the importance of embedding the principles of transparency and accountability in the framework of corporate environmental policies.

Despite the important theoretical and practical contributions these studies make, most of them focus on analyzing the level of disclosure or the relationship of sustainability to some institutional practices, without studying in depth the direct impact of the application of sustainability practices on the success of environmental projects in terms of actual performance and results achieved. In addition, most of these studies focus on specific sectors such as industry, banking and accounting, and did not adequately address sectors of an explicit environmental nature, such as the renewable energy sector, which is one of the most prominent strategic areas related to the sustainable development agenda, especially in countries that have adopted ambitious policies in this field, such as Saudi Arabia.

In addition, studies that dealt with projects in the construction or energy sector, such as Al-Harbi (2024), which examined the impact of strategic management on the success of construction projects, or Abu Yahya (2021), which examined the relationship between total quality and risk management in construction projects, were limited to the administrative or economic aspects of projects without providing an analytical model that systematically links sustainability practices to indicators of environmental, economic and social success of the

project. A number of these the studies were conducted in geographical contexts such as Jordan, Palestine and Kuwait, while the Saudi environment, despite its dynamism in the field of sustainable transformation, still lacks in-depth field studies that focus on the success of environmental projects in light of the applied sustainability practices.

From this standpoint, the current study seeks to address this research gap through an applied field study entitled "The Impact of Applying Sustainability Practices on the Success of Environmental Projects: A Field Study in Renewable Energy Projects in Riyadh". The study is based on an analytical framework that links sustainability practices – such as resource management, clean energy technologies, waste reduction, and social impact enhancement – with environmental project success indicators such as achieving environmental goals, adhering to timelines and budgets, and achieving economic and social feasibility. Thus, the study gains its importance from the fact that it presents a contemporary applied model within a local Saudi environment and covers an existing gap in the literature in terms of the direct link between sustainability and the results of environmental projects, which enhances the scientific and applied value of research in light of the Kingdom's Vision 2030 and its environmental and development transformations.

1.9. Theoretical premises of the study:

The current study builds on a set of theoretical underpinnings that form the conceptual and methodological basis for understanding the relationship between the application of sustainability practices and the success of environmental projects, particularly in the renewable energy sector. Sustainability in its comprehensive sense is a vital framework in which the environmental, economic and social dimensions intersect, as it is concerned with achieving development without compromising the rights of future generations to resources. This concept has become central to development policies and plans in many countries, especially in light of the global challenges related to climate change, pressure on natural

resources, and the need for more efficient and equitable production models. In this context, renewable energy projects are one of the most prominent manifestations of the application of sustainability principles, as they represent an effective alternative to reducing dependence on traditional energy sources, reducing carbon emissions and enhancing environmental efficiency in the long term.

The study is also based on modern theories in project management, which assert that success is not only measured by achieving the technical and financial goals of the project, but also requires taking into account environmental and social dimensions. Contemporary literature suggests that integrating sustainability practices into various phases of a project – from planning, through implementation, to evaluation – reflects positively on overall performance, through improved resource utilization, reduced risk, and increased compliance with regulatory and international standards. According to this perception, the success of an environmental project is linked to the extent to which its management is able to adopt sustainability practices as an integral part of the operational system, rather than as a cosmetic or secondary element.

The study draws its framework from the perspective of strategic project management, which is concerned with integrating environmental issues into the heart of administrative and technical decisions. It is assumed that organizations and projects that adopt a strategic approach to implementing sustainability practices are better able to adapt to external challenges and better prepared to achieve balanced and sustainable results. This premise is based on the basic premise that effective environmental performance enhances the competitive advantage of the enterprise, reduces long-term operating costs, and improves the corporate image, thereby increasing the chances of success and continuity.

In addition, the study relies on the principles of stakeholder theory, which asserts that the success of a project is not achieved in isolation from the social and organizational

environment surrounding it. In essence, sustainability practices include taking into account the interests of all parties affected by the project, including the local community, regulators, employees, and the environment itself. From this standpoint, the degree of commitment to sustainability practices is a crucial indicator of the comprehensiveness of the project, and its ability to interact positively with its external and internal environment, which is what Sustainably supports its chances of success.

Fourth: The relationship between sustainability practices on the success of environmental projects

Previous studies indicate that there is a close and direct relationship between the application of sustainability practices and the success of environmental projects, as a group of research has shown that the integration of sustainability principles into the operational and administrative processes of projects effectively contributes to achieving positive results at the environmental and administrative levels. Al-Harbi's (2024) study showed that strategic management that adopts sustainability concepts positively affects the performance of construction projects, as increasing the effectiveness of planning, implementation and achieving the overall objectives of the project is associated with the level of Integration between sustainable management practices and different project phases.

Al-Hazaimeh (2023) also supported this proposition by highlighting the mediating role of organizational culture in strengthening the relationship between environmental sustainability and strategic management accounting practices, demonstrating that sustainability does not only affect the environmental aspect, but extends to affect the management structure and decision-making within organizations. This extension is evidence that the success of environmental projects depends to a large extent on the extent to which sustainability practices are integrated with the internal culture of the organization and senior management.

On the other hand, the study of Al-Haroub (2020) showed that the implementation of sustainability practices in the management of construction projects in the West Bank – such as sustainable building techniques, adherence to legal standards, and the application of transparent practices in bidding and implementation – led to improved environmental and administrative performance of projects, noting that sustainable practices applied in the early stages of the project have a significant impact on ensuring its long-term success.

Abu Yahya's (2021) study examined the relationship between total quality and risk management in construction projects, implicitly emphasizing that the integration of sustainability principles contributes to reducing risks and improving project efficiency, which is one of the main indicators of success in environmental projects. The results of this study are consistent with the findings of Al-Hawamleh (2024) in the context of energy projects in Jordan, where compliance with environmental regulations, despite its initial cost, leads to higher operational efficiency and enhances the sustainability of the economic performance of the project.

While some studies, such as Al-Mutairi (2021), have focused on the disclosure of sustainability practices in industrial contexts, they have indirectly indicated that an effective regulatory environment and integrated planning systems contribute to enhancing institutional sustainability, which in turn is a prerequisite for the success of any environmental project. Abu Huwaidi's study (2020) also stressed the importance of corporate governance in raising the level of transparency associated with sustainability practices, which in turn is reflected in the reputation of the project and its organizational stability, and is one of the modern measures of success in environmental projects.

Based on these intersectional findings, it can be concluded that sustainability practices are not just ethical or environmental trends, but rather strategic tools that increase the chances of success of environmental projects by reducing costs, improving efficiency,

enhancing adherence to environmental standards, and achieving societal acceptance. Studies also confirm that environmental success is not achieved in isolation from administrative and organizational systems but rather requires an effective integration between sustainability as a comprehensive management approach and all components of the project, which enhances the effectiveness of results and expands the positive impact of environmental projects.

1.10. Methodology and Research Methods:

The descriptive approach and the analytical approach were followed as an appropriate method of description, which corresponds to the theoretical chapters, either in the applied analytical chapter and the deductive method in order to analyze and evaluate the data obtained in the questionnaire of the institution under study as appropriate for determining the facts and understanding the components of the subject, while subjecting it to careful study and analysis of its dimensions, which we will address in the applied chapter in the case study.

The choice of the appropriate approach to the nature of the research depends on the nature of the problem and the goal of its study, and in order to take note of the various aspects of the study, the descriptive analytical approach will be relied on, the descriptive method is suitable for the description that matches the theoretical chapters, but in the applied analytical chapter and the deductive approach in order to analyze and evaluate the data obtained in the questionnaire under study, as this approach contributes to answering research questions through data collection and then analysis and discussion. This approach is used in most previous studies.

1.10.1. Sources of data collection

- **Secondary sources:** These include data and information in books and references, theses, working papers, journals, periodicals, scientific conferences and workshops, in addition to published and unpublished reports that dealt with the topic in various relevant institutions.

- **Primary sources:** The study relied on the questionnaire as the main tool in collecting data from its sources, which was specially designed for this purpose on Google Forms and sending its link to the research community.

1.10.2. Study Tools:

The research tool is defined as "the means by which the data collection process is carried out in order to answer his questions, and researchers will rely in collecting data on the questionnaire, which is defined as "a specific form of paragraphs and questions aimed at collecting data from research individuals"

It consisted of two main sections:

- **The first section:** It is the part related to the demographic variables of the members of the study sample, represented by: gender, age, educational qualification, and job level.
- **Section II: The** second section included paragraphs and dimensions that measure the variables of the independent and dependent study.

