



**University of Bahrain
College of Business Administration
Department of Accounting**

**Determinants of Voluntary Climate Change
Disclosure: Empirical Evidence from Gulf
Cooperation Council Region Carbon-intensive Sectors**

**A Thesis Submitted in Partial Fulfilment of the Requirements
for the MSc. Degree in Accounting**

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☐ Without making any changes to the thesis.

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Abstract

This thesis aims to examine the nature and extent of climate change disclosure (CCD) of carbon-intensive firms operating in the Gulf Cooperation Council (GCC) region and identify disclosure's main determinants. The study is based on cross-sectional data of 212 firms for the year 2022. Content analysis is preformed to evaluate the scope of sampled firms' CCD in annual and sustainability reports based on a disclosure index that is suitable for the GCC context. The results reveal a concerning low level of carbon disclosure across the region and limited external assurance over disclosed information.

In order to identify disclosure influencers, a regression model is developed to test the effect of firm size, age, profitability, leverage, board independence, the existence of sustainability or environmental committees, the adoption of Global Reporting Initiative (GRI) standards, and countries' environmental performance index (EPI) scores on CCD. It is worth noting that the regression results accept the research hypotheses pertaining to the positive relationship between factors including size, debt levels, as well as GRI adoption and CCD at the 1% significance level. Hypotheses concerning the positive impact of both sustainability or environmental committees and EPI scores are also accepted, yet at the 10% significance level only, whereas firm age, profitability, and board independence have not been found to be significant determinants of CCD.

The study contributes to the existing body of literature by providing empirical evidence of CCD determinants in the GCC, a region that has been overlooked by prior studies within the same field of research. The insight provided by the study regarding the nature and extent of CCD is expected to improve users' comprehension of the current status of CCD within the region, thus enabling them to approach and evaluate such disclosure critically. Furthermore, research findings can be utilized by regulators to form policies and plans aimed at fostering a culture of greater corporate transparency and sustainability.

Keywords: Climate change, Climate change disclosure, Carbon disclosure, GHG, Sustainability reporting

Dedication

I dedicate this thesis to all those who supported me throughout the journey.

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Working on this thesis had been a difficult journey. Besides the ordinary research challenges, I encountered unforeseen circumstances that tested my resilience. I am sincerely grateful to Allah Almighty for his blessings and for being with me every step of the way. All praise and thanks are due to him.

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List of Abbreviations

CCD	Climate Change Disclosure
ESG	Environmental, Social and Governance (ESG)
EPI	Environmental Performance Index
GCC	Gulf Cooperation Council
GHGs	Greenhouse Gases
GRI	Global Reporting Initiative
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
ISSB	International Sustainability Standards Board
NDCs	<i>Nationally Determined Contributions</i>
SDG	Sustainable Development Goal
TCFD	Task Force on Climate-related Financial Disclosures
TRBC	The Refinitiv Business Classification
UNFCCC	United Nations Framework Convention on Climate Change
VNR	Voluntary National Review

Chapter One

Introduction to the study

1.1 Introduction

Corporate climate change disclosure (CCD), also known as carbon disclosure, witnessed a significant increase in recent years. It could be argued that this trend is driven by the seriousness of climate change. According to the United Nations, climate change is defined as a long-term change in temperatures and weather conditions. While climate change can be driven by natural events such as volcanic eruptions, it has been proven that the rapid increase in temperatures and global warming levels are triggered by human activities. Accordingly, scientists have started referring to the current geologic time as *the Anthropocene* to emphasize the vital role of humans (anthropos) in influencing the Earth's climate and ecosystems (Shrivastava & Zsolnai, 2020). The continuous increase in warmth levels over the previous four decades, besides the fact that the current average temperature of the earth is approximately 1.1°C higher than it was before the industrial revolution, further reinforces humans' tremendous role in the climate change issue (*What Is Climate Change?* | *United Nations*, n.d.).

Humans' contribution to the problem is attributable to their excessive use of fossil fuels as a source of energy. This is because burning fossil fuels, including coal, oil, and gas, produces emissions such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O). These emissions are referred to as greenhouse gases (GHGs) and form a layer that surrounds the earth and blocks the sun's heat, leading to higher temperature levels (*What Is Climate Change?* | *United Nations*, n.d.). In this regard, it might be worth mentioning that the Intergovernmental Panel on Climate Change (IPCC) states that human-driven warming is expected to reach 1.5°C by 2040, which is perceived to be the recommended limit of global warming as exceeding this limit and reaching 2°C above industrial-level is expected to result in long-lasting or irreversible damages (IPCC, 2018).

The dangers of climate change are not limited to warmer climates and higher temperatures; in fact, climate change can result in other serious consequences that can negatively affect the natural systems. It is believed that climate change can cause droughts, rise in sea levels, water scarcity, loss of biodiversity, catastrophic floods and

fires, and other social challenges such as loss of habitats and health implications (IPCC., 2023). In this respect, the United Nations states that our planet has already started suffering from extreme weather events and emphasizes that the grave implications of climate change are going to become more intense considering the inadequacy of current initiatives to combat climate change (United Nations, 2023). Additionally, climate change is expected to have crucial macroeconomic consequences that could accelerate into a global financial crisis. This is because changes in temperatures and rainfall levels may lead to the spread of communicable diseases, inversely affect labor productivity, and diminish agricultural outputs, thus, decreasing economic growth (Cho, 2019).

In light of the urgency of the matter, “*Climate Action (SDG13)*” has been recognized by the United Nations as a Sustainable Development Goal (SDG). Similarly, sustainability reporting has placed high emphasis on the climate change phenomenon due to its adverse impact on the environment and humankind (Doupnik et al., 2020). Accordingly, stakeholders started to exert pressure on firms by demanding thorough climate-related disclosures, which led companies to voluntarily engage in climate change reporting in order to showcase environmental responsibility and compliance with the United Nations SDG (Martínez-Ferrero & García-Meca, 2020).

1.2 Research Problem

It has become clearly evident that accounting literature is no longer solely concentrated on research topics that address conventional accounting concerns, such as financial reporting and standards, managerial accounting, as well as auditing and assurance. Nowadays, accounting literature encompasses various fields of research that delve into contemporary accounting issues including sustainability, integrated reporting, as well as social and environmental accounting (Marrone et al., 2020). It is assumed that such research trends have gained wide appeal due to the rising awareness of serious sustainability challenges. These critical sustainability concerns explain stakeholders’ high emphasis on how firms respond to critical environmental and social issues (Maroun, 2018). It is argued that stakeholders’ pressure is further intensified by the launch of the 2030 Agenda for Sustainable Development and the introduction of the 17 SDGs by the United Nations (Tilt et al., 2021). The same factors can also interpret firms’ voluntary engagement in sustainability reporting for legitimacy purposes.

Since climate change is viewed as a profound sustainability concern, if not the one with the utmost significance, carbon disclosure research has gained great dominance in environmental accounting literature. The importance of scrutinizing firms' carbon disclosure lies within the perception of corporate disclosures as the main communication channel between firms and users. If taken seriously, CCD will not only serve as a communication tool that enhances transparency and is used to make informed decisions but also as an instrument that influences firms to mitigate their emissions for a better environment. In this regard, Matisoff (2013) states that firms that are pressured to disclose their climate change impact tend to closely monitor their energy consumption to report lower GHG emissions, thus conveying a more favorable image to external users.

According to Bazhair et al. (2022), among the different themes of carbon disclosure research, "*determinants of carbon disclosure*" is the most prevailing. This is because alongside the importance of studying the extent of firms' CCD, there is a parallel significance of identifying factors influencing such disclosure. Empirical evidence of disclosure determinants can provide policymakers with a deep insight that can be leveraged to design or refine regulations aimed at mitigating climate change. Interestingly, despite the high focus on determinants of CCD as a research topic, a review of existing literature indicates that this field of research is predominantly centered on developed nations with little emphasis on developing countries (Bazhair et al., 2022; Hahn et al., 2015). Since the topic remains understudied in many regions, this study attempts to contribute to literature through studying the subject matter within the Gulf Cooperation Council (GCC) region. It is believed that providing insight into CCD within the context of the GCC is essential due to the significant economic reliance of GCC countries on oil and gas, which is considered to be an environmentally destructive industry.

While previous studies aimed at identifying influencers of CCD focus on disclosure drivers from the standpoint of a particular aspect, such as corporate governance (Islam & Hossain, 2022; Karim et al., 2021; Kılıç & Kuzey, 2019b; Liao et al., 2015; Toukabri & Mohamed Youssef, 2023), this research intends to study the matter using broader dimensions, especially because the topic has not been previously explored within the region. Accordingly, besides the firm's age, the study attempts to assess the impact of

financial metrics such as profitability, leverage, and size on CCD. Also, board independence and the existence of sustainability or environmental committees are included as independent variables that account for the effect of corporate governance on the extent of disclosure. Finally, since the study is based on multiple countries, Environment Performance Index (EPI) score is incorporated as a variable that captures the effect of environmental efforts at country level on corporate CCD.

1.3 Research Motivation

This study is motivated by both the considerable magnitude of climate change and the lack of research concerning the matter within the GCC region. Providing insight into CCD within the context of the GCC is assumed to be essential due to the significant economic reliance of GCC countries on environmentally destructive industries such as the oil and gas. Especially because the literature provides evidence surrounding the positive impact of carbon disclosure on corporate environmental practice and its contribution to supporting efforts to combat climate change (Kim et al., 2022). In light of the scarcity of carbon disclosure research within the region, it is believed that examining CCD in terms of nature and extent in addition to identifying disclosure key drivers are crucial first steps that lay the foundation for subsequent research on carbon disclosure in the GCC. Furthermore, the absence of research of similar nature and scope warrants a specific attention placed on the disclosure of significant emitters (i.e., firms operating within carbon-intensive sectors) considering the regions' heavy economic dependence on unsustainable sectors. The necessity of a study that is centered on such sectors stems from the fact that carbon-intensive firms are found to be leaders in environmental disclosure (KPMG, 2020b), thus setting a benchmark for best practice that may be applied across other sectors.

1.4 Research Objectives and Questions

The research aims to evaluate GCC carbon-intensive firms' CCD in terms of nature and extent and provide empirical evidence of disclosure key determinants. Hence, the study is based on a sample that is composed of GCC-listed firms that operate within sectors that include basic materials, energy, industrials, and utilities based on The Refinitiv Business Classification (TRBC). It is worth noting that these firms are selected to be the focus of the study considering the environmentally detrimental nature of their operations, warranting an understanding of the means by which they approach CCD. It

is believed that the research objectives are best achieved through addressing the following research questions:

1. What is the nature and extent of GCC carbon-intensive firms' CCD?
2. What are the key determinants of GCC carbon-intensive firms' CCD?

1.5 Research Significance

Despite the carbon-intensive nature of GCC countries, to the best of the author's knowledge, research with a similar focus has not previously been conducted in the region. Therein lies the importance of investigating corporate CCD within the GCC context. Insight of the current scope of carbon disclosure in the region, along with its influencers, can be used by regulators for policy formation targeted at enhanced disclosure and sustainable corporate practice. Additionally, businesses can address disclosure gaps and weaknesses identified by the study to improve their carbon disclosure practice further. Finally, it is assumed that such research can potentially contribute to a more sustainable future considering the evidence pertaining to the positive effect of CCD on corporate sustainable behavior (Kim et al., 2022).

1.6 Research Structure

The thesis is composed of four chapters, including the introduction. The second chapter provides a background of the GCC region and describes different initiatives made at the country level to combat climate change, reviews literature that forms the basis of the research, discusses theories that relate to the research topic, and develops the research hypotheses. The third chapter outlines the study's methodological approach, detailing the research sample and variables, and explaining analysis techniques employed besides data collection tools. The fourth chapter presents and discusses the research findings, draws conclusions, lists research contributions and implications, provides relevant recommendations, highlights research limitations, and makes suggestions for future research.