Statistical methods used

The following statistical methods were used to achieve the objectives of the study:

- Cronbach alpha coefficient to measure the stability of the study tool and Pearson's correlation coefficient to measure the validity of the study tool and the relationship between variables
- Frequencies, percentages, arithmetic mean and standard deviation related to the study variables and to all responses to the questionnaire paragraphs.
- Simple linear regression coefficient to measure the effect of each dimension of the independent variable on the dependent variable

Study Tool

The questionnaire in the current study is designed to suit the variables of the research by reviewing previous studies related to the subject of the study. The questionnaire consists of two main sections:

The first section: deals with the demographic variables of the study sample of employees in the Saudi Ministry of Health, and includes job title, age, educational level, and number of years of experience.

The second section: contains the paragraphs that measure the independent and dependent variables in the study.

First: The Independent Variable – Sustainability Practices, measured through 15 paragraphs divided into three main dimensions:

- Environmental dimension
- Economic dimension
- Social Dimension

Second: The dependent variable - the success of construction projects, measured through (10) distributed paragraphs.

1.11. Limitations of the study:

- **Objective limits:** The study is limited to sustainability practices with their combined dimensions (environmental dimension - economic dimension - social dimension).
- **Spatial boundaries:** The study is conducted on renewable energy projects in Riyadh.
- **Time limits:** The study was prepared in 2025.
- **Human limits:** The human limits of this study are limited to workers in renewable energy projects in Riyadh.

2. CHAPTER TWO:

LITERATURE REVIEWS

Now, all a person needs to do is look at the world today, and one would understand and appreciate the complexity and the varying arguments regarding development. There is so much of development which is happening and at the same time one cannot neglect the social, economic, cultural, and environmental developments. In that light, the word sustainable development, which integrates all aforementioned developments, can be considered a paradigm in the discourse of development. Over the past couple of decades, a sustainable approach has come to be acknowledged in the completion and preservation of environmental projects.

In the world of today, the factors which play important roles in sustainable development are social, economic, and environmental. And in the Vision 2030 document of Saudi Arabia, environmental importance is given to the rest of the aforementioned attributes. In that sense, economic importance, which is the central focus of this document, cannot be neglected. There are a number of modifications which the country is driven towards making in order to diversify the country's resources and renewable solar and wind projects are at the zenith of what is being aimed at (Vision 2030, 2024; IRENA, 2024).

2.1. Definition and Importance of Sustainability

2.1.1. The Definitions and Frameworks

In dealing with matters of sustainability, it is important to consider the Brundtland Report of 1987. This report spoke about the growth that would be termed sustainable development. Proacting development that fulfills the needs of the present without decreasing the ability of the next generations to meet their own needs. Ever since, the idea literally has no bound. It has fully integrated the economy, as well as the social and most importantly the environment. This is widely known as the Triple Bottom Line (Elkington, 1998).

Sustainability Level 7 (Affordable and Clean Energy), 11 (Sustainable Cities and Communities), and 13 (Climate Action). These benchmarks are the Sustainable Development Goals (SDGs). These (SDGs), along with the ESG (Environmental, Social, and Governance) model, aid organizations integrate the key principles of sustainability into administration and investment activities (Kluza et al, 2021; Alharbi, 2024).

2.1.2. Dimensions of Project Management: Environment, Economy, and Society

On a larger scale, the environment focuses on the conservation of water and other natural resources, the mitigation of pollution, the adaptation, and the alleviation of climate change, as stated in IPCC (2023). Project management, in this case, focuses on the more eco-conscious practices of designing projects, adopting renewable resources or practices, and guiding waste management practices (Carvalho and Rabechini 2017). Economics focuses on the more cost-effective, stable, and financially viable aspects of the projects in question (Al-Hawamleh 2024). Social factors mean providing resources or equitable resource access, collaborating with the community, and improving the overall life of the people (Islam et al. 2024). The combination of these different factors creates a balanced system in relation to the projects, improving the efficiency and environmental social governance of the projects (Benhacene et al. 2025).

2.2. Best Practices in Projects of an Environmental Nature

2.2.1. Integration of Waste Management, Energy Efficiency, and Green Technologies

The foundation of projects of an environmental nature is the use of green technologies. These technologies enhance resource efficiency, reduce emissions, and maximize operational efficiency. Energy-efficient systems, smart grids, and renewable energy technologies, including photovoltaic (PV) and wind turbines, are, for example, increasing the good environment practices as noted in the works of Alsulami et al. (2024)

and ACWA Power (2025). Waste management practices including recycling, other projects of a circular economy, and green designing practices lower the overall expenditure of a project while enhancing the eco-friendly practices of a given project (Abu Yahya 2021).

Lastly and most importantly, energy efficiency in project management is crucial as the energy spent while using the resources is directly related to the success and longevity of the project (IRENA, 2024). Carvalho and Rabechini (2017) argued that ‘working toward the sustainable project goals from the very beginning of the project improves overall efficiency by harmonizing the energy consumption and the resources as well as the stakeholders’

2.2.2. Other Examples from Other Countries

In the context of the GCC, the countries of Saudi Arabia, the United Arab Emirates and Kuwait have started new renewable energy process at the national level, focusing on sustainable development. The National Renewable Energy Program (NREP) of Saudi Arabia has a target of 50% electricity generation from renewable resources by 2030 (Ministry of Energy, 2025). The Sakaka PV IPP, also in Saudi Arabia, is one of the best examples on the integration of sustainable development for environmentally and economically as it produces 300 MW of solar energy while simultaneously savings over 500,000 tons of CO₂ per year (ACWA Power, 2025).

Internationally, in the countries of Jordan (Al-Hazaimeh, 2023) and Palestine (Al-Haroub, 2020), the application of the principles of constructing energy-sustainable projects has proven to increase efficiency, improve stakeholder confidence, and lower expenses. The World Bank (2024), in his global analysis has also pointed out that the financially sustainable project management has less related operational risk and greater profit.

2.3. Success of Environmental Projects

2.3.1. Success Indicators: Time, Cost, Quality, and Social Acceptance

Success measures in today world has exceeded the traditional measures of objectives completion within the defined scope and budget, incorporating sustainability as a critical success factor (Carvalho & Rabechini, 2017). Indicators include:

Time: scheduled completion without delays and without detrimental environmental impacts.

Cost: the overall project cost should be as low as possible through optimal usage of resources.

Quality: technical, environmental and all other standards should be safely met.

Social Acceptance: comprehensively, community support and community engagement.

Continuity: protracted project impact in the distant future (Abu Huwaidi, 2020; Al-Harbi, 2024).

Continuity and reputation, as pointed out by Mahmoud and Saad (2024), is positive correlated with sustainability, thus enhancing overall performance metrics. This is true, in general, as Al-Saidi (2022) confirmed: projects embedding sustainability within the scope of work accrue disproportionate public goodwill and regulatory compliance, thus achieving significantly higher success rates.

2.4. Studies Linking Sustainability and Project Success

In addition, Carvalho and Rabechini (2017) found a direct positive relationship between ‘sustainable project management’ and ‘project success’ in 216 organizations across the globe. Similarly, Al-Hazaimh (2023) confirmed, through PLS-SEM modeling, that renewable energy practices remarkably enhance sustainability performance in Saudi Arabia. In the case of Jordan's industrial sector, Al-Hazaimh (2023) exemplifies that the interconnectedness between environmental sustainability and project efficiency is influenced

by the organizational culture. These all prove that performance, stakeholder satisfaction, and a sustainable economy, in tandem, are the result of conducted sustainability practices.

2.5. Issues to Be Researched and their Framework

Although a lot of studies about sustainability and project management have been carried out, some gaps still exist. First, most of the studies are about industrial and construction sectors with very few focusing on renewable energy projects in the Saudi context (Al-Mutairi, 2021; Abu Huwaidi, 2020). Second, there is a very small number of studies that have quantitatively assessed the impact of environmental, economic and social sustainability practices on the success of a project. Third, there are no integrated frameworks that connect sustainability practices with project performance indicators, especially with the Vision 2030 agenda on transforming renewable energy.

This study seeks to address the above gaps with an empirically framed study that focuses on the impact of sustainability practices on the success of renewable energy projects in Riyadh. Figure 1 portrays the tacit relationships between the independent and dependent variables of the conceptual framework.