Chapter Two

Literature Review and Hypotheses Development

2.1 Chapter Introduction

This chapter begins with an overview of the GCC region and efforts being made by GCC countries to tackle climate change. The chapter also emphasizes the significance of climate change as a sustainability concern by explaining the magnitude of the problem along with its environmental, social, and economic implications. It then discusses international initiatives aimed at addressing climate change and explains the key differences between the Paris Agreement, the most recent climate change treaty and the previous treaty, the Kyoto Protocol. Furthermore, the chapter attempts to draw attention to the root cause of the problem by highlighting the role of capitalism in climate change and the climate injustice it creates for vulnerable groups and communities. Additionally, it discusses the emergence of sustainability reporting as a voluntary practice and its contribution to increased CCD. After providing examples of the main climate change reporting frameworks, the chapter delves into environmental accounting literature and identifies research trends that relate to corporate carbon disclosure. Once it demonstrates the importance of CCD, the chapter discusses theories applicable to CCD and develops research hypotheses.

2.2 The GCC region: Background and Climate Change Initiatives

The Gulf Cooperation Council (GCC) comprises six Middle Eastern countries, namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. The council was established in 1981 in order to reinforce political, economic, and social security among member countries (*The Charter*, n.d.). These countries share several common characteristics, including geographical location, political stability, and socio-economic conditions. It is worth highlighting that the GCC region is well-known for its economic reliance on the oil and gas industry. A statistics report by the International Energy Agency (IEA) indicates that three out of six GCC countries were ranked among the top 10 countries in terms of crude oil production and export in 2021. Saudi Arabia was ranked as the world's largest oil exporter and third in place in terms of oil production, whereas the United Arab Emirates and Kuwait were ranked as the world's seventh and ninth oil producers, respectively. The report also indicates that in 2021,

Qatar was the second-largest natural gas exporter and sixth-largest gas producer (IEA, 2022). Oman and Bahrain are also highly involved in the oil industry, with Oman and Bahrain being ranked in 19th and 35th place in terms of oil production, respectively (*Total Energy Production from Petroleum and Other Liquids 2021* | EIA, n.d.). This places governments within the GCC region under high pressure to develop and act on rigorous plans aimed at mitigating the severity of climate change. This is because the oil and gas industry is perceived to be a critical carbon-intensive industry, given the tremendous amount of GHGs emitted throughout the process of extracting, producing, and consuming oil and gas.

According to the IEA, it would not be feasible to align global warming levels with the Paris Agreement through restricting temperature increases to below 1.5°C above pre-industrial levels if the global oil and gas industry did not reduce its emissions by at least 60% by 2030 (*Oil and Gas Industry Faces Moment of Truth – and Opportunity to Adapt – as Clean Energy Transitions Advance*, 2023). A recent report by the IEA indicates that the oil and gas industry is responsible for around 15% of the overall emissions of the energy sector, which is equivalent to 5.1 billion tonnes of GHG emissions. Fortunately, the report further states that there is a great potential to minimize the industry's emissions by around 50% through implementing various measures that can be used to achieve the intended objective. It is assumed that such measures will require an investment of around USD 600 billion (IEA, 2023b).

Al-Sarihi (2023), in an article published by the Middle East Institute, states that as a major player in the oil and gas industry, the GCC region can play a vital role in mitigating global warming and achieving the Paris Agreement targets. In this regard, five GCC countries have specified a clear timeframe for achieving the target of net-zero emissions. Bahrain, Kuwait, and Saudi Arabia aim to achieve net-zero emissions by 2060, while the targets of Oman and the United Arab Emirates are set to be achieved by 2050 (Al-Sarihi, 2023). It might be worth mentioning that the UAE was the first country in the MENA region to announce its commitment to achieving net-zero emissions (*UAE Net Zero 2050*, n.d.). GCC countries have been creating different initiatives and programs aimed at facilitating the achievement of their climate targets. The below sections briefly discuss efforts made by each country with respect to climate change mitigation.

2.2.1 Bahrain

In Bahrain, the Supreme Council for Environment is responsible for overseeing environmental issues and preserving natural resources (*The Supreme Council for Environment - Kingdom of Bahrain*, n.d.). Also, in 2007, Bahrain created the Joint National Committee on Climate Change to adopt, develop, and implement programs that are specifically designed to tackle climate change (*Climate Action in Bahrain*, n.d.). Bahrain has recently come up with a credible strategy to cut down its carbon emissions by 30% by 2035. The strategy paves the way for achieving this objective through minimizing energy consumption and intensity, identifying alternative sustainable energy sources, and investing in technologies to decarbonize carbon-intensive sectors (*Bahrain Unveils National Energy Strategy to Achieve Net Zero Emissions by 2060*, 2023). In its most recent Voluntary National Review (VNR), a report that countries voluntarily submit to the United Nations to showcase the progress they made in achieving the SDGs, the Bahraini government stated that more than 90% of its emissions are attributable to 10 entities. To ensure successful achievement of Bahrain's emission reduction targets, the government is closely working with these emitters on their GHGs reduction plans (The Ministry of Sustainable Development, 2023). Additionally, the Supreme Council for Environment have installed a methane collection system in one of its main landfills. The system is designed to collect methane and prevent it from being emitted into the atmosphere (The Ministry of Sustainable Development, 2023).

2.2.2 Kuwait

In 1995, Kuwait established a governmental body that is called the Environment Public Authority to oversee and control environmental issues and concerns. Nowadays, this body has taken over the responsibility of combating climate change and developing Kuwait's national climate change strategies and adaptation plans (*Environment Public Authority*, n.d.). In 2019, the Environment Public Authority released Kuwait's National Adaptation Plan and pledged to reduce its carbon emissions by 7.4% by 2035 (*Kuwait's 2060 Low-Carbon Strategy Based on Economic Pillars, in Partnership with UN*, 2023). Even though Kuwait intends to achieve its emission reduction targets by encouraging voluntary domestic efforts, Kuwait Oil Company has already showed its commitment to the national plan by significantly reducing emissions resulting from oil extraction activities. This is because the company's gas flaring, which is assumed to be the

byproduct of oil extraction, dropped from 17% to 1% within 12 years (National Committee for Sustainable Development in Kuwait, 2023).

2.2.3 Oman

Oman established a government agency that is referred to as the Environment Authority. The main objective of this agency is to preserve natural resources and tackle environmental issues (*Oman - Environment Authority*, n.d.). In 2021, Oman submitted its second nationally determined contribution to the United Nations Framework Convention on Climate Change (UNFCCC), whereby it revealed its commitment to 2% reduction in the country's absolute GHG emissions by 2030. According to the submitted plan, this objective is to be achieved through significant reduction of the carbon emissions of the oil and gas industry besides the development of renewable energy sources (*Oman's Second Nationally Determined Contribution*, 2023). Currently, Oman is actively exploring different methods to expand its energy portfolio by incorporating renewable energy sources in order to minimize overall emissions and to effectively manage challenges imposed by climate change (IEA, 2023a).

2.2.4 Qatar

Despite the fact that Qatar has not formally set a target to achieve net-zero emissions, it has expressed its commitment to reduce GHG emissions by 25% by 2030. Also, Qatar established the Ministry of Environment and Climate Change in 2021 with the purpose of protecting the environment and reducing carbon emissions, thus mitigating climate change (*Environment and Sustainability - Government Communications Office*, n.d.). As part of its 2030 vision, Qatar has been investing in the development of sustainable cities. For instance, Msheireb Downtown, which is located at the heart of Doha (Qatar's capital) is the world's first sustainable city. The city is well-equipped with a wide range of facilities that serve residents, businesses, and tourists. Msheireb Downtown is designed in a manner that minimizes the need for car use, thus reducing carbon emissions (*Msheireb Downtown Doha*, n.d.). Lusail is another sustainable city that is equipped with an advanced cooling system that saves around 65 million tons of CO₂ annually (*Environment and Sustainability - Government Communications Office*, n.d.). In its latest VNR, which was released in 2021, Qatar showcased the effectiveness of its Gas Recovery Project in generating savings of around 2.5 million tonnes of CO₂. Furthermore, the report states that in 2019, Qatar Petroleum, Qatar's national oil

corporation, had the largest facility in the MENA region designed to capture and preserve CO₂ emissions in tanks rather than being emitted. It is worth noting that the facility managed to preserve around 1.2 million tonnes of CO₂ by 2019 (Planning and Statistics Authority, 2021).

2.2.5 Saudi Arabia

The Saudi Green Building Forum was established in 2010 with the purpose of aligning Saudi efforts with the United Nations SDGs as well as setting a foundation that encourages green initiatives and sustainability (*Saudi Green Building Forum*, n.d.). The Saudi Energy Efficiency Center is another entity that was established in 2010 to preserve natural resources by promoting energy efficiency. It is worth pointing out that these bodies, in addition to other entities, cooperate with each other to facilitate the achievement of Saudi climate targets. This is because, besides its commitment to an annual reduction of 278 million tons of carbon emissions by 2030, Saudi Arabia is committed to shifting 50% of its energy usage to renewable energy sources. Saudi Arabia introduced its Circular Carbon Economy Program in 2021 as a means to achieve these targets. It is to be noted that the program is a step towards transitioning to a circular economy whereby resources and products are continuously recycled and reused rather than disposed of to minimize waste (*Reducing Carbon Emissions | Saudi Green Initiative Target*, n.d.). Also, the Saudi Energy Efficiency Center launched a program in 2012 that is devoted to enhancing energy consumption efficiency of three sectors, namely industry, construction, and land transport (*Saudi Energy Efficiency Program*, n.d.). According to its 2023 VNR, Saudi Arabia has invested over SAR 700 billion to fund projects aimed at facilitating the transition to a circular carbon economy. Thus far, this substantial investment has contributed to the creation of 13 renewable energy projects, the ongoing development of a renewable energy capacity that amounts to 11.4GW, and the existence of 150,000 that are fully reliant on clean energy sources (Ministry of Economy and Planning, 2023).

2.2.6 United Arab Emirates

Back in 2006, the United Arab Emirates (UAE) established the Ministry of Water and Environment. Yet, in 2016, the scope of the ministry expanded to include the responsibility of managing climate change concerns. Hence, the ministry was renamed to be referred to as the Ministry of Climate Change and Environment (*About the*

Ministry, n.d.). In pursuit of achieving net-zero emissions by 2050, the UAE has been heavily involved in clean energy projects. Thus far, the country has invested more than USD 40 billion to finance such projects (*UAE Net Zero 2050*, n.d.). Dubai Integrated Energy Strategy 2030 is another key initiative that addresses climate change by promoting the efficient use of energy and paving the way for reliance on renewable energy sources rather than conventional carbon-emitting energy sources. In 2015, Dubai pledged to generate 15% of its power from renewable sources by 2030 (*Efforts towards Sustainability*, n.d.). Also, Ras Al Khaimah Energy Efficiency and Renewables Strategy 2040 provides an overall plan aimed at minimizing energy consumption in Ras Al Khaimah, besides incorporating renewable energy as a key energy source. Among the main targets of the strategy is to generate 30% and 20% energy and water savings, respectively, in addition to generating 20% of total energy from renewable sources by 2040 (*EE&R Strategy 2040*, n.d.).

The above discussion concerning climate change initiatives in the GCC region indicates that GCC countries are attempting to demonstrate commitment to climate change mitigation through ratifying the Paris Agreement and developing plans and strategies aimed at achieving net-zero emissions. Qatar, Saudi Arabia, and the United Arab Emirates are illustrating a higher level of transparency by utilizing different communication channels including their VNRs to deliver information regarding investments being made and actual programs implemented to achieve their national emission targets, besides savings generated from these initiatives. Whereas the limited information reported by countries including Bahrain, Kuwait, and Oman raises questions over the effective execution of their articulated strategies.

2.3 Climate Change: Magnitude and Implications

Climate change warrants serious global consideration due to its severe environmental and human implications. The urgency of the matter stems from the vulnerability of approximately 3.6 billion people around the world to climate change effects (IPCC, 2023). It is important to highlight that the most recent IPCC report states that the current global average surface temperature is around 1.1° C above the pre-industrial level. The Paris Agreement, which is the most profound international initiative to combat climate change, aims to restrict global warming to below 2°C above pre-industrial levels, preferably 1.5°C to avoid irreversible damage to the natural systems (IPCC, 2018).