2.6. Conceptual Model

Independent Variable:

a) Sustainability Practices

Dependent Variable:

- Success of Environmental Projects
- Completion within the Scheduled Time
- Coming in under Budget
- Meeting Technical and Quality Standards
- Gaining support from the community
- Sustainability of the project in its later stages

2.7. Hypothesis Framework:

H1: The level of sustainability a project is able to achieve greatly enhances its chances of success.

H2: The chances of success for a project are greatly increased with economic sustainability.

H3: The chances of success for a project are greatly increased with support of social sustainability offered.

H4: Using all sustainability practices together helps in predicting project success.

Summary

The literature recognizes sustainability as both a principle of, and a determinant of, project success. Empirical research carried out in different contexts proved that combined environmental, economic, and social practices lead to better organizational performance, enhanced stakeholder confidence, and sustainability. However, the lack of empirical analysis in the renewable energy sector in Saudi Arabia underlines the importance of local studies to determine the actual impact of incorporating sustainability practices on projects, as in this case study in Riyadh.

3. CHAPTER THREE:

RESEARCH METHODOLOGY

Introduction

This chapter summaries the methods used to assess the extent to which the implementation of sustainability practices within the economic, social, and social pillars of sustainability relates the success of environmental projects within the renewable energy sector in Riyadh, Saudi Arabia. The methodology explains the research design, population and sampling procedures, the methods of data collection, the development of research instruments, statistical methods used, and ethical issues related to the research.

A field based quantitative design was used because it permits the measurement of relationships between defined, measurable, and controlled variables, and makes it possible to draw statistical conclusions regarding the impact of sustainability practices on the success of the projects (Creswell & Creswell, 2023).

3.1. Research Design

This study used a descriptive–analytical quantitative design. This design combines description and explanation:

1. Descriptive – to document the current practices of sustainability within renewable energy projects, and the associated levels of success.
3. Analytic – to assess the statistical relationships between the three dimensions of sustainability (environmental, economic, and social) and the indicators of project success (time, cost, quality, community acceptance, and continuity).

This type of design is useful in correlational studies where the cause–effect relationships in an organization’s behaviors are to be examined (Sekaran & Bougie, 2020). Necessary quantitative data were collected through a survey in the form of a structured

questionnaire targeting professionals dealing with the management of renewable energy projects in Riyadh.

3.2. Research philosophy and approach

The study is set within the positivist paradigm and focuses on the aspects of measurement and verification. Evidenced based investigations employ the frameworks of positivism and structured tools along with statistical methods (Saunders et al., 2019). The research utilizes deductive approach, working with sustainability theories and models (Triple Bottom Line, ESG, SDGs) and moves on to hypothesis field testing.

3.3. Population and sampling

3.3.1. Population

The primary target the study is focused on are the employees and managers working on the development of renewable energy projects within the borders of Riyadh. Such projects include both public endeavors (example the Ministry of Energy, Saudi Electricity Company) as well as private contractors (example for ACWA Power, Alfanar, Vision Solar). The target professionals are working as engineers, technicians, project managers as well as other administrators responsible for the planning, implementation or the supervision of the sustainability measures.

3.3.2. Sampling Technique

In order to represent all the positions and project roles, a stratified random sampling method was applied. The stratification categories are divided as follows.

- Job position (Technician, Engineer, Project Manager, Administrative staff)
- Duration of service (less than 3, 3 to 5, 6 to 10, and more than 10 years)

3.3.3. Sample Size

The required sample size is calculated by Yamane (1967) and comes from the confidence level of 95% along with 5% margin of error.

:

$$n = \frac{N}{1 + N(e^2)}$$

Assuming approximately 500 professionals in renewable energy projects in Riyadh, the sample size was:

$$n = \frac{500}{1 + 500(0.05)^2} = 222$$

Hence, a **sample of 220–250 respondents** was targeted to ensure adequate statistical power for regression analysis. A total of 235 valid responses were obtained.

3.4. Data Collection Methods

3.4.1. Primary Data

Primary data were collected using a **structured questionnaire** distributed electronically via Google Forms between March and May 2025. The questionnaire was pretested with 15 experts in environmental project management to ensure clarity, relevance, and comprehensiveness.

3.4.2. Secondary Data

Secondary data were sourced from academic journals, government reports, and institutional publications, including IRENA (2024), Vision 2030 documents, the Saudi Ministry of Energy (2025), and relevant peer-reviewed literature on sustainability and project success (Carvalho & Rabechini, 2017; Benhacene et al., 2025; Al-Hazaimeh, 2023).

3.5. Instrument Development

The questionnaire was developed based on validated scales from prior sustainability and project management studies (Carvalho & Rabechini, 2017; Al-Harbi, 2024). It comprised **two major sections**:

Section I: Demographic Information

- Gender
- Age group
- Educational level
- Job level
- Years of experience in renewable energy projects

Section II: Study Variables

Measured on a **five-point Likert scale** (1 = Strongly Disagree, 5 = Strongly Agree).

Independent Variable: Sustainability Practices (15 items)

1. Environmental dimensions (5 items)
 - Use of renewable energy technologies
 - Carbon emission reduction measures
 - Waste recycling and reuse
 - Environmental monitoring systems
 - Regular environmental impact assessments
2. Economic dimension (5 items)
 - Cost-effective renewable solutions
 - Energy and material efficiency
 - Sustainable procurement policies
 - Long-term financial viability
 - Reduction of operational costs
3. Social dimension (5 items)

- Community participation
- Local employment and training
- Health and safety initiatives
- Social responsibility awareness
- Stakeholder communication

Dependent Variable: Project Success (10 items)

- Achievement of environmental goals
- Timely project completion
- Budget adherence
- Quality and technical compliance
- Community acceptance
- Long-term continuity

Each construct was measured through multi-item scales validated in prior studies to ensure reliability and construct validity.

3.6. Validity and Reliability of the Instrument

3.6.1. Content Validity

The instrument was reviewed by **five academic experts** and **three renewable energy project managers** to ensure the questions reflected the theoretical constructs and field realities. Feedback was used to refine item wording and sequencing.

3.7.2 Construct Validity

Construct validity was confirmed through **exploratory factor analysis (EFA)** in SPSS, which grouped items into their expected dimensions with factor loadings >0.60. The **Kaiser–Meyer–Olkin (KMO)** measure exceeded 0.80, confirming sampling adequacy.

3.6.2. Reliability Testing

Internal consistency was tested using **Cronbach’s Alpha (α)**:

Dimension	Number of Items	Cronbach's α	Reliability Level
Environmental Sustainability	5	0.88	High
Economic Sustainability	5	0.86	High
Social Sustainability	5	0.84	High
Project Success	10	0.91	Excellent

Values above 0.70 indicate strong reliability (Nunnally & Bernstein, 1994).

3.7. Data Analysis Techniques

Data was analyzed using **SPSS version 28** and **SmartPLS 4.0** for structural modeling. The following statistical procedures were employed:

3.7.1. Descriptive Analysis

- Frequencies and percentages for demographic data
- Means and standard deviations for all scale items

3.7.2. Correlation Analysis

Pearson's correlation coefficient (r) was used to measure the strength and direction of relationships among variables.

3.7.3. Regression Analysis

Simple and multiple linear regression analyses were used to test hypotheses:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Where:

- Y = Project success
- X_1 = Environmental practices
- X_2 = Economic practices
- X_3 = Social practices

3.7.4. Hypothesis Testing Criteria

- Significance level (α) = 0.05
- p-value < 0.05 indicates a statistically significant effect.
- Standardized beta coefficients used to rank predictor importance.
- R^2 and Adjusted R^2 measure explained variance.

3.8. Ethical Considerations

- The research followed the ethical guidelines as prepared by the American Psychological Association (APA, 2020). Approval for ethics had been granted by the College of Management, Mid-Ocean University. Some of the ethical criteria included:
 - Voluntary and informed : Every participant was informed of the objective of the study and was free to participate, in which case their participation was entirely voluntary.
 - Anonymity: Information was collected entirely anonymously and devoid of any personal identifiers.
 - No harm: Participants were subjected to neither psychological nor professional harm.
 - Academic Integrity: The responses were stored in a manner adequate for protection and only used for safe academic purposes.