Combatting the problem and restricting its adverse consequences requires collaborative action, especially because the effects of climate change might not be directly felt by emission-producing nations since environmentally destructive actions performed within the boundaries of a specific country can disproportionately cause damages in other countries or locations (*Climate Action - United Nations SDGs*, n.d.). This is because some countries and regions are more vulnerable to climate change due to several reasons, including poor socio-economic conditions, unfavorable geographic locations, weak infrastructure, and limited capacity to adapt to changing conditions (IPCC, 2023). The following sections further demonstrate the importance of a prompt intervention aimed at tackling the problem by discussing the severe environmental, social, and economic implications of climate change.

2.3.1 Environmental and Social Impacts

The adverse implications of global warming have already become visible. The planet is witnessing an unprecedented increase in frequency and intensity of floods, droughts, changes in sea levels, and other severe environmental impacts that are driven by human-induced climate change (IPCC, 2023; *Climate Action - United Nations SDGs*, n.d.). In addition to the unequivocal natural systems damage driven by climate change, the problem has been causing other tremendous interconnected environmental and social implications, such as the emergence of human and animal diseases, including but not limited to zoonoses (*Climate Change*, 2023). Additionally, it has been found that global warming is contributing to an overall deterioration in human physical health across the world, besides adverse mental well-being effects on people residing in vulnerable regions. More intense heat events are contributing to a general increase in mortality rates. Yet, those who are living in highly vulnerable regions are the most affected, as the mortality rate in these regions increased by 15 times over the last decade compared to other regions that are assumed to be less vulnerable (IPCC, 2023; *Climate Change*, 2023). This can be attributable to the fact that people in vulnerable regions such as Africa, Asia, Central and South America, Small Islands, and the Arctic have been facing diminishing food and water security besides increased food-borne and water-borne diseases (Mora et al., 2022). Furthermore, some people have had to involuntarily migrate to other locations as climate change have affected their livelihood and contributed to the loss of their habitats (IPCC, 2023; CHAZALNOËL, 2019; United Nations, 2023).

Based on IPCC (2023), the losses and adverse implications of climate change will continue to accelerate as global warming increases, exposing more people to its hazards. Notably, vulnerable groups that are found to be contributing the least to climate change will continue enduring the most severe consequences. Therein lies the importance of encouraging sustainability and committing to serious plans aimed at reducing GHG emissions.

2.3.2 Global Economic Impacts

In addition to the environmental and social effects of global warming, climate change can have critical economic implications. These implications are universal in the sense that they are expected to negatively affect the economic conditions of all countries regardless of their economic strength or vulnerability to climate change, yet the economic effects are expected to be more severe for developing countries that are currently facing economic challenges (*Climate and the Economy*, n.d.; Kahn et al., 2019). The governor of the Bank of England and chairman of the Financial Stability Board in 2015, Mark Carney, discusses three main financial stability challenges imposed by climate change, namely physical risks, liability risks, and transition risks. While the physical risks of climate change can be represented by damages or loss of properties and restricted trade due to climate change-driven events such as floods or storms, liability risks can take the form of claims for compensation raised by affected parties to those who are assumed to be accountable. Transition risks are assumed to be the byproducts of strategies and actions taken to restrict climate change and move towards low-carbon economies (Carney, 2015).

Moreover, Kahn et al. (2019) apply a novel econometric strategy to estimate the economic implications of climate change based on data gathered from 174 countries over the period starting from 1960 and ending in 2014. The findings suggest that by the end of the century, the world's real GDP per capita is expected to decrease by 7.2 percent if the average global temperatures continue to increase and adequate plans that aim to combat climate change have not been put into action. The study of Kahn et al. (2019) provides another interesting finding, arguing that even abiding by the Paris Agreement through successful attempts to maintain global warming levels within the recommended threshold will result in a 1.07 percent decrease in global income by 2100. Therefore, it is assumed that strategies aimed at mitigating global warming are effective

in limiting climate-driven economic distress for most countries; nevertheless, eliminating the economic consequences of climate change is highly unlikely.

2.4 Initiatives to Combat Climate Change

In light of the significance of climate change, the United Nations recognized *Climate Action (SDG 13)* as one of the 17 SDGs. It might be worth mentioning that the SDGs were adopted by the United Nations in 2015 with the purpose of mitigating troublesome economic, social, and environmental issues to ensure that people around the world are enjoying decent living conditions by 2030 (*The SDGs in Action | United Nations Development Programme*, n.d.). Based on the United Nations, we still have an opportunity to succeed in our fight against climate change, especially because 196 countries ratified the Paris Agreement, which is the latest international treaty aimed at addressing climate change.

The Paris Agreement was introduced in late 2015 during COP21 in Paris and took effect in November 2016. While the main objective of the treaty is to prevent the global average temperature from exceeding 2°C above pre-industrial levels, efforts to further restrict the temperature level to 1.5°C above pre-industrial levels are highly encouraged. Otherwise, exceeding these limits will result in permanent social and environmental damages (*The Paris Agreement | UNFCCC*, n.d.). It is to be highlighted that the only path towards achieving these limits is reducing carbon emissions and reaching net-zero emissions by the mid of the century (*Net Zero Coalition | United Nations*, n.d.). To achieve the net-zero emission target, all human-induced emissions must be offset by removing an equal amount of emissions from the atmosphere (IEA, 2021; *Net Zero Coalition | United Nations*, n.d.).

The Paris Agreement requires each participating country to submit its own climate action plan and outline the methods by which it contributes to achieving the ultimate goal of the agreement. These action plans are formally referred to as “*nationally determined contributions (NDCs)*” and must be updated and submitted every five years. Collectively, the NDCs serve as an indicator of the possibility of minimizing global warming and achieving the targets set by the agreement. It is of significance to acknowledge that, although the Paris Agreement functions as a legally binding treaty, necessitating compliance with specific obligations such as the provision of NDCs,

adherence to the NDCs does not carry the force of legal obligation (*Nationally Determined Contributions (NDCs)* | UNFCCC, n.d.).

The Paris Agreement, which succeeded the Kyoto Protocol, represents the latest international treaty addressing climate change. Among the key differences between the two treaties is that the Kyoto Protocol was targeted at developed countries, whereas the Paris Agreement adopts a more inclusive approach whereby it applies to all countries. Another important difference is that while the Kyoto Protocol held countries accountable for carbon emission reduction, commitment to reduce carbon emissions is not legally binding under the Paris Agreement (The Paris Agreement | UNFCCC, n.d.; What Is the Kyoto Protocol? | UNFCCC, n. d.).

2.5 A Call for Climate Justice

Some argue that it is not sufficient to recognize climate change as a vital issue and express an interest in mitigating its implications. To effectively combat climate change, it is imperative to admit the primary cause of the problem and take corrective actions accordingly (Guerrero, 2018; Moe-Lobeda, 2016; Satgar, 2018). Based on the view of Guerrero (2018), capitalism has always been the underlying driver of climate change. This is because financially sound nations that possess access to and control over resources have been heavily involved in climate-destructive activities to further grow their economies. Yet, poor countries are the most vulnerable to the adverse implications of climate change despite having minimal environmental impact. Similarly, elite groups within poor countries also have been exploiting their access to resources at the expense of most of the population. This exemplifies how the growth-dependent system of capitalism has been feeding into both social inequality and global warming. Therefore, Moe-Lobeda (2016) argues that it is unethical to attempt to resolve the problem only through relying on sustainability frameworks whereby everyone is encouraged to act sustainably and minimize their carbon emissions. This approach assumes that people and countries are equally responsible for the problem and disregards the climate debt which rich nations owe poor countries due to their tremendous historical and ongoing contribution to global warming. In this regard, some Indian scholars argue that current measures to confront climate change place poor vulnerable people in a more disadvantageous position, as they are being adversely affected by initiatives to combat climate change more than climate change itself (Dutta, 2013). This is consistent with

the perception of Guerrero (2018) who states that recent sustainability initiatives act as an obstacle that restricts the development of vulnerable countries as it limits their options to expensive sustainable means such as renewable energy.

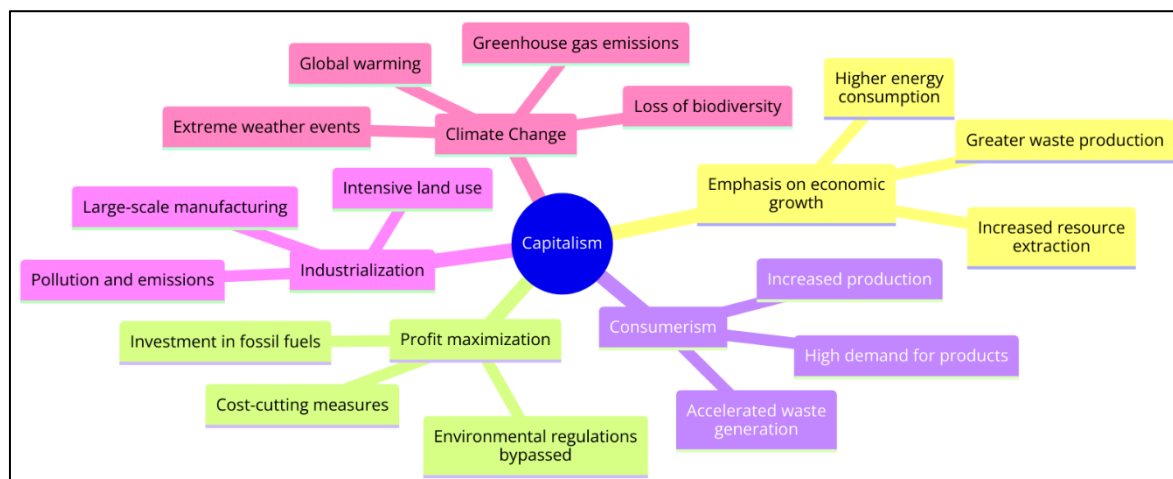


Figure (2.1): The Role of Capitalism in Climate Change

Satgar (2018) further elaborates on the matter from the context of international treaties aimed at addressing climate change. While the earlier treaty (i.e., Kyoto Protocol) clearly held developed large nations accountable for their environmental impact by acknowledging the historical context of climate change and introducing different levels of responsibility based on countries' contribution to the problem, the Paris Agreement which came to replace the Kyoto Protocol disregards the climate debt. Instead, it calls for voluntary commitments designed and developed at the country level. As stated earlier, the Paris Agreement does not introduce enforcement mechanisms that exert pressure on countries to commit to GHG emissions reduction. In this respect, a recent report by the United Nations criticizes current international efforts to avert climate change; in fact, it describes the progress that has been made thus far as inadequate despite the passage of seven years since the Paris Agreement entered into force (*New Analysis of National Climate Plans: Insufficient Progress Made, COP28 Must Set Stage for Immediate Action*, 2023) Also, the United Nations encourages large emitters to not only enlarge the scope of their NDCs, but also to promptly commit to them in order to be able to achieve the recommended targets (*Net Zero Coalition | United Nations*, n.d.). This demonstrates that the absence of a regulatory framework that requires countries to commit to their NDCs creates an environment that allows countries to continue acting in a manner that best suits their own interest and restricts our ability to tackle climate

change. Additionally, Satgar (2018) sheds light on the shocking silence of the Paris Agreement on the urgent need to restrict the operations of carbon-intensive industries in spite of the robust evidence provided by numerous studies pertaining to the necessity of an immediate stop of fossil fuels extractive activities to be able to maintain temperature increase levels below 2°C as recommended by the treaty.

Guerrero (2018) argues that putting an end to climate change requires confronting capitalism by creating a strong political foundation that advocates for shared ownership and control over resources. Otherwise, powerful groups who are benefiting from the status quo will never forgo their privileged positions for the common good of the public and the environment. Yet, it is believed that imposing such a profound shift in the system is associated with serious challenges and requires considerable time. In spite of the difficulty of achieving climate justice across and within countries, conceptualizing the matter through the lens of the climate debt and recognizing its disproportionate effects on vulnerable groups, as proposed by Moe-Lobeda (2016), can assist in ensuring fairness in the distribution of climate action costs and benefits based on historical responsibility. Moreover, political pressures to prioritize and embed the interest of oppressed, vulnerable groups into policy may mitigate climate injustice (Scandrett, 2016). Finally, promoting domestic sustainable production and placing limits on the free trade of goods as suggested by Guerrero (2018), appears to be a practical strategy that supports climate justice. This is because restrictions on free trade will prioritize domestic economies by encouraging local indigenous communities to produce and consume domestically and reduce carbon emissions resulting from excessive export of goods.