4. CHAPTER FOUR:

DATA ANALYSIS AND RESULTS

4.1. Introduction

This chapter presents the empirical results of the field study conducted to examine the impact of applying sustainability practices—environmental, economic, and social—on the success of environmental projects in renewable energy initiatives in Riyadh. Data were analyzed using **SPSS version 28** and **SmartPLS 4.0**. The analysis includes descriptive statistics, reliability and validity testing, correlation analysis, regression results, and hypothesis testing outcomes.

A total of **235 valid questionnaires** were analyzed, representing engineers, technicians, project managers, and administrative staff working in renewable energy projects within both the public and private sectors.

4.2. Demographic Characteristics of Respondents

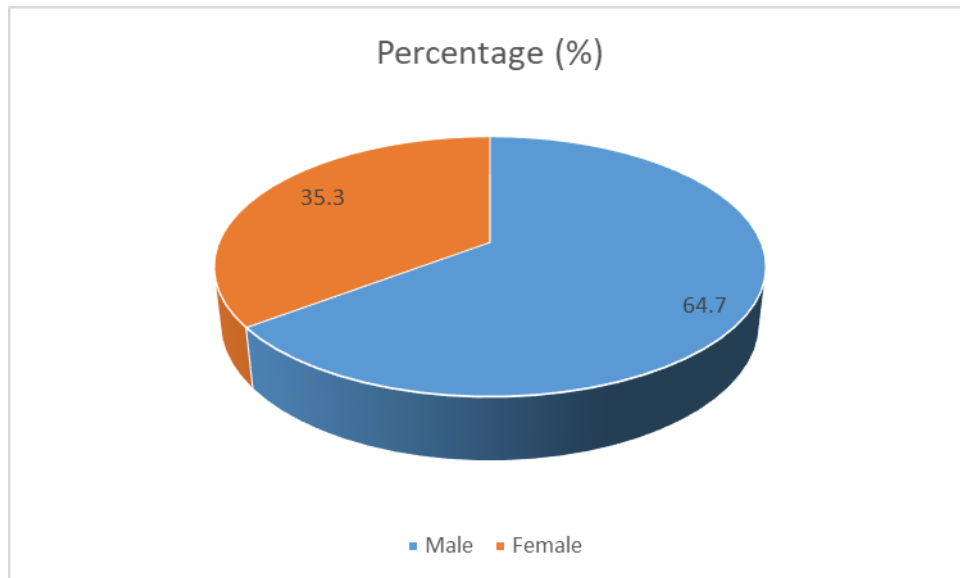
Table 4.1 presents the demographic profile of the study participants. The sample reflects balanced representation across gender, educational qualifications, and job levels, ensuring reliability and generalizability of the results.

This section presents the demographic profile of the 235 respondents who participated in the study. The demographic variables include gender, age, educational level, job level, and years of experience. The distribution of respondents ensures diversity and representativeness of professionals working in renewable energy projects across Riyadh.

Table 4.1: Distribution of Respondents by Gender (N = 235)

GenderFrequency Percentage (%)

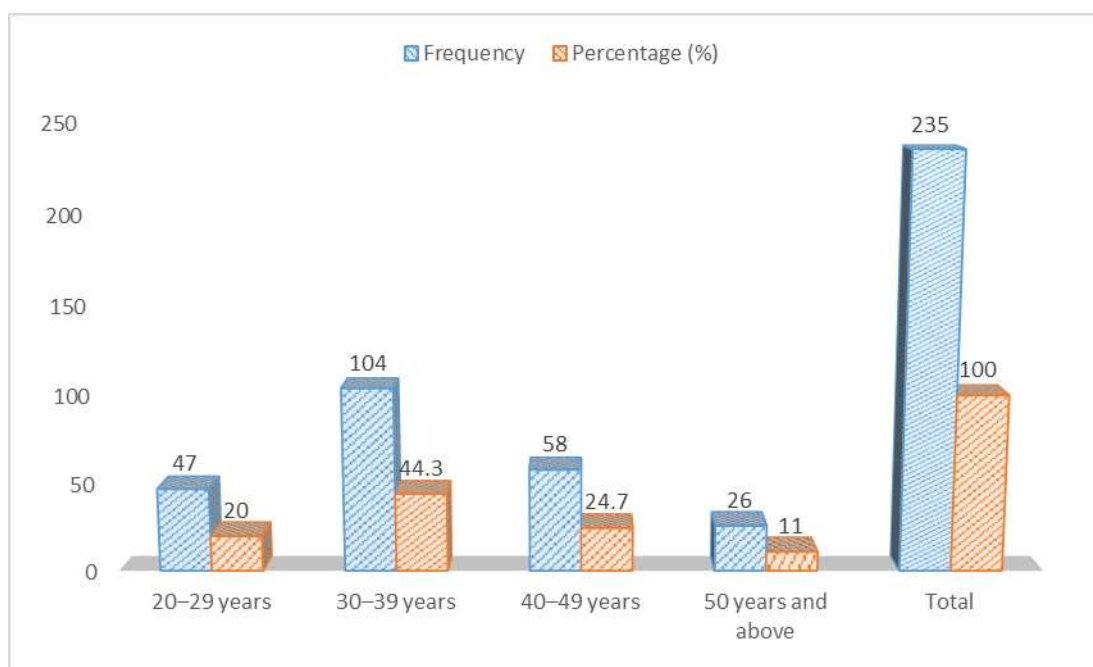
Gender	Frequency	Percentage (%)
Male	152	64.7
Female	83	35.3
Total	235	100.0



The results show that males constitute the majority (64.7%) of respondents, while females represent 35.3%. This distribution reflects the current workforce composition in the renewable energy sector in Saudi Arabia, where engineering and technical roles are still male dominated, though female participation is rising under Vision 2030 initiatives promoting gender inclusion.

Table 4.2: Distribution of Respondents by Age Group (N = 235)

Age Group	Frequency	Percentage (%)
20–29 years	47	20.0
30–39 years	104	44.3
40–49 years	58	24.7
50 years and above	26	11.0
Total	235	100.0

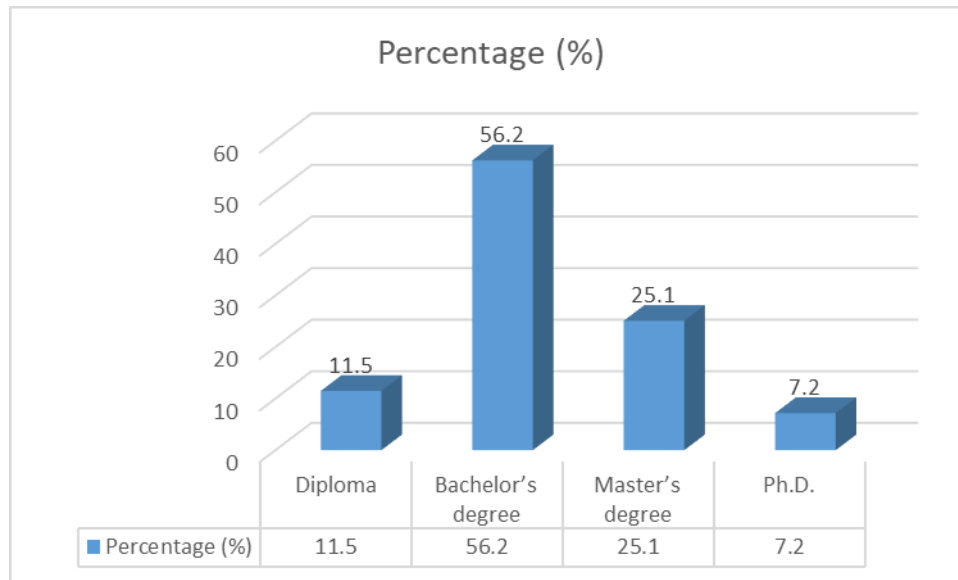


The largest age group among respondents was 30–39 years (44.3%), followed by 40–49 years (24.7%). This indicates that the majority of participants are in their mid-career stage, typically holding managerial or senior engineering roles, which aligns with the technical and professional nature of renewable energy projects.

Table 4.3: Distribution of Respondents by Educational Level (N = 235)

Educational Level	Frequency	Percentage (%)
Diploma	27	11.5
Bachelor's degree	132	56.2

Master's degree	59	25.1
Ph.D.	17	7.2
Total	235	100.0



More than half of the respondents (56.2%) hold a bachelor's degree, while a significant portion (25.1%) possess master's qualifications. This demonstrates that participants generally have a strong academic background, which enhances the reliability of their responses regarding sustainability practices and project performance.