2.6 Sustainability and Climate Change Reporting

The Exxon Valdez oil spill is perceived to be one of the most devastating environmental catastrophes in history. The event took place in the late twentieth century (1989), when a tanker that belongs to Exxon Shipping Company struck a reef that is called the Bligh Reef and resulted in a spill of around 11 million gallons of crude oil into the water of Prince William Sound, Alaska, USA (Paine et al., 1996). The mayor of the small port of Valdez at the time of the spill stated that prior to the spill, the community was keen on the oil industry as taxes generated from oil companies were viewed as a valuable source of income, yet their perception of the industry completely changed as soon as

they witnessed the massive damages caused by the disaster (*Examining the Legacy of the 1989 Exxon Valdez Oil Spill*, 2010). The severity of the spill led to immediate repercussions, including public outrage, as it caused an extensive spread of oil which affected over 2,000km of coastlines. This resulted in the distortion of vast fisheries and paralyzed the fishing industry within the region (Kinver, 2010).

Many scholars view the Exxon Valdez oil spill as a profound event that contributed to the emergence of environmental accounting since the tremendous outrage it caused resulted in a pressing demand for environmental disclosure (Bansal & Hoffman, 2011; Domenec, 2012; Doupnik et al., 2020). In fact, Doupnik et al. (2020) refer to the tragedy to explain the rationale behind the prompt, proactive engagement in environmental disclosure by other firms within the oil industry, realizing that voluntary disclosure is a powerful instrument that reinforces legitimacy. While some firms responded to the public outcry by expanding their annual reports though engaging in environmental disclosure, others started publishing stand-alone reports that are fully devoted to communicating their environmental performance, especially in the early 1990s (Bansal & Hoffman, 2011).

As the importance of social matters started to gain traction, the scope of firms' voluntary disclosure expanded to also include communications concerning corporate social impacts (Bansal & Hoffman, 2011). This paved the way towards the emergence of the concept of sustainability reporting around the beginning of the 21st century whereby firms started to augment their annual reports by disclosing voluntary information to showcase their social and environmental practices rather than solely reporting mandatory financial information (Doupnik et al., 2020; Elalfy & Weber, 2019). It is worth pointing out that when the practice of complementing mandatory financial information with voluntary environmental and social disclosures first emerged was referred to as corporate social responsibility disclosure (Bansal & Hoffman, 2011). Yet, the developed reporting framework by the Global Reporting Initiative (GRI) which provides a comprehensive set of standards with the purpose of improving corporate voluntary disclosures through promoting stakeholder-oriented reporting, contributed to the widespread of sustainability reporting (KPMG, 2020a). Therefore, sustainability reporting can be described as the process of being accountable to various stakeholders

though monitoring and disclosing firms' economic, social, and environmental performance (GRI, 2022).

2.6.1 Sustainability Reporting in the GCC

In light of the significant growth of the sustainability reporting phenomenon across the world, numerous stakeholders have become keen on inspecting and evaluating the sustainability reporting practice of firms to scrutinize their social and environmental impact besides their financial performance (Boiral & Henri, 2017). Consequently, some jurisdictions and stock exchanges introduced regulations that mandate sustainability reporting to promote transparency and accountability. For example, the Non-Financial Reporting Directive was adopted by the European Parliament and the Council of the European Union in 2014 with the purpose of enhancing corporate transparency through requiring certain listed firms to report non-financial information that is highly focused on sustainability concerns (Carungu et al., 2021).

While sustainability reporting remains a voluntary practice in most GCC countries, it seems that regional stock exchanges have started making serious strides that encourage listed firms to report on sustainability dimensions, including environmental and social concerns. This is expected to pave the way towards a potential mandate for such reporting. For instance, in the second quarter of 2021, the UAE Securities and Commodities Authority announced that both sustainability reporting, as well as compliance with GRI standards, would be mandated for listed firms (*The Value of Sustainability Reporting - KPMG United Arab Emirates*, 2023). With respect to Bahrain's initiatives in this regard, Bahrain Bourse issued an ESG reporting guide with the purpose of assisting listed firms in embedding environmental, social and governance (ESG) considerations in their reporting practice (Bahrain Bourse, 2022). Additionally, in light of the increased demand for ESG reporting from different stakeholders, the Central Bank of Bahrain launched another guide for ESG reporting and announced that the mandate of ESG reporting for listed firms and other CBB licensees is going to take effect in 2024 (*Central Bank of Bahrain Issues New Environmental, Social and Governance Reporting Framework*, 2023). ESG reporting guidelines that are designed to assist firms in reporting relevant ESG information have also been provided by other GCC stock exchanges, namely Boursa Kuwait (Boursa

Kuwait, 2023) , Muscat Stock Exchange (Muscat Stock Exchange, 2023), Qatar Stock Exchange (Qatar Stock Exchange, 2017), and Saudi Exchange (Saudi Exchange, 2018).

Notwithstanding the above discussion regarding sustainability initiatives in the GCC, it is imperative to acknowledge that ESG and sustainability reporting are two distinct yet overlapping concepts. While both strive for improved transparency and greater accountability, the scope of each reporting framework is different due to the difference in their orientation and target audience. Sustainability reporting is broader in scope as its main objective is to build a sustainable future by thoroughly disclosing firms' economic, social, and environmental impacts. It is noteworthy that the purpose of disclosing comprehensive information related to these sustainability concerns is to provide information that is beneficial to a wide range of stakeholders rather than disseminating information targeted at a particular group of users (*GRI - Mission & History*, n.d.). On the other hand, ESG reporting is mainly focused on reporting the risks and opportunities of firms' environmental, social, and governance concerns. The disclosure of such quantifiable information related to the risks and opportunities of ESG factors is assumed to be useful for investors who are usually concerned with incorporating such information into valuation and decision-making. In fact, Kang and Arikrishnan (2024) investigate ESG literature and find out that the literature indicates that capital market participants view ESG disclosure as a vital investor-driven metric that influences firms' values. Apparently, the shared focus of ESG and sustainability reporting on similar disclosure concerns led to the misperception that these two concepts are the same and contributed to the interchangeable use of these terms by different parties, including GCC stock exchanges.

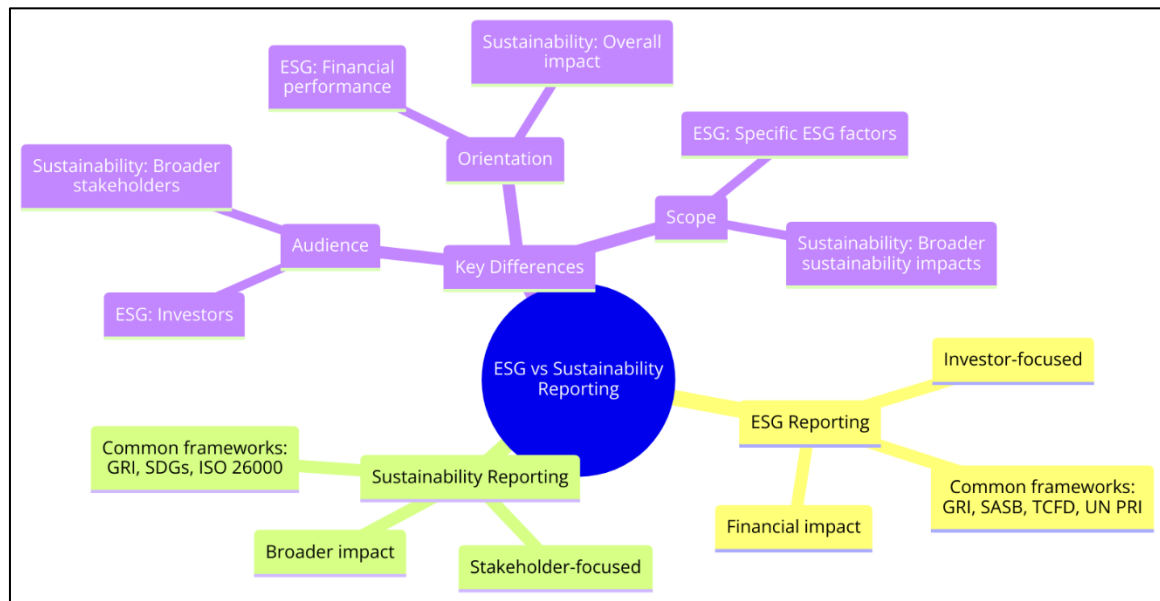


Figure (2.2): The Difference between Sustainability and ESG Reporting

2.6.2 Climate Change Reporting Frameworks

It might be worth noting that due to the rapid growth of voluntary disclosures and sustainability reporting, various organizations began to provide reporting frameworks and guidelines that can assist firms to better present and disseminate voluntary information in their published reports. While some reporting frameworks have a broad sustainability scope in the sense that they offer guidelines that correspond to firms' economic, social, and environmental disclosures, other frameworks are dedicated to providing guidelines for a narrow or particular sustainability aspect such as climate change or water security (Elalfy & Weber, 2019). The above discussion regarding the difference between ESG and sustainability reporting explains why some of these guidelines are aimed at providing valuable information to a wide range of stakeholders, while others are designed to serve specific users. The below sections present the three main standards and frameworks for climate change reporting:

2.6.2.1 Global Reporting Initiative

The GRI, currently providing the first and most profound global sustainability reporting standards, was initially established in 1997 in response to the public outrage over the Exxon Valdez oil spill. The main objective of GRI at the time of its establishment was to provide a system that held firms accountable for their environmental impact. After that, their scope expanded to include other social, economic, and governance aspects. Given that GRI standards follow a multi-stakeholder process, they are considered as

stakeholder-oriented standards that do not prioritize a group of stakeholders over another (*GRI - Mission & History*, n.d.). The GRI standards consist of three main categories, namely *universal standards*, *sector standards*, and *topic standards*. The GRI universal standards comprise the fundamentals of sustainability reporting and should be adopted by all organizations that report in accordance with the GRI. The sector standards are designed to enhance the consistency of reporting across organizations that belong to the same sector by providing guidelines for reporting sector-related sustainability concerns. Finally, the topic standards are classified into three groups (environmental, social, and economic topics) and provide guidelines for reporting 33 sustainability topics, including materials, water, biodiversity, and emissions (*A Short Introduction to the GRI Standards*, n.d.). It is worth pointing out that GRI addresses climate change through “*GRI 305: Emissions*”, a topic standard that details how to report GHG emissions. Additionally, “*GRI 302: Energy*” is another topic standard that indirectly relates to climate change by requiring entities to report their energy consumption. It is notable that the GRI standards are aligned with the SDGs. In addition to providing sustainability reporting standards, the GRI encourages firms to align their practices with the SDGs and provides specific guidelines that assist firms in integrating SDGs in sustainability reporting (*Integrating SDGs into Sustainability Reporting*, n.d.).

2.6.2.2 CDP (formerly the Carbon Disclosure Project)

CDP is a well-known environmental disclosure organization that was established in 2000 to encourage businesses to disclose their climate impact. After that, their scope expanded also to target cities, states, and regions, this is besides recognizing two additional environmental matters, namely deforestation and water security (*About Us | CDP*, n.d.). With regard to climate change and corporate disclosure, which is the subject matter of this study, the CDP recognizes the need to combat climate change to create a sustainable economy and encourages companies to disclose relevant climate change information. Companies can voluntarily opt to disclose through the CDP by filling out an annual questionnaire aimed at assessing and scoring firms’ climate change performance and transparency (*About Us | CDP*, n.d.). Yet, unlike the GRI, CDP seems to be investor-oriented as it stresses the need for carbon disclosure to better manage climate change risks and opportunities with the purpose of demonstrating superior risk management abilities and a strong potential for sustainable long-term profitability (*Climate Change - CDP*, n.d.).