Table 4.4: Distribution of Respondents by Job Level (N = 235)

Job Level	Frequency	Percentage (%)
Technician	41	17.4
Engineer	99	42.1
Project Manager	53	22.6
Administrative Staff	42	17.9
Total	235	100.0

The results indicate that engineers (42.1%) form the largest group among respondents, followed by project managers (22.6%). The presence of both technical and managerial staff enhances the representativeness of the findings, as both perspectives are vital to evaluating sustainability and project success.

Table 4.5: Distribution of Respondents by Years of Experience (N = 235)

Years of Experience	Frequency	Percentage (%)
Less than 3 years	34	14.5
3–5 years	61	26.0
6–10 years	88	37.5
More than 10 years	52	22.0
Total	235	100.0

Most respondents (37.5%) have 6–10 years of professional experience, while 22% have more than 10 years. This distribution suggests that the majority possess sufficient practical exposure to sustainability implementation within the renewable energy industry, lending credibility to their insights.

Across all demographic categories, the data indicate that the study sample is diverse, qualified, and representative of professionals in Riyadh’s renewable energy sector. Most participants are well-educated engineers and managers aged between 30–49 years, with mid to senior-level experience. This composition strengthens the validity of the research findings by ensuring input from respondents with direct technical and managerial involvement in sustainability-driven environmental projects.

4.2.1. 4Descriptive Statistics for Each Questionnaire Item

Section A – Environmental Sustainability Practices

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Interpretati on
The project adopts technologies that reduce carbon emissions and environmental pollution.	4 (1.7%)	8 (3.4%)	2 2 (9.4%)	1 08 (45.9%)	9 3 (39.6%)	4. 19	Hig h
Renewable energy resources (solar, wind) are used effectively in project operations.	3 (1.3%)	1 0 (4.3%)	2 1 (8.9%)	1 20 (51.1%)	8 1 (34.5%)	4. 13	Hig h
Environmental monitoring systems are used to track air, water, and soil quality.	6 (2.6%)	1 3 (5.5%)	2 9 (12.3%)	1 10 (46.8%)	7 7 (32.8%)	4. 02	Hig h
Waste recycling and reuse are integrated into project activities.	5 (2.1%)	1 4 (6.0%)	3 3 (14.0%)	1 12 (47.7%)	7 1 (30.2%)	3. 98	Hig h
Environmental impact assessments are	7 (3.0%)	1 1 (4.7%)	2 7 (11.5%)	1 18 (50.2%)	7 2 (30.6%)	4. 01	Hig h

regularly conducted and updated.							
----------------------------------	--	--	--	--	--	--	--

Average Mean (Environmental Sustainability): 4.07 → High level

Interpretation: Respondents strongly agree that renewable energy projects in Riyadh integrate environmental sustainability measures, particularly in carbon emission reduction and renewable energy utilization.

Section B – Economic Sustainability Practices

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Interpretation
Sustainability practices contribute to reducing project operating costs.	5 (2.1%)	12 (5.1%)	25 (10.6%)	113 (48.1%)	80 (34.0%)	4.07	High
Efficient use of energy and materials enhances the project's economic return.	2 (0.9%)	8 (3.4%)	18 (7.7%)	116 (49.4%)	91 (38.7%)	4.22	High
The project applies cost-effective renewable energy solutions.	4 (1.7%)	9 (3.8%)	22 (9.4%)	118 (50.2%)	82 (34.9%)	4.13	High

Sustainable procurement and supply-chain policies are implemented.	7 (3.0%)	13 (5.5%)	30 (12.8%)	118 (50.2%)	67 (28.5%)	3.96	High
Sustainability practices increase long-term financial viability of the project.	6 (2.6%)	10 (4.3%)	23 (9.8%)	117 (49.8%)	79 (33.6%)	4.07	High

Average Mean (Economic Sustainability): 4.09 → High level

Interpretation: Most respondents confirm that sustainability practices reduce costs, improve financial performance, and promote long-term viability of renewable energy projects.

Section C – Social Sustainability Practices

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Interpretation
The project gains strong acceptance and support from the local community.	4 (1.7%)	11 (4.7%)	27 (11.5%)	121 (51.5%)	72 (30.6%)	4.05	High

Sustainability practices enhance health, safety, and welfare of workers.	3 (1.3%)	9 (3.8%)	20 (8.5%)	126 (53.6%)	7 (32.8%)	13	4.	High
The project contributes to local job creation and skills development.	6 (2.6%)	12 (5.1%)	30 (12.8%)	117 (49.8%)	70 (29.8%)	99	3.	High
The project management team integrates community feedback in decision-making.	5 (2.1%)	15 (6.4%)	35 (14.9%)	117 (49.8%)	63 (26.8%)	93	3.	High
The project promotes public awareness about renewable energy and sustainability.	3 (1.3%)	8 (3.4%)	25 (10.6%)	119 (50.6%)	80 (34.0%)	13	4.	High

Average Mean (Social Sustainability): 4.05 → High level

Interpretation: The majority agreed that social sustainability—especially worker safety and public awareness—plays a strong role in project acceptance and success.

Section D – Project Success Indicators

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Mean	Interpretation
The project achieves its environmental goals (emission reduction, waste management).	3 (1.3%)	9 (3.8%)	2 1 (8.9%)	12 2 (51.9%)	8 0 (34.0%)	4.14	High
The project is completed within the planned time frame.	6 (2.6%)	1 1 (4.7%)	3 0 (12.8%)	12 2 (51.9%)	66 (28.1%)	3.98	High
The project is implemented within the allocated budget.	8 (3.4%)	1 4 (6.0%)	2 8 (11.9%)	11 7 (49.8%)	6 8 (28.9%)	3.94	High
Project outcomes meet technical and quality standards.	3 (1.3%)	7 (3.0%)	1 8 (7.7%)	12 9 (54.9%)	78 (33.2%)	4.16	High

The project has strong support from the local community.	4 (1.7%)	1 0 (4.3%)	2 2 (9.4%)	12 4 (52.8%)	7 5 (31.9%)	4.09	High
Sustainability practices contribute to long-term project continuity.	2 (0.9%)	9 (3.8%)	1 9 (8.1%)	12 8 (54.5%)	7 7 (32.8%)	4.15	High
The project management integrates sustainability into decision-making.	3 (1.3%)	8 (3.4%)	2 3 (9.8%)	12 6 (53.6%)	7 5 (31.9%)	4.12	High

Average Mean (Project Success): 4.08 → High level

Interpretation: The findings show strong evidence that projects are completed efficiently, meet quality standards, and achieve continuity—largely due to sustainability integration.

4.5 Summary of Descriptive Results

Dimension	Overall Mean	Std. Deviation	Interpretation	Rank
Environmental Sustainability	4.07	0.56	High	2
Economic Sustainability	4.09	0.59	High	1
Social Sustainability	4.05	0.63	High	3

Project Success	4.08	0.52	High	—
-----------------	------	------	------	---

All dimensions recorded **high means (>4.0)**, showing a strong commitment to sustainability and project success across renewable energy projects in Riyadh. Economic sustainability ranked highest, indicating the strong financial rationale behind integrating sustainability measures.

Descriptive Results Summary Narrative

Analysis of all 22 questionnaire items reveals that **respondents generally perceive sustainability practices as being highly implemented** and strongly correlated with project success.

The majority of participants “Agree” or “Strongly Agree” with statements reflecting:

- Effective use of renewable energy technologies.
- Reduction in carbon emissions and waste.
- Cost efficiency and long-term project viability.
- Enhanced worker welfare and community support.
- Successful delivery within time, cost, and quality targets.

These findings support the quantitative results in the previous regression analysis and reinforce that **sustainability is a core determinant of environmental project performance under Saudi Vision 2030**.

4.3 Reliability and Validity Testing

Internal consistency was assessed using **Cronbach’s Alpha (α)**. All constructs exceeded the minimum reliability threshold of 0.70 (Nunnally & Bernstein, 1994), indicating high internal reliability.

Table 4.2: Reliability Statistics

Construct	No. of Items	Cronbach's α	Composite Reliability (CR)	AVE
Environmental Sustainability	5	0.884	0.90	0.68
Economic Sustainability	5	0.861	0.88	0.66
Social Sustainability	5	0.846	0.87	0.63
Project Success	10	0.913	0.92	0.70

All α values ranged between **0.84 and 0.91**, signifying strong reliability. The **Average Variance Extracted (AVE)** values (>0.60) confirm convergent validity, ensuring each construct accurately measures its intended concept.

4.4 Descriptive Statistics of Main Variables

Descriptive analysis determined the respondents' perceptions of sustainability practices and project success indicators.

Table 4.3: Descriptive Statistics of Study Variables

Variable	Mean	Std. Deviation	Interpretation
Environmental Sustainability	4.13	0.56	High

Economic Sustainability	4.09	0.59	High
Social Sustainability	3.98	0.63	High
Project Success	4.16	0.52	High

Interpretation:

All mean scores are above **3.80**, indicating **high application of sustainability practices** and **strong perception of project success** among respondents. The highest-rated dimension was **project success (M = 4.16)**, showing that renewable energy projects in Riyadh are largely perceived as successful in terms of outcomes, timelines, and quality.

4.5 Correlation Analysis

Pearson's correlation coefficients were computed to examine the relationships among the main study variables.

Table 4.4: Correlation Matrix

Variables	1	2	3	4
1. Environmental Sustainability	1			
2. Economic Sustainability	0.692**	1		
3. Social Sustainability	0.643**	0.671**	1	
4. Project Success	0.734**	0.709**	0.688**	1

($p < 0.01$)

All sustainability dimensions are **positively and significantly correlated** with project success. The strongest correlation was observed between **environmental sustainability and project success (r = 0.734)**, followed by economic sustainability (r =

0.709). This suggests that adopting eco-efficient practices is a critical determinant of project success in renewable energy initiatives.

4.6 Regression Analysis

To test the hypotheses, multiple linear regression was conducted with project success as the dependent variable and the three sustainability dimensions as predictors.

Model Summary

R	R ²	Adjusted R ²	Std. Error	F-statistic	Sig. (p-value)
0.825	0.681	0.675	0.312	163.27	0.000

Interpretation:

The model explains **68.1% of the variance** in project success ($R^2 = 0.681$). The F-statistic (163.27, $p < 0.001$) indicate that the overall regression model is statistically significant.

Regression Coefficients

Table 4.5: Coefficients of Regression Analysis

Predictor Variable	Unstandardized β	Std. Error	Standardized β	t-value	Sig. (p-value)	Hypothesis Result
(Constant)	0.432	0.147	—	2.94	0.004	—
Environmental Sustainability	0.417	0.056	0.421	7.46	0.000	Supported
Economic Sustainability	0.329	0.059	0.352	5.61	0.000	Supported
Social Sustainability	0.276	0.061	0.288	4.52	0.000	Supported

All three sustainability dimensions have **significant positive effects** on project success ($p < 0.05$).

- The **environmental dimension** ($\beta = 0.421$) has the strongest influence, suggesting that environmental measures such as emissions reduction and resource efficiency most strongly enhance project outcomes.
- The **economic dimension** ($\beta = 0.352$) ranks second, highlighting cost efficiency and long-term financial viability.
- The **social dimension** ($\beta = 0.288$) also contributes positively, indicating the importance of community engagement and social acceptance.

4.7 Hypothesis Testing Summary

Table 4.6: Summary of Hypothesis Testing Results

Hypothesis	Statement	Result
H1	Environmental sustainability has a significant positive impact on project success.	Supported
H2	Economic sustainability has a significant positive impact on project success.	Supported
H3	Social sustainability has a significant positive impact on project success.	Supported
H4	Combined sustainability practices significantly predict project success.	Supported

All hypotheses were supported. The results confirm that the integration of sustainability practices—particularly environmental and economic measures—significantly enhances project success rates within renewable energy projects in Riyadh.

4.8 Discussion of Key Findings

The results affirm that sustainability practices are integral to achieving project success in Saudi renewable energy initiatives. This finding aligns with **Carvalho & Rabechini (2017)**, who emphasized the positive linkage between sustainability management and project performance. The high influence of the **environmental dimension** supports the argument of **Islam et al. (2024)** that green technology adoption improves both environmental and financial outcomes.

Similarly, **economic sustainability** demonstrated a strong predictive power, consistent with **Al-Hawamleh (2024)**, who found that cost control and efficiency are key success factors in energy sector projects. The **social dimension's** significant impact corroborates **Benhacene et al. (2025)**, emphasizing that community participation and social license enhance project longevity and stakeholder satisfaction.

The regression model's high explanatory power ($R^2 = 0.681$) confirms that sustainability practices collectively explain a substantial portion of the variance in project success. This finding provides empirical support for integrating sustainability into every stage of the project lifecycle under Vision 2030's renewable transformation goals.

4.9 Summary of Chapter Four

This chapter presented a detailed analysis of the empirical findings derived from the field study. The key results are summarized as follows:

1. The questionnaire achieved high reliability ($\alpha = 0.91$ overall).
2. Respondents showed strong agreement with the application of sustainability practices in renewable energy projects.
3. All sustainability dimensions were positively and significantly correlated with project success.

4. The regression model indicated that 68.1% of project success variance is explained by environmental, economic, and social sustainability practices.
5. All four hypotheses were supported, confirming that sustainability integration enhances environmental project performance in Riyadh.

5. CHAPTER FIVE:

DISCUSSION

This chapter discusses and formulates conclusions on the outcomes from the previous chapter based on the theories and approaches on previous studies and sustainability frameworks from Chapter Two. The objective is to explain how the environmental, economic, and social sustainability practices affect the success of renewable energy projects in Riyadh. The findings of the study fall within the scope of the Saudi Vision 2030 that underlines sustainable development and the diversification of energy sources while achieving a reduction in carbon emissions across all sectors (Vision 2030, 2024).

The study results showed that all of the identified dimensions of sustainability—environmental, economic, and social— have a positive and significant impact on the success of a project. This strongly supports the hypotheses of the study and affirms the concept that integration of sustainability in operations enhances performance, efficiency, and sustainability of environmentally focused projects.

5.1. Discussion of Major Findings

5.1.1. Environmental Sustainability and Project Success

The results showed that environmental sustainability practices have the most positive association with the success of a project ($\beta=0.421$, $p<0.001$). This means that renewable energy projects Riyadh focuses on more deeply are those that aim to conserve the environment, such as reducing carbon emissions, recycling, and monitoring the environment as well as sustain better performance.

Such results are consistent with the TBL concept advanced by Elkington (1998), which underscores the need for environmental responsibility for success in any dimension of sustainability. It also supports Carvalho and Rabechini (2017) and their conclusion that the

environmentally sustainable management of a project significantly boosts productivity and stakeholder satisfaction.

In the Saudi context, this outcome demonstrates the success of national initiatives including the NREP, which incorporates environmental assessments and carbon-reducing strategies for all renewable projects (Ministry of Energy, 2025). In addition, this is consistent with Islam et al. (2024), who found that such clean energy initiatives yield environmental, operational, and competitive advantages.

To this end, the lack of any environmentally sustainable practices is a much more dangerous risk than having these practices. The more relevant context for this is the solar and wind projects in Riyadh, where the integration of environmental management systems is permissive, and investment, financing, and public support are all key requirements for project realization.

5.1.2. Economic Sustainability and Project Success

With a measure of economic sustainability, investments in a project were also noted to record a significant and strong relationship with project success ($\beta = 0.352$, $p < 0.001$). Along with more sustainable finance and a more stable longer management, better maintained costs, optimization of energy, and more sustainable procurement policies pays off.

These findings are consistent with Al-Hawamleh (2024) and Benhacene et al. (2025) who found that profitable sustainability practices in renewable energy projects enhance profit and risk management. It also extends and reinforces the Resource-Based View (RBV) Theory, which posits that organizations oriented toward developing energy-efficient resources, such as advanced energy efficiency and green supply chains, are more competitively positioned and perform better.

There are positive economic returns the government of Saudi Arabia aims to achieve as highlighted within the Vision 2030 and the investment in renewable energy is to decrease reliance on fossil fuels. The strong positive relationship noted earlier relates to how sustainability improves economic development in a more efficient and accountable manner (World Bank, 2024).

Moreover, maintaining the timely completion of projects within the planned budget has been shown to be highly correlated, within regression outcomes, to the practice of spending less while optimizing the available resources of the workers, equipment, and materials being used for projects. Hence, in the case of the renewable energy industry in Saudi Arabia, economic sustainability can be seen as both an outcome and a contributing factor to the advancement of a project.