2.6.2.3 Task Force on Climate-related Financial Disclosures

The Task Force on Climate-related Financial Disclosures (TCFD) was established by the Financial Stability Board in 2015. The main objective of TCFD was to reinforce capital markets transparency through providing companies with climate-related financial disclosure recommendations that are designed in a manner that offers timely and relevant information that could be used by investors to make informed decisions (*About | TCFD*, n.d.). This indicates that the TCFD recommendations were created with the ultimate goal of protecting the interest of capital providers by providing information that corresponds to the financial implications of climate change rather than communicating firms' climate change impact. In order to achieve its intended objective, the TCFD classified its CCD recommendations into four categories, namely governance, strategy, risk management, and metrics (*About | TCFD*, n.d.). It must be noted that the TCFD disbanded in October 2023 as the Financial Stability Board delegated the responsibility of overseeing firms' carbon disclosure to the International Sustainability Standards Board (ISSB), created by IFRS in 2021 with the purpose of developing global sustainability disclosure standards (TCFD, 2023). It is worth pointing out that the ISSB's CCD standards will continue to build on the foundation established by TCFD recommendations (*ISSB and TCFD*, n.d.).

While the three reporting frameworks namely GRI, CDP, and TCFD offer reporting guidelines for climate change reporting, they have distinct orientations. The GRI is stakeholder-oriented as its sustainability reporting standards are designed to achieve greater transparency and accountability by providing a comprehensive view of firms' environmental, social, and economic performance. Accordingly, their guidelines for climate change reporting attempt to provide useful information to a multistakeholder audience. Whereas both CDP and TCFD view investors as their primary audience, thus offer reporting guidelines and recommendations that are highly centered on the financial implications of climate change.

2.7 Environmental Accounting Research: a Historical Context

As previously stated, sustainability reporting, which is perceived to be the most profound development in modern accounting, recognizes the need for social and environmental reporting to provide a comprehensive view of firms' performance and impact (Doupnik et al., 2020). Thus, accounting literature has been deeply delving into

social and environmental topics. Marrone et al. (2020) investigated environmental accounting literature from the mid-1970s to 2019 in order to track and identify the emergence of topics and trends. The results of their study indicate that research within the field of environmental accounting has been continuously growing in both accounting and non-accounting journals. Yet, it is noteworthy that the number of publications in non-accounting journals has been witnessing a surge that started back in the mid-2000s, which is consistent with the results of the bibliometric review of Bilal et al. (2023), as their research also finds that most corporate environmental disclosure studies are published in non-accounting journals. While Marrone et al. (2020) identify the *Journal of Cleaner Production*, *Ecological Economics*, and *Social and Environmental Accountability Journal* as the leading journals in terms of the number of environmental accounting publications, the study of Bilal et al. (2023) suggests that the vast majority of corporate environmental disclosure research is published in *Business strategy and the environment*, *Journal of Cleaner Production*, and *Corporate Social Responsibility and Environmental Management*, respectively. It is important to highlight that prior to the 2000s surge captured by Marrone et al. (2020), environmental accounting research trends in accounting and non-accounting journals were almost similar. Nevertheless, as the surge began, topic trends started to depart. Based on the interpretation of Marrone et al. (2020), the steep increase in environmental accounting topics in non-accounting journals is triggered by a series of reports released by the IPCC to discuss the urgency of climate change and the pressing need to account for carbon emissions, in addition to international efforts aimed at addressing climate change. Notably, the same factors have also contributed to the departure in research trends. The below table illustrates the most recent research bursts in accounting and non-accounting journals based on the study conducted by (Marrone et al., 2020):

Table (2.1): Recent Environmental Accounting Research Trends in Accounting and Non-accounting Journals Based on the Study of Marrone et al., (2020)

Research trends in accounting journals	
2015–2017	Regulation; innovation; environmental resource management; integrated reporting; social enterprise; neoliberalism; corporation; organisation; stakeholder (corporate); finance; economy
2018–2019	Sustainability and sustainability accounting; corporate social responsibility; society and government; stakeholder (corporate)

Research trends in non-accounting journals	
2014–2017	Corporate social responsibility; stakeholder (corporate); risk; export; material flow cost accounting; methane; emissions intensity
2018–2019	Climate change mitigation; electricity; sustainable development goals; China; circular economy; ecosystem services and ecosystem; low-carbon economy; socio-economics

As indicated in Table 2.1, recent research trends in accounting journals appear to be broad in the sense that they do not directly address specific environmental issues, but rather, they are focused on general concepts that can relate to environmental aspects such as corporate social responsibility, sustainability, integrated reporting, and regulations. On the other hand, research trends in non-accounting journals delve into more specific environmental issues such as emission intensity, climate change mitigation, circular economy, and low-carbon economy. Nonetheless, Marrone et al., (2020) clarifies that failure to capture topics concerning specific environmental issues as key trends in accounting journals do not translate into a complete absence of such a stream of research within publications in accounting journals.

2.7.1 Carbon Disclosure Research

Carbon disclosure has emerged as a field of research due to the dramatic leap in studies surrounding vital environmental issues and concerns within accounting literature. It can be argued that the trend of carbon disclosure research stems from the seriousness of climate change and its recognized and potential consequences. The systematic review performed by Bazhair et al. (2022) breaks this trend into two main phases, whereby 2011 is marked as the trigger point of the first phase, and 2015 is assumed to be the starting point of the second phase. Similarly, the review of Bilal et al. (2023) identifies a dramatic leap in corporate environmental disclosure research starting in 2015. It is noteworthy that both phases are assumed to be driven by initiatives to combat climate change. While the first phase, which started in 2011, can be explained by the effect of the Kyoto Protocol since its first commitment period started in 2008 and ended in 2012 (*What Is the Kyoto Protocol?* | UNFCCC, n.d.), the second phase, which started in 2015, can be interpreted by the effect of the Paris Agreement, which was adopted at COP 21 in 2015 (*The Paris Agreement* | UNFCCC, n.d.). A similar interpretation of the two waves is also used by (Borghei, 2021).

Additionally, it may be worth mentioning that Bazhair et al. (2022) performed a thematic analysis to identify key themes within carbon disclosure research. The results reveal that this field of research is mainly divided into seven themes. *Determinants of carbon disclosure* is the most dominant, followed by *carbon disclosure quality* and *climate change management*. Also, Bazhair et al. (2022) have been able to identify some studies that surround *carbon disclosure implications*, *carbon accounting*, and *carbon disclosure assurance besides the Paris Agreement*. Despite the notable rise in the number of carbon disclosure studies, this area of research remains understudied in many regions, such as Africa, Latin America, and the Middle East. Bazhair et al. (2022) classify 130 CCD studies based on geographical distribution; the classification results indicate that around 25% of the studies were devoted to investigating carbon disclosure within an international context, whereas 8% studied the matter in Europe. Country-specific studies were mainly from the UK, Australia, and the US, respectively. This suggests that this field of research is highly concentrated on developed nations with a minor focus on emerging countries, which is consistent with the observation of Kılıç and Kuzey (2019b). This study acts as a step towards bridging this gap in literature by providing empirical evidence from the Middle East, specifically from the GCC region. It is believed that research in this context provide insights specific to the GCC, as these countries have a unique economic landscape characterized by a heavy reliance on carbon-intensive industries such as oil and gas. Given the region's prominence in the global energy sector, it is crucial to understand how these industries approach CCD.

2.8 Prominence of Carbon Disclosure

Based on the CDP, businesses are found to be the main contributors to climate change since more than 70% of global emissions are attributable to them. Hence, firms have started to engage in environmental disclosure due to growing awareness of environmental issues and increased pressures from various parties to hold firms accountable for their environmental performance. While initial initiatives that provide guidelines for such disclosure were merely focused on impact reporting, recent developments in reporting frameworks place greater emphasis on risk disclosure. In the sense that nowadays, firms are not only encouraged to disclose their environmental impact, but they are also pressured to demonstrate through disclosure the means by which they incorporate critical environmental issues (e.g., climate change) into their overall risk management strategy (O'Dwyer & Unerman, 2020).

Despite the fact that the effectiveness of narrative risk disclosures in corporate published reports remains an unresolved controversy due to their boilerplate nature (SEC, 2016), several studies reveal that risk disclosures are used by investors and other external stakeholders for decision-making purposes (Campbell et al., 2014, 2019; Chiu et al., 2019). With regard to carbon risk disclosure, Lee et al. (2013) find that, indeed, investors' decisions are affected by such disclosure. Yet, their response to disclosed information has a substantial adverse impact on firms' market values. This suggests that from the viewpoint of investors, CCD is associated with unnecessary additional costs for addressing climate change.

On the other hand, Kanodia and Sapra (2016) argue that qualitative risk disclosures are of great importance as they are not only beneficial from external users' viewpoints but also their usefulness extends to management at the corporate level. Their benefits lie within the use of stakeholders' feedback on risk disclosure by management to constantly adapt their behavior and decision-making process to the perception of their stakeholders. In this regard, Kim et al. (2022) provide empirical evidence of the effectiveness of climate change risk reporting in improving disclosing firms' environmental performance. It might be worth mentioning that their study compares the environmental behavior of US firms prior and after engaging in carbon reporting. The results reveal that in general, CCD increases firms' engagement in environmental activities. Nevertheless, more profound implications are found to be associated with firms that are either engaged with environmentally friendly stakeholders or highly involved in operations that significantly contribute to climate change.

2.9 Carbon Disclosure: Measurement Approaches

Most CCD studies rely on quantitative content analysis to assess disclosure whereby they examine firms' annual and sustainability reports to assign companies a disclosure quality score based on different indices that are perceived to be suitable for the context of their research (Bae Choi et al., 2013; Comyns, 2016; Darus et al., 2019; Faisal et al., 2018; Islam & Hossain, 2022; Kalu et al., 2016; Taurigana & Chithambo, 2015).

The development of carbon disclosure indices is usually inspired by the reporting guidelines of relevant reporting frameworks such as the GRI and CPD. For instance, when Bae Choi et al. (2013) attempted to identify variables that influence carbon disclosure in Australia, they referred to the CDP questionnaire and adopted 18 items to

create an index that they assumed to be fit for the purpose of assigning a quality score to firms' carbon disclosure. Similarly, De Grosbois and Fennell (2022) relied on the CDP questionnaire and GRI reporting standards, besides carbon disclosure indices of prior studies to create a unique index that is suitable for examining the carbon disclosure of the largest hotel firms across the world.

Other approaches that are also applied by literature to measure carbon disclosure include the use of a binary variable based on whether firms are voluntarily submitting the annual CDP questionnaire (Desai, 2022; Grauel & Gotthardt, 2016) and the use of firms' CDP scores as a proxy for the quality of firms' CCD (Caby et al., 2020; Toukabri & Mohamed Youssef, 2023).

2.10 Critical Literature Gaps and Study Relevance

Notwithstanding the preceding discussion concerning the growing body of research on carbon disclosure, there remains several critical gaps in literature. In line with the findings of Bazhair et al. (2022), the review of carbon disclosure literature by Hahn et al. (2015) concludes that studies within this field of research are primarily concentrated on disclosure determinants. Also, the results of Hahn et al. (2015) shed light on the scarcity of research concerning other relevant matters such as the environmental and economic effects of carbon disclosure and carbon disclosure assurance.

It is worth of note that while determinants of carbon disclosure is the most prevailing topic in CCD literature, studying the topic in the context of emerging economies is deemed crucial. This is because existing studies are mainly focused developed countries (Bae Choi et al., 2013; Cormier & Magnan, 1999; Hollindale et al., 2019; Karim et al., 2021; Tauringana & Chithambo, 2015; Toukabri & Mohamed Youssef, 2023). Furthermore, most studies on CCD determinants are based on a single country sample covering firms from diverse sectors (Bae Choi et al., 2013; Faisal et al., 2018; Halkos & Skouloudis, 2016; Hollindale et al., 2019; Toukabri & Mohamed Youssef, 2023). While studying carbon disclosure using a cross-sector sample within a single country provides a deep insight into the national context of CCD, utilizing a sample that focuses on specific sectors within a regional context is assumed to be equally important as it provides a comparative perspective concerning the effect of the national context on CCD of firms operating within similar sectors.