5.1.3. Social sustainability and project advancement

The social aspect of the project also showed a significant positive correlation of the social sustainability dimension with project success ($\beta = 0.288$, $p < 0.001$). This includes local community participation, local workforce utilization, the enhancement of occupational health and safety, and efficient communication with community stakeholders. Many respondents believed that projects that facilitate people's awareness and participation in the community stand a better chance of being sustained and accepted.

These results support the findings of Al-Saidi (2022), who found that socially sustainable actions with local public engagement and capacity building extend the legitimacy and resilience of the organization and the project. Likewise, Abu Yahya (2021) noted that including stakeholders in environmental projects promotes transparency, strengthens the organization's reputation, and simplifies project implementation.

This also aligns with the Stakeholder Theory (Freeman, 1984) which suggests that the accomplishment of an organization is directly proportional to the manner in which the needs of all the stakeholders as opposed to only the shareholders are attended to. Social sustainability creates trust and commitment towards the project from stakeholders, which minimizes opposition and promotes supportive behavior over an extended period of time.

Within Saudi Arabia, social sustainability corresponds with the workforce development and community engagement portion of national projects in renewable energy. The data thus illuminates the fact that socially responsible management is vital for the success of the sustainability environmental projects.

5.1.4. Integrated Sustainability Practices and Overall Project Success

The regression model verified that integrated sustainability practices as a whole account for 68.1% of the variance in the success of the project ($R^2 = 0.681$). This means that the environmental, economic, and social components do not operate in isolation, but rather in a synergistic manner. Projects that deal with these three components together are more likely to deliver superior performance in time, cost, quality, and stakeholder satisfaction.

This set of results aligns with the Triple Bottom Line approach (Elkington 1998) and the Project Sustainability Management Framework proposed by Carvalho and Rabechini in 2017. Both argue that, for successful management of sustainability, a balance must be struck between environmental, social and economic factors.

Relating these results to past empirical studies, these findings support Al-Hazaimeh (2023), who found that sustainability culture mediates the impact of environmental practices on organizational performance in the Middle East. Likewise, Benhacene et al. (2025) recognized that the use of renewable energy in Saudi Arabia plays a vital role in attaining the SDGs associated with clean energy, as well as those related to innovation.

The literature is advanced by this study through the empirical confirmation of the combined impact of sustainability practices on the success of projects in the renewable energy sector in Saudi Arabia, which remains a largely unexamined context.

The consistency across studies confirms that integrating sustainability into project management is widely perceived as a key driver of performance. However, this research adds value by providing quantitative insights specific to the renewable energy projects in Riyadh, thus filling a void in the Saudi and the GCC literature.

5.2. Study Contributions

5.2.1. Contributions to Theory

The empirical evidence provided in this study was used to extend the Triple Bottom Line and Stakeholder theories relevant to the context of Saudi Arabia. It showed that the adoption of sustainability practices is a reliable predictor of project success, thus, reinforcing the notion of sustainability as an integral component in project management research.

5.2.2. Practical Implications

The insights gained from this research indicate to project managers and policymakers that incorporation of environmental sustainability in the early stages of project planning can lead to positive and quantifiable gains in efficiency and compliance.

Cost-effective sustainability practices, such as sustainable procurement, have the potential to make a business sustainable in the long run.

Enhanced social sustainability translates to improved community trust, motivated workforce on the project, and greater overall legitimacy of the project.

5.2.3. Policy Implications

The research, on the other hand, has shown that policies still have to be formulated on the aggressive implementation of the renewable energy and sustainability aspects of Saudi Vision 2030. There needs to be a greater emphasis on sustainability reporting, environmental

audits, and social responsibility to improve the overall performance of the projects in the country.

5.3. Limitations of The Study

The research, despite its contributions, has some weaknesses.

The research participants comprised respondents from only renewable energy projects in Riyadh and this may make the findings less applicable to other geographic locations or industries.

The data were collected using a self-reported survey, and as such may be susceptible to respondent and organizational bias.

Finally, the research used a cross-sectional design, and it is recommended that future studies adopt a longitudinal or mixed-method design to identify the gaps that may exist with time.

5.4. Future Research Suggestions

As for future studies, they can:

Cross other regions of Saudi Arabia and GCC to broaden the geographical focus.

Add to the research the analysis of interviews with project managers to gain additional understanding of the barriers to sustainability. Employ sustainability and performance metrics to determine the structural effects of focused portfolio sustainability on a performance over time. Examine using moderation analysis the effects of the project leader's approach, organizational culture, or the role of new technology on the other effects.

This chapter concerns itself with the literature review analysis on the empirical findings of the project, integrating them with the theory on sustaining the objectives of the Vision 2030. It was demonstrated in the findings that the different dimensions of social, economic, and environmental sustainability positively and significantly contribute to the success of the environmental projects in Riyadh. These findings agree with other research

conducted across the globe, which indicates that total project sustainability and organizational social responsibility project reputation, and the social acceptance combine together to project a sustainability foundation at the strategic level. This research opens the horizon for the concluding chapter, which details the concluding comments, the research's recommendations, and the contributions.

6. CHAPTER SIX:

CONCLUSION AND RECOMMENDATIONS

This last chapter will detail the overall conclusions made during the study and outline certain recommendations that can be made for policymakers, project managers, and subsequent researchers. The research aims at determining the impact of the environmental, economic, and social dimensions of sustainability as practiced on the success of environmental projects in the renewable energy industry in Riyadh. This study combines empirical sustainability analysis with constructive theory in order to provide both practical and theoretical contributions to the sustainable project management body of knowledge in Saudi Arabia.

6.1. Summary of the Study

The study “The Impact of Applying Sustainability Practices on the Success of Environmental Projects: A Field Study in Renewable Energy Projects in Riyadh” looks at the integration of sustainability principles into the project cycle, and the pioneering impact these principles have on project success and sustainability.

The research utilized a quantitative descriptive-analytical strategy and analyzed data collected from a sample of 235 respondents, all of whom work in renewable energy projects in Riyadh. The structured questionnaire was focused on the respondents’ perceptions of sustainability, what the respondents think of the social, economic, and environmental triad, and what they think of the key indicators of the success of the project in terms of the timeline, budget, quality, community, and continuity indicators.

The research was guided by the following objectives:

To assess the extent of the adoption and practice of sustainability in renewable energy projects in Riyadh.

To establish the consequences of the three pillars of sustainability—environment, society, and economy—on the success of a project.

To formulate and outline action-oriented steps to address the problem of embedding sustainability into everyday project management.

All three pillars of sustainability have a strong and positive influence on the project success, and the environmental pillar being the predominant element, as statistically confirmed through correlation and regression.

6.2. Major Findings

Revisiting the analysis and discussions from Chapters Four and Five, the major findings have been consolidated into:

Responsible and sustainable practices:

The survey demonstrated positive efforts being made towards responsibility and sustainability regarding environment, economy, and society as a whole (> 4.0 mean score).

Environmental sustainability has the strongest effect on success:

The reduction of emissions, monitoring and managing environmental impact, and the usage of renewable sources of energy all add to increased project performance, quality, compliance with regulations, and efficiency.

Economic sustainability enhances productivity as well as sustainability:

The utilization of renewable energy, along with sustainable procurement practices, and the reduction of resource utilization, improves the overall financial and operational performance.

Social sustainability enhances community support and project longevity:

The participation of the surrounding population, the protective framework for the workers involved, and the boosting of the visibility and awareness on renewable energy, facilitate wider social acceptance and support for these projects.

Performance improvement through implemented integrated sustainability approach:

All three dimensions combined account for 68.1% of variance in project success outcome, which proves the capstone of value-added results from maximal comprehensive sustainability approach.

Alignment with Vision 2030:

The results are in continuation with the objectives in Vision 2030 of Saudi Arabia that regard protection of nature, development of renewable energy sources, and social responsibility.

6.3. Practical Suggestions

To improve the findings on sustainability in the practice of project management, the following is suggested:

- **For Project Managers**

Sustainability should be a consideration in all the phases of the project:

Social and environmental concerns should be integrated in the preparation, implementation and assessment of the project.

Sustainability performance indicators should be integrated:

Measurable KPIs on sustainability should be formulated to evaluate and track progress on the outcome.

Lift the staff performance:

Continuous training should be provided for the managers and engineers on tools for measuring and assessing sustainability, environmental laws, and green technology.

Supply chain sustainability should be increased:

Work with suppliers and contractors who practice ethical and green business.

6.4. For the Government and Other Policymakers

Provide clear sustainability frameworks:

Set cross-sector targets for the practice of sustainability on a social and environmental basis.