This research attempts to bridge some of the gaps in literature by studying CCD determinants in the GCC region, which is an emerging region that has been clearly overlooked by literature despite its significant economic reliance on extractive activities and immense contribution to climate change. The research intends to study the matter utilizing a sample of GCC carbon-intensive sectors to better understand the means by which major polluters are approaching CCD. Additionally, it is worth pointing out that existing literature lacks relevant CCD indices that are suitable for examining carbon disclosure in the GCC as such disclosure has not been previously studied in the region. Accordingly, this study attempts to address the matter through proposing a suitable disclosure index.

2.11 Theoretical Framework and Hypotheses Development

2.11.1 Theories Applicable to Climate Change Disclosure

The literature remains inconclusive with regard to theories that explain firms' voluntary CCD. Based on the work of Bazhair et al. (2022), existing literature analyzes carbon disclosure from the standpoint of 25 different theories. Yet, it is to be noted that the legitimacy, stakeholder, institutional, and agency theories are found to be among the most commonly applied theories within this area of research.

2.11.1.1 Political Economy Theory

The political economy theory argues that an economic event cannot be properly analyzed and investigated without taking into consideration the social, political and institutional context within which it occurs. Hence, the theory does not view firms' reports and disclosures merely as economic objects but also as powerful social and political documents. Accordingly, the three theories derived from the political economy theory, namely legitimacy theory, stakeholder theory, and institutional theory, are widely used to explain firms' voluntary disclosures (Deegan, 2014). The below sections further explain how each of these theories can relate to the scope of this study (i.e., CCD).

2.11.1.1.1 Legitimacy Theory

The avid interest in studying the incentives behind firms' CCD is driven by its voluntary nature. Deegan (2002) states that voluntary disclosures may be used by firms as a means to seek overall legitimacy or legitimize a particular aspect of their operations, as

legitimacy is assumed to be the cornerstone of firms' existence. It is argued that the only path for gaining legitimacy is meeting the implicit and explicit expectations set by society for firms (i.e., the social contract) since a firm that is not operating within the bounds and norms of society has no odds of survival (Suchman, 1995). This is because deviating from the social contract is associated with serious implications that may jeopardize firms' ability to continue operating. Such implications may include sanctions, a significant drop in demand, or restrictions on access to resources (Deegan, 2014).

Social contracts are dynamic; they change as society's values and issues of concern change. Aerts and Cormier (2009) state that companies can act strategically and manage to maintain control over their legitimacy status by adapting their behaviors to society's changing perceptions. As the public becomes more interested in environmental issues, decision-makers at the corporate level are pressured to adapt their behavior, thus, are more likely to report their environmental performance to maintain their legitimacy (Wilmshurst & Frost, 2000). Other scholars also emphasize the role of environmental disclosure in conveying adherence to the social contract, especially by firms that are highly involved in environmentally sensitive activities (Cho & Patten, 2007; Desai, 2022). This is consistent with the argument of some researchers who view voluntary reporting as a marketing tool that is used by firms to promote themselves as good corporate citizens (El-Bassiouny et al., 2017; Hamza & Jarboui, 2022).

Numerous studies investigate corporate voluntary CCD from the standpoint of legitimacy theory. According to the systematic review of Bazhair et al. (2022), legitimacy theory is the most commonly used theory in carbon disclosure literature. This suggests that firms are reporting their GHG emissions to respond to the public's growing awareness of climate change and society's urgent demands to hold firms accountable for their carbon footprint. Examples of studies that provide empirical evidence that supports the legitimacy theory include (Bae Choi et al., 2013; Cong et al., 2020; Karim et al., 2021; Kılıç & Kuzey, 2019a; Kouloukoui et al., 2019).

2.11.1.1.2 Stakeholder Theory

As per the definition of Clarkson (1995), a stakeholder is any party that can relate to a particular organization regardless of the nature of their relationship. In the context of corporations, stakeholders include employees, customers, suppliers, shareholders,

governments, regulators, and any other party that can either influence or be influenced by the corporation. It is stated that firms' existence is dependent upon the continued support of their stakeholders, creating an incentive for firms to continuously strive to meet their stakeholders' expectations. Given that balancing the interest of all stakeholders is a cumbersome task, firms tend to adapt their behavior to accommodate the needs of salient stakeholders (Gray et al., 1995; Mitchell et al., 1997). Chen et al. (2023) interpret firms' CCD through the lens of the stakeholder theory. They argue that engagement in such disclosure is driven by an interest in seeking validation from particular salient stakeholders rather than society as a whole to avoid the implications of non-compliance.

Despite the unquestionable difficulty of balancing the interests of wide groups of stakeholders, firms can be strategic in their choices and voluntarily disclose information that is expected to reinforce their relationship with several stakeholders. Since climate change has become an issue of concern to different stakeholders, Guenther et al. (2016) argue that voluntary CCD can be viewed as a mechanism that manages firms' relationship with different parties in spite of their varying needs and requirements. For instance, firms can disclose carbon-related information to convey to regulators their green initiatives besides their compliance with laws and regulations (Silva-Gao, 2012). Also, carbon disclosure may assist environmentally conscious customers in making informed purchase decisions. Similarly, Velte et al. (2020) state that firms' CCD can be targeted to several categories of stakeholders including financial intermediaries such as rating agencies. Especially because the role of these agencies has expanded beyond assisting investors in making informed decisions based on economic metrics, this is because notably firms' environmental, social, and governance (ESG) scores are nowadays viewed as a vital investment criterion.

It is to be noted that carbon disclosure literature provides empirical evidence that supports the stakeholder theory (Anas et al., 2015; Ben-Amar et al., 2017; Cotter & Najah, 2013; Fontana et al., 2015; Guenther et al., 2016; Prado-Lorenzo et al., 2009; Taurigana & Chithambo, 2015).

2.11.1.1.3 Institutional Theory

The institutional theory is concerned with interpreting the similarities in behaviors and practices among different organizations (Deegan, 2014). Even though the term

“institution” can be subject to various interpretations as the literature did not reach a consensus over a precise definition that clearly explains the concept of institution (Scott, 1987), Scott (2008) suggests a broad definition “Institutions are comprised of regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life”. These three pillars, namely the *regulative*, *normative*, and *cultural-cognitive* serve as the institutional environments within which firms are operating.

According to DiMaggio and Powell (1983), firms apply three distinct mechanisms in order to adhere to the institutional environment and obtain institutional legitimacy, each of which is used to comply with one of the three pillars. To elaborate, firms use the *coercive mechanism* whereby they tend to comply with rules and regulations to correspond to the first pillar. A *normative mechanism* which corresponds to the second pillar is demonstrated through firms’ adoption of procedures and practices merely because they are perceived to be right or proper. Whereas the third pillar is maintained by a *mimetic mechanism* whereby firms tend to mimic the practices of other companies that operate within similar environments. On the one hand, it is argued that the adoption of these mechanisms with the purpose of incorporating the three pillars into firms’ structures will eventually result in homogenous firms. This is because companies operating under similar conditions will end up having the same structure through a process that is referred to as isomorphism (Scott, 1987). On the other hand, Meyer and Rowan (1977) state that the pressing necessity for being institutionalized through meeting the institutional requirements can lead to inconsistency between firms’ normative and operational structures, which is referred to as “decoupling” in accounting literature.

Numerous studies utilize institutional theory to interpret CCD. For instance, De Grosbois and Fennell (2022) argue that reporting frameworks such as GRI place normative pressures on firms to voluntarily report their social and environmental performance, including their climate change impact. Similarly, De Villiers and Alexander (2014) state that the adoption of GRI sustainability reporting standards is becoming a norm which implies that firms are pressured to report in accordance with these reporting standards to maintain their institutional legitimacy. Studies that provide

empirical evidence that support the institutional theory include (Comyns, 2016; De Grosbois & Fennell, 2022; Hollindale et al., 2019).

2.11.1.2 Agency Theory

The agency theory is centered on the relationship between managers, who act as agents for the principals (i.e., capital providers). Jensen and Meckling (1976) define this relationship as a contract whereby principals employ another party (agent) to act on their behalf through delegating decision-making authority, which leads to the creation of an agency problem. The problem occurs due to a possible conflict of interest between the two parties, thus resulting in agency costs. It is to be noted that the problem and its associated costs are further accelerated by information asymmetry, which is a situation whereby agents, as insiders, possess more information than capital providers.

Numerous studies applied the agency theory to explain firms' voluntary disclosure. Amran et al. (2014) state that firms voluntarily opt to disclose non-financial information in order to ameliorate information asymmetry. The literature also emphasizes the role of corporate governance in mitigating the agency problem. For instance, Jizi et al. (2022) argue that the composition of the board of directors can have a significant impact on firms' transparency. Thus, a board that consists of a large number of independent directors is more likely to place pressure on managers to disclose social and environmental information. Additionally, there are many studies that provide empirical evidence that supports the impact of agency theory on voluntary disclosure. Examples of evidence surrounding carbon disclosure in particular include (Cotter & Najah, 2012; Fontana et al., 2015; Karim et al., 2021; Moses et al., 2020).

2.11.2 Hypotheses Development

2.11.2.1 Firm-specific Characteristics

2.11.2.1.1 Size

It is assumed that large firms are exposed to a broad range of stakeholders since they are more likely to operate in multiple countries and interact with a large number of stakeholders including suppliers, customers, and regulators. Hence, the stakeholder theory suggests that large firms tend to voluntarily disclose carbon-related information to meet the expectations of their stakeholders (De Grosbois & Fennell, 2022). Also, the legitimacy theory suggests that firms may use CCD as a means to maintain their legitimacy. This is because large firms are subject to greater media attention, thus,

voluntary engagement in such disclosures can protect them from being perceived as environmentally irresponsible by the public (Gonzalez-Gonzalez & Ramírez, 2016).

Interestingly, based on a global sample that consists of 45 firms operating within the oil and gas industry, Comyns (2016) finds that size has a significant positive effect on the number of climate change-related terms (i.e., words) mentioned in firms' published reports. Nevertheless, it does not influence the quality of disclosure which is assessed based on an index that includes a set of items that are assumed to provide an insight of firms' climate change performance. This implies that large firms may attempt to convey good disclosure practices by increasing the frequency of words that correspond to the climate change phenomenon without providing meaningful information to the users.

Despite the existence of empirical studies that fail to identify a significant relationship between firms' size and the extent of CCD measured by a relevant disclosure index (Darus et al., 2019; De Grosbois & Fennell, 2022), there are numerous studies that provide empirical evidence of the significant positive impact of size on CCD (Bae Choi et al., 2013; Desai, 2022; Faisal et al., 2018; Kılıç & Kuzey, 2019a; Tauringana & Chithambo, 2015). Additionally, evidence from Saudi Arabia indicates that size is a key driver of voluntary disclosure (Boshnak, 2022). Accordingly, the first hypothesis is developed as the following:

H1. There is a significant positive relationship between firms' size and GCC carbon-intensive firms' CCD

2.11.2.1.2 Age

It is assumed that firms' reputation is built throughout the years of their existence (Menassa, 2010). Thus, from the standpoint of the legitimacy theory, older firms are more likely to voluntarily disclose non-financial information, including carbon disclosures, with the purpose of preserving their public image. In this regard, Kılıç and Kuzey (2019) state that there is a positive relationship between age and CCD. Empirical evidence that supports the positive relationship between the two variables has been provided by (Caby et al., 2020).

While there is a lack of research that directly investigates the impact of age on CCD in the MENA region generally, and GCC specifically, empirical evidence from Jordan indicates that age has a significant positive impact on corporate social responsibility

disclosure (Alkayed & Omar, 2023). Additionally, evidence from Libya sheds light on the role of age in expanding the extent of corporate environmental disclosure (Bayoud et al., 2012). Inconsistent with several studies that suggest a positive relationship between age and voluntary disclosure, a Saudi-based study indicates that there is a lack of a significant relationship between age and corporate social and environmental voluntary disclosures (Boshnak, 2022). Based on the theoretical explanation supported by most empirical evidence within voluntary disclosure literature, the second hypothesis is developed as the following:

H2. There is a significant positive relationship between firms' age and GCC carbon-intensive firms' CCD

2.11.2.1.3 Profitability

Based on Cormier and Magnan (1999), firms that enjoy high profitability are more likely to be transparent with their environmental impact. This is because they possess the financial capacity to encounter potential costs associated with unfavorable disclosures. Others argue that highly profitable firms may engage in different voluntary disclosures in order to legitimize their profits (Katarachia et al., 2018).

In spite of the theoretical discussion which assumes a positive relationship between profitability and environmental disclosure, Hahn et al. (2015) state that empirical studies provide mixed findings with regard to the effect of profitability and corporate CCD. While some studies suggest that profitability does not exercise significant influence over firms' disclosure (Bae Choi et al., 2013; Halkos & Skouloudis, 2016; Tauringana & Chithambo, 2015), there are some studies that provide empirical evidence that contradicts the theoretical discussion and suggest a negative relationship between profitability and carbon disclosure (Desai, 2022; Prado-Lorenzo et al., 2009). Yet, it is worth noting that there is some empirical evidence that supports the theoretical perspective of the two variables (Caby et al., 2020; Darus et al., 2019; Faisal et al., 2018; Kılıç & Kuzey, 2019a). Hence, the third hypothesis is developed as the following:

H3. There is a significant positive relationship between profitability and CCD

2.11.2.1.4 Leverage

According to Jensen and Meckling (1976), managers of highly leveraged firms are more likely to engage in voluntary disclosures to mitigate the agency problem and its

associated costs, which are driven by information asymmetry. Some studies from the GCC region provide evidence that supports this argument. The results of Boshnak (2022) indicate that there is a significant positive relationship between leverage and social and environmental disclosure in Saudi Arabia. Similarly, Juhmani (2014) provides evidence from Bahrain pertaining to the positive impact of leverage on the web-based social and environmental disclosure of listed firms. With respect to the relationship between leverage and CCD, it is worth noting that Kim et al. (2022) find that firms funded by environmentally conscious creditors tend to not only disclose more information but also show a greater tendency to embed environmental considerations in their operations and strategic plans.

Nevertheless, the literature remains inconclusive regarding the effect of leverage on CCD (Hahn et al., 2015). For instance, a study that is based on a sample that consists of the 100 largest firms in Australia fails to identify a significant relationship between the two variables (Bae Choi et al., 2013). On the other hand, several studies find that leverage has a significant negative influence on CCD (Ben-Amar et al., 2017; Darus et al., 2019; Desai, 2022; Faisal et al., 2018; Tauringana & Chithambo, 2015). Yet, consistent with the theoretical perspective of the agency theory, the fourth hypothesis is formed as the following:

H4. There is a significant positive relationship between leverage and GCC carbon-intensive firms' CCD

2.11.2.1.5 Board Independence

Effective corporate governance can play a significant role in mitigating the agency problem between principals and agents. It is argued that a board of directors that is composed of a high percentage of independent directors implies good governance and greater transparency (Jizi et al., 2014). This is because independent directors are expected to improve the objectivity of the board, restrict the opportunistic behavior of executive managers, scrutinize the decisions made by managers, and ensure that firms are operating in the best interest of stakeholders. Accordingly, independent directors are more likely to encourage firms to operate responsibly and in an environmentally friendly manner (García Martín & Herrero, 2020). Hence, it would be reasonable to assume that a high proportion of independent directors improves carbon disclosure. In fact, there are many studies that provide evidence of the positive impact of independent

directors on voluntary environmental disclosure generally (Agyemang et al., 2020; Aliyu, 2019), and CCD specifically (Amran et al., 2014; Islam & Hossain, 2022; Toukabri & Mohamed Youssef, 2023).

H5. There is a significant positive relationship between board independence and GCC carbon-intensive firms' CCD

2.11.2.1.6 Board Committees

Yunus et al. (2016) argue that the existence of an environmental committee increases firms' carbon reporting as the creation of environmental committees is usually driven by firms' interest in enhancing their reputation and legitimacy. This is through monitoring, managing, and reporting their environmental risk. A similar interpretation is provided by Neu et al. (1998) whereby they perceive environmental committees as an instrument that is used by companies to manage their environmental image and convey commitment towards mitigating GHG emissions. Others view incorporating an environmental committee into a firm's corporate governance structure as a proactive measure aimed at minimizing overall carbon emissions in the long term (Rankin et al., 2011).

Since the same goals and responsibilities can fall within the scope of the sustainability committee, it would be reasonable to assume that the existence of either an environmental or sustainability committee leads to better environmental performance. In fact, García Martín and Herrero (2020) encourage policymakers to design rules that mandate the creation of sustainability committees as they are found to be effective in enhancing firms' commitment to environmental issues besides aligning firms' goals and objectives with society. Given the goals and objectives of both committees, it is assumed that the existence of either committee increases firms' CCD. It is worth noting that this positive relationship is confirmed by most empirical studies within this area of research (Kılıç & Kuzey, 2019b; Toukabri & Mohamed Youssef, 2023). Thus, the sixth hypothesis is developed as the following:

H6. There is a significant positive relationship between the presence of an environmental or sustainability committee and GCC carbon-intensive firms' CCD

2.11.2.1.7 GRI Adoption

Carbon disclosure literature places high emphasis on firms' adopted reporting framework. For instance, CDP participation is widely used in carbon disclosure literature. Desai (2022) as well as Grauel and Gotthardt (2016) treat firms' carbon disclosure through CDP reports as a dichotomous variable that is used to indicate adequate CCD. Whereas Toukabri and Mohamed Youssef (2023) utilize firms' CDP scores as a proxy of CCD. Other studies identify a significant positive association between CDP participation and the extent of firms' carbon disclosure in annual and sustainability reports (Cotter & Najah, 2012; De Grosbois & Fennell, 2022; Rankin et al., 2011).

GRI is another reporting framework that is commonly used in literature. This might be attributable to the fact that the adoption of GRI sustainability reporting standards is becoming a norm (De Villiers & Alexander, 2014). In fact, Bhattacharyya and Yang, (2019) argue that GRI is the most adopted reporting framework across the world, thus, firms are being pressured to report in accordance with these reporting standards to maintain their institutional legitimacy. The empirical evidence of Rankin et al. (2011) indicates that besides its effect on the extent of CCD, GRI adoption has a substantial positive impact on the credibility of disclosed information. Similarly, there are several studies that reinforce the role of GRI in expanding the degree of firms' carbon disclosure (Comyns, 2016; De Grosbois & Fennell, 2022). The positive impact of GRI reporting on CCD is assumed to be driven from the fact that GRI standards incorporate specific guidelines for emissions reporting (*GRI 305: Emissions*). In light of the limited CDP participation in the GCC region besides the discussions surrounding the effect of GRI reporting on CCD, the seventh hypothesis is formulated as the following:

H7. There is a significant positive relationship between GRI adoption and GCC carbon-intensive firms' CCD

2.11.2.2 Country-level Determinants

The country in which a firm is operating is expected to influence its extent of CCD. This can be attributable to various factors including differences in policies and initiatives, regulatory environment, and economic conditions at the country level. Some studies provide evidence that supports the effect of countries' economic development on the degree of carbon disclosure. A sample that consists of firms from 10 industries

operating across 13 developed and emerging countries in Asia Pacific indicates that developed countries showcase superior CCD relative to emerging nations (Amran et al., 2014). In the same vein, Grauel and Gotthardt (2016) provide empirical evidence that supports the positive effect of favorable economic conditions on CCD, whereby their study finds that higher GDP per capita is associated with a greater likelihood of CDP participation. Other country-level variables that are empirically found to be associated with enhanced CCD include strict environmental regulations (Grauel & Gotthardt, 2016), participation in international treaties aimed at combating climate change (Gallego-Álvarez et al., 2011), and high environmental performance index (EPI) scores (Caby et al., 2020). It is worth noting that the EPI is a measure that provides scores and ranks countries based on three main aspects, namely climate change performance, environmental health, and ecosystem vitality (*About the EPI*, n.d.).

Caby et al. (2020) state that any development at the country level increases the likelihood of the existence of policies, regulations, and frameworks that attempt to combat climate change, thus improving CCD. Since all GCC countries ratified the latest climate change treaty (i.e., the Paris Agreement) and are classified as Emerging Market and Developing Economies by the IMF, this study relies on the EPI score as a country-level development indicator that is expected to improve firms' carbon disclosure. This is consistent with the institutional theory which assumes that firms' actions are driven by the institutional environment in which they are operating (Meyer & Rowan, 1977). This leads to the development of the last hypothesis:

H8. There is a significant positive relationship between EPI scores and GCC carbon-intensive firms' CCD

The figure below depicts the theoretical framework used by the study. It visualizes the expected impact of the independent variables on CCD and the theories used to explain disclosure.

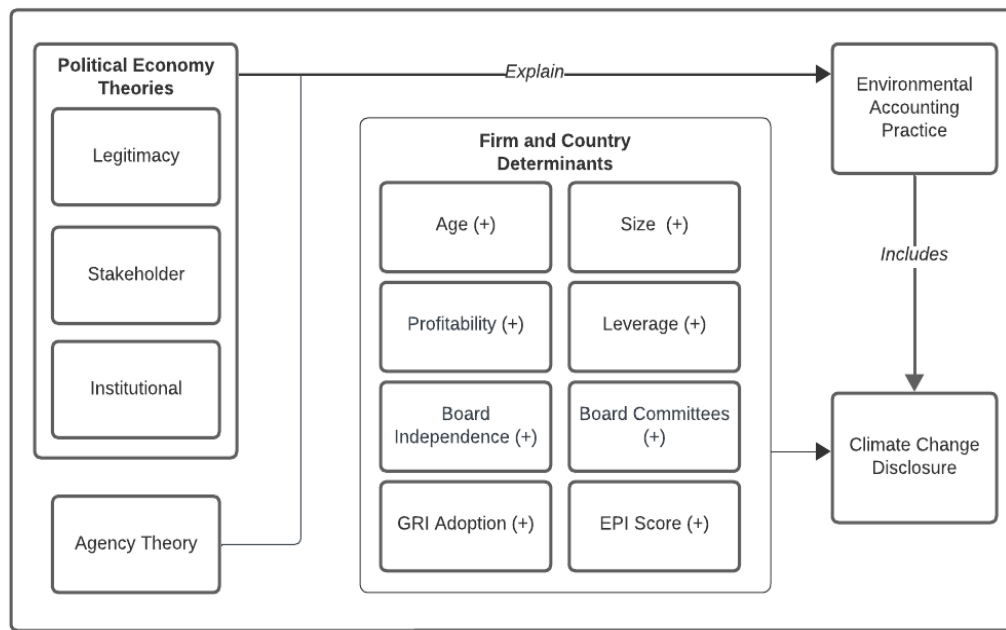


Figure (2.3): Theoretical Framework

2.12 Chapter Summary

The chapter establishes the foundation of the research by underscoring climate change as a serious global challenge and sheds light on its tremendous adverse impacts on the environment, societies, and economies. Notably, the concerning increase in environmental disasters, newly emerged diseases, and the anticipated significant drop in global income are just a fraction of the detrimental consequences of climate change. Through an extensive review of the literature, the chapter highlights the importance of studying CCD, considering the vital role businesses play in contributing to the problem and the effectiveness of carbon disclosure in positively influencing corporate environmental behavior. Additionally, the chapter discusses different methods used by scholars to measure carbon disclosure and underscores determinants of CCD as the most common research topic within the carbon disclosure literature. Nevertheless, it draws attention to the lack of research concerning the matter within the GCC region. Furthermore, it explores the role of the political economy theory along with its derived theories, namely legitimacy theory, stakeholder theory, and institutional theory, besides the agency theory, in understanding drivers of corporate CCD. Finally, the chapter lays out the research hypotheses, outlining the anticipated relationship between several variables and CCD.

Chapter Three

Research Methodology

3.1 Chapter Introduction

This chapter lays out the methodology adopted in the study. It begins with a discussion of the research philosophy and approach and identifying the sample characteristics. Also, the chapter explains the basis of quantifying CCD (i.e. the dependent variable) and the development of the regression model used to test research hypotheses. Finally, it provides a description of research variables and discusses data collection methods.