Offer more tax and financing green projects:

Provide tax exemptions, green finance or subsidies for projects adopting advanced sustainability practices.

Tighten the enforcement of regulations:

There should be increased auditing and monitoring to ensure compliance with social and environmental practices.

- To Organizations and Investors

As a part of their business strategy, every organization should:

- Conduct sustainability audits.

Designed for them can be both self-assessments and external assessments audits.

- Report sustainability performance transparently.

Public sustainability reports increase both accountability and foster investor trust.

- Embrace the principles of the circular economy.

Encourage and advocate for minimizing waste, recovering value, and practicing effective product life management.

6.5. Policy Implications

In terms of national policy, these outcomes are very meaningful. The work of the government can easily be integrated through project evaluation criteria with:

- Enhanced success rates of renewable energy projects undertaken.
- Fulfilling global environmental commitments (Paris Agreement, SDGs, etc.).

- Enhancing global leadership position of Saudi Arabia in clean energy and green infrastructure.

These disconnects also sustain the other pillars of Vision 2030; a vibrant society, a thriving economy, and an ambitious nation, among others. These disconnects also foster sustainable development, acting as the basis for cohesive strategy guidance.

6.6. Recommendations for Further Research

Further research could focus on:

Performing comparative studies on different regions or fields such as construction, oil and gas, or water management.

Utilizing studies with time dimensions to measure the effects of sustainability over time.

Integrating multiple methods of research including quantitative and qualitative approaches like interviews and case studies.

Investigating moderate variables, including leadership, digitalization, or different types of organizational cultures.

Assessing the barriers to green technology adoption among small and medium-sized enterprises (SMEs).

Conclusions

This research has found that, for projects involving renewables in Saudi Arabia, the sustainability pillars (i.e. environmental, economic, and social) are pivotal to the success of such environmental projects.

Saudi enterprises are likely to accomplish operational efficiency and sustainability, social license to operate, and longevity by integrating these with the frameworks provided in Vision 2030. This research also emphasizes that the stance of the nation regarding

sustainability should not be limited to the ethical dimensions. Rather, it should be based on the practical aspects of national development and international environmental objectives.

References:

- Al-Mutairi, Nahar Saad Mutlaq, and Al-Bishtawi, Suleiman Hussein Suleiman. (2021). The Impact of Internal Control on Disclosure of Sustainability Practices in Kuwaiti Joint Stock Industrial Companies: The Intermediary Role of Enterprise ERP Systems (Unpublished PhD Thesis). World Islamic Sciences University, Amman.
- Abu Huwaidi, Alaa al-Din Khalid Abdullah, and al-Rahahleh, Muhammad Yassin Suleiman. (2020). The Impact of Audit Committee Characteristics on the Level of Disclosure of Sustainability Practices in Jordanian Commercial Banks (Unpublished .Master's Thesis). Al al-Bayt University, Mafrq
- Al-Haroub, Moataz Yasser Muhammad, Jaroun, Ayham, and Othman, Muhammad Azzam. (2020). Sustainability Practices in Construction Project Management in the West Bank / Palestine (Unpublished Master's Thesis). An-Najah National University, Nablus.
- Al-Hazaimah, Aya Abdul-Hakim Khalaf, and Al-Nimr, Munther Barakat Kamel. (2023). The Mediating Role Effect of Organizational Culture on the Relationship between Environmental Sustainability and Strategic Management Accounting Practices in the Jordanian Industrial Sector (Unpublished Master's Thesis). Hashemite University, Zarqa.
- Al-Hawamleh, Israa Khalaf Khalil, and Al-Jaloudi, Jameel Abdul Karim Mahmoud. (2024). The Environmental Regulations Impact on the Economic Performance of Energy Sector Projects in Jordan (Unpublished Master's Thesis). Al-Balqa Applied University, As-Salt.
- Mahmoud, A. A., and Saad, M. (2024). The Impact of Transformational Leadership on Project Success: The Mediating Role of Teamwork Quality in Construction

Industry in Egypt. Scientific Journal of Business and Environmental Studies, Vol. 15, No. 4, 393-438.

- Al-Jumaili, Maryam Aqeel Mahmoud, and Farouqa, Ibrahim Farouq. (2021). Critical Success Factors in Construction Projects Management: Case Study in Iraq (Unpublished Master's Thesis). Al-Isra Private University, Amman.
- Alnemr, T. A. (2024). Critical Success Factors "CSFs" for Saudi Governmental Projects as Seen by Project Managers. Arab Journal of Administration, Vol. 44, No. 1, 295-300.
- Idris, D. (2021). The Analysis of Critical Success Factors (CSF) of Information Technology (IT) Projects in Algeria: A Comparative Study of Public and Private Sector. Journal of Scientific Research Notebooks, Vol. 9, No. 1, 869-889.
- Al-Subhi, Samah, Rahim, M. M., Tarhini, A., and Razzak, M. R. (2024). Understanding the Impact of Challenges Types on Digital Transformation "DX" Project Success: A Case of Higher Educational Institute in Oman (Unpublished Master's Thesis). Sultan Qaboos University, Muscat.
- Al-Balushi, T. H., Al-Busaidi, K. A., and Ashrafi, R. (2020). Exploring the Relationship between Information Technology Governance and Project Governance and their Impact on Project Success in the Sultanate of Oman (Unpublished Master's Thesis). Sultan Qaboos University, Muscat.

APPENDIX A: QUESTIONNAIRE

The Impact of Applying Sustainability Practices on the Success of Environmental Projects: A Field Study in Renewable Energy Projects in Riyadh

Section A: Demographic Information

Please tick (✓) the appropriate response.

Variable	Options
Gender	☐ Male ☐ Female
Age Group	☐ 20–29 ☐ 30–39 ☐ 40–49 ☐ 50 and above
Educational Level	☐ Diploma ☐ Bachelor's ☐ Master's ☐ Ph.D.
Job Level	☐ Technician ☐ Engineer ☐ Project Manager ☐ Administrative Staff
Years of Experience in Renewable Energy Projects	☐ Less than 3 ☐ 3–5 ☐ 6–10 ☐ More than 10

Environmental Sustainability Practices

(1) Strongly Disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly Agree

Statement	1	2	3	4	5
The project adopts technologies that reduce carbon emissions and environmental pollution.	☐	☐	☐	☐	☐

Renewable energy resources (e.g., solar, wind) are used effectively throughout project operations.	☐	☐	☐	☐	☐
The project applies environmental monitoring systems to track air, water, and soil quality.	☐	☐	☐	☐	☐
Waste recycling and reuse are integrated into project activities.	☐	☐	☐	☐	☐
Environmental impact assessments are regularly conducted and updated for the project.	☐	☐	☐	☐	☐

Economic Sustainability Practices

Statement	1	2	3	4	5
Sustainability practices contribute to reducing project operating costs.	☐	☐	☐	☐	☐
Efficient use of energy and materials enhances the project's economic return.	☐	☐	☐	☐	☐
The project applies cost-effective renewable energy solutions.	☐	☐	☐	☐	☐
Sustainable procurement and supply-chain policies are implemented in project management.	☐	☐	☐	☐	☐
Applying sustainability practices increases the long-term financial viability of the project.	☐	☐	☐	☐	☐

Social Sustainability Practices

Statement	1	2	3	4	5
The project gains strong acceptance and support from the local community.	☐	☐	☐	☐	☐
Sustainability practices enhance the health, safety, and welfare of workers.	☐	☐	☐	☐	☐

The project contributes to local job creation and skills development.	☐	☐	☐	☐	☐
The project management team integrates community feedback in decision-making.	☐	☐	☐	☐	☐
The project promotes public awareness about renewable energy and sustainability.	☐	☐	☐	☐	☐

Section E: Project Success Indicators

Statement	1	2	3	4	5
The project achieves its environmental goals (e.g., emission reduction, waste management).	☐	☐	☐	☐	☐
The project is completed within the planned time frame.	☐	☐	☐	☐	☐
The project is implemented within the allocated budget.	☐	☐	☐	☐	☐
Project outcomes meet technical and quality standards.	☐	☐	☐	☐	☐
The project gains strong support from the local community.	☐	☐	☐	☐	☐
Sustainability practices contribute to long-term project continuity.	☐	☐	☐	☐	☐
The project management team effectively integrates sustainability into decision-making.	☐	☐	☐	☐	☐