3.2 Research Philosophy and Approach

According to Hussey and Collis (2021), the research philosophy is perceived to be the compass of any study as it directs the entire research process. In this study, the research philosophy is rooted in positivism. Since the positivist research paradigm is built on the assumption that reality is objective and measurable, quantitative methods are usually applied in positivist studies (Hussey & Collis, 2021; Sekaran & Bougie, 2016). Consistent with this research paradigm, the study adopts a deductive approach and utilizes quantitative tools to address the two research questions. Firms' CCD is evaluated using quantitative content analysis based on a predetermined disclosure index that is derived from certain relevant frameworks. Whereas the second research question pertaining to the determinants of CCD is address by developing the research hypotheses based on reviewed literature and established theoretical frameworks.

3.3 Study Sample

The population of the study consists of 230 firms, representing the total number of GCC carbon-intensive firms as of 31 December 2022. Carbon-intensive firms in the context of this research are those that operate within sectors including basic materials, energy, industrials, and utilities as per TRBC. While the study is aimed at targeting the entire population, 18 Omani firms had to be excluded due to a lack of access to essential data needed for addressing the research questions. This led to the arrival of a sample that consists of 212 firms. In order to better capture and evaluate the current status of CCD, the study is based on cross-sectional data gathered from the most recent financial period (2022).

Table (3.1): Sample Size: Sector Breakdown

Country	Basic Materials	Energy	Industrials	Utilities	Total firms
Bahrain	1	0	5	0	6
Kuwait	10	9	13	1	33
Oman	4	6	3	11	24
Qatar	4	4	3	1	12
Saudi Arabia	58	9	29	6	102
United Arab Emirates	11	7	13	4	35
Total	88	35	66	23	212

It is to be noted that 2022 is selected to be the center of this research because it is the most recent financial period for which annual and sustainability reports, besides other data relevant to the study are accessible. Also, the use of a cross-sectional data from 2022 is supported by the findings of a pilot study that was conducted using 23 randomly selected carbon-intensive firms, prior to the commencement of data gathering. Selected firms' annual and sustainability reports that belong to the two recent financial periods (2022 and 2021) were examined to compare the corporate CCD of the two periods. The results indicate that in 2022, the size of disclosure increased by around 39% when compared to 2021. This can be attributable to the fact that CCD is a recent and evolving practice. Thus, firms' disclosure is improving on an annual basis. It might be worth pointing out that the results of the pilot study are consistent with the findings of a report published by ACCA since the report states that in 2020, the CCD of extractive firms across the world witnessed a clear improvement relative to the preceding year (2019) (ACCA, 2021).

3.4 Nature and Extent of CCD

In order to examine the nature and extent of CCD within the region, an index that assesses carbon disclosure is adopted from the study of Bae Choi et al. (2013). It is worth of note that while the index was initially developed to measure the disclosure of the 100 largest listed firms in Australia, the same index was used by other studies to measure CCD from the context of different countries such as Indonesia (Faisal et al., 2018), Malaysia (Darus et al., 2019; Kalu et al., 2016), and Turkey (Kılıç & Kuzey, 2019a). Given its applicability to the scope of this study, the index of Bae Choi et al. (2013) is used to measure CCD of GCC carbon-intensive firms and examine the nature

of disclosed information. Yet, it is slightly modified to accommodate the limitations identified by a pilot test that was conducted to evaluate the suitability of the index to the GCC context.

3.4.1 Index Mapping and Pilot Testing

Prior to utilizing the adopted CCD index for content analysis, the index was mapped to two climate change reporting frameworks namely GRI and CDP to ensure that the index is aligned with relevant reporting frameworks. Additionally, a pilot test was conducted using 2022 and 2021 annual and sustainability reports of 23 randomly selected firms to assess the index suitability for the GCC context. The results of the pilot test indicate that the extent of firms' disclosure improved by around 39% over the span of one year, suggesting that the disclosure of carbon-sector firms within the region is improving on a yearly basis. Furthermore, the pilot test revealed some limitations that were addressed by incorporating additional disclosure items and introducing some amendments to the index.

The index adopted by this study is adapted by including an item that accounts for having an environmental certification (e.g., ISO14001) or any relevant award that is assumed to improve the degree and/ or credibility of disclosed carbon information. The addition of this item is supported by the evidence pertaining to the effectiveness of having ISO14001 in improving the extent as well as the credibility of firms' climate-related disclosure (Rankin et al., 2011) and the use of this criterion by some other carbon disclosure indices (De Aguiar & Bebbington, 2014). It is worth noting that this disclosure item is added because the pilot test showed extremely low disclosure levels of items concerning carbon emissions accountability of the adopted index. Additionally, unlike the initial index of Bae Choi et al. (2013), the adapted index of this study breaks the disclosure of Scopes 1 and 2, or Scope 3 GHG emissions into three separate items, each of which accounts for a specific class of GHG emissions. This adjustment is made in an attempt to provide more accurate disclosure scores since the content analysis of firms included in the sample indicates that GCC-listed firms do not always simultaneously report their Scopes 1 and 2, or Scope 3 GHG emissions. Furthermore, an item that accounts for the use of carbon offsets is added to the index as climate reporting frameworks such as CDP and GRI encourage such disclosure. Consequently, the amendments made resulted in a disclosure index that is composed of 22 items

classified into five main categories namely climate change: risk and opportunities, GHG emissions accounting, energy consumption accounting, GHG reduction and cost, and carbon emission accountability.

Table 3.3 illustrates the index used to examine the nature and measure the extent of CCD and maps items within the index to GRI and CDP corresponding reporting requirements. It is to be noted that the index is mapped to the most recent relevant reporting guidelines. These include GRI 305: Emissions 2016, GRI 302: Energy 2016, and GRI 103: Management Approach 2016, along with the CDP Climate Change 2023 Questionnaire.

3.4.2 Content Analysis

Despite acknowledging the fact that different groups of users assign varying value weights to different disclosure aspects, it is imperative to emphasize that this study does not attempt to investigate the matter from the viewpoint of a particular user. Thus, in order to avoid the subjectivity associated with utilizing weighted disclosure indexes as suggested by Cooke (1989), the index used in this study is unweighted. Accordingly, disclosure scores are assigned via a thorough inspection of annual and sustainability reports to check for the existence of items within the index and assigning a score of 1 for existing items and 0 for non-existing items, the total number of disclosed items thereafter results in each firm's overall disclosure score. Hence, such scores are expected to range between 0 and 22. It is important to highlight that this study utilizes firms' annual and sustainability reports to examine voluntary CCD because of they are assumed to be firms' primary source of disclosure given their high accessibility to stakeholders (Bae Choi et al., 2013).

The quantitative content analysis in the study is performed using a specialized software (MAXQDA24) to improve the reliability and the accuracy of the content analysis process. The software is commonly used by scholars for qualitative data analysis (Consoli, 2021; Seddighi et al., 2022; Valizadeh et al., 2020), and this study uses the same software due to its feasibility, renowned qualitative data analysis features, and user-friendly interface. The process started with using MAXQDA24 to create 22 distinct codes, each of which corresponds to a specific disclosure item within the index and importing all firms' 2022 annual and sustainability reports into the software. Software features were utilized to identify specific terms and phrases that relate to CCD

to identify the locations of relevant disclosures within firms' published reports and manually assign each instance of disclosure a relevant code. Thereafter, the extent of firms' CCD was quantified based on the number of disclosure items disclosed within its reports.

3.4.3 Index Reliability and Validity

To verify the validity and reliability of the carbon disclosure index, a content validity assessment was performed by comparing the index items with those used in similar studies or frameworks found in the literature. This step ensures comprehensive coverage. As previously discussed, the index items for our study are developed based on an extensive literature review, followed by a pilot test using a small sample to refine the items to fit the study context.

The carbon disclosure data were then gathered using this refined disclosure index. To ensure the consistency of the index results across different observers, we calculated Cronbach's Alpha to assess the internal consistency of the index. The calculated Cronbach's Alpha for the carbon disclosure index is approximately 0.946. Based on Hair et al. (2009), this high value indicates excellent internal consistency among the items in the index, suggesting that they reliably measure the same underlying construct.

Table 3.2): Cronbach's Alpha Reliability Test

Average interitem covariance	0.467563
Number of items on the scale	22
Scale reliability coefficient	0.9459

Table (3.3): Disclosure Index

Category	Code	GRI	CDP	Disclosure item
Climate change: risks & opportunities	CC1	103-1	C2.1, C2.2, C2.3, & C2.4	Assessment/description of the risks (regulatory, physical or general) relating to climate change and actions taken or to be taken to manage the risks
	CC2	103-1	C2.1, C2.2, C2.3, & C2.4	Assessment/description of current (and future) financial implications, business implications and opportunities of climate change
GHG emissions accounting	GHG1	305-1, 305-2, & 305-3	C5.3	Description of the methodology used to calculate GHG emissions (e.g. GHG protocol or ISO)
	GHG2	103-3	C10.1	Existence of external verification of quantity of GHG emission– if so, by whom and on what basis
	GHG3	305-1, 305-2, & 305-3	C7.9	Total GHG emissions – metric tonnes CO2-e emitted
	GHG4a*	305-1	C6.1	Disclosure of Scope 1 direct GHG emissions
	GHG4b*	305-2	C6.3	Disclosure of Scope 2 indirect GHG emissions
	GHG4c*	305-3	C6.5	Disclosure of Scope 3 indirect GHG emissions
	GHG5	305-1: 2.2.5, 305-2: 2.4.5, & 305-3: 2.6.5	C7.4	Disclosure of GHG emissions by sources (e.g. coal, electricity, etc.)
	GHG6	305-1: 2.2.5, 305-2: 2.4.5, & 305-3: 2.6.5	C7.3 & C7.6	Disclosure of GHG emissions by facility or segment level
	GHG7	305-1: 2.2.5, 305-2: 2.4.5, & 305-3: 2.6.5	C7.9	Comparison of GHG emissions with previous years
Energy consumption accounting	EC1	302-1	C8.2 & C8.2a	Total energy consumed (e.g. tera-joules or peta-joules)

GHG reduction and cost	EC2	302-1	C8.2a	Quantification of energy used from renewable sources
	EC3	302-1: 2.2.6	NA	Disclosure by type, facility or segment
	RC1	103-2	C4.3, C4.3a, & C4.3b	Detail of plans or strategies to reduce GHG emissions
	RC2	103-2	C4.1	Specification of GHG emissions reduction target level and target year
	RC3	103-3 & 305-5	C4.1a	Emissions reductions and associated costs or savings achieved to date as a result of the reduction plan
	RC4	103-2	C3.4	Cost of future emissions factored into capital expenditure planning
	RC5*	103-2 & 305-5	C11.2	Use of carbon offsets, including the purchase of carbon credits or any other participation in emissions trading schemes
Carbon emission accountability	ACC1	103-2	C1.1 & C1.2	Indication of which board committee (or other executive body) has overall responsibility for actions related to climate change
	ACC2	103-2	C1.1b	Description of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change
	ACC3*	NA	C10.1	Mention of certifications or awards relevant to climate change

3.5 Research Model and Description of Variables

A multiple regression model is developed with the purpose of addressing the second research question aimed at identifying determinants of CCD. Disclosure scores assigned through content analysis are used as the dependent variable, whereas the independent variables consist mainly of firm-specific characteristics and a variable that accounts for differences at the country level. The OLS multiple regression model is presented below, along with a detailed description of the variables presented in Table 3.4.

$$\text{CCD} = \beta_0 + \beta_1 \text{SIZE} + \beta_2 \text{AGE} + \beta_3 \text{ROA} + \beta_4 \text{LEV} + \beta_5 \text{BIND} + \beta_6 \text{BCOM} + \beta_7 \text{GRI} + \beta_8 \text{EPI} + \varepsilon$$

Table (3.4): Description and Measurement of Study Variables

Type of Variable	Variable	Measurement	Reference
Dependent variable	Climate Change Disclosure (CCD)	A score is assigned by using a disclosure index that consists of 22 items classified into five main categories	Adopted from Bae Choi et al. (2013) and amended by the author to better fit the GCC context.
Independent variables	Size (SIZE)	Natural logarithm of total assets	(Bae Choi et al., 2013; Caby et al., 2020; Comyns, 2016; Darus et al., 2019)
	Age (AGE)	Number of years since the foundation of the firm	(Caby et al., 2020; Kılıç & Kuzey, 2019a)
	Profitability (ROA)	Net income to total assets	(Bae Choi et al., 2013; Kılıç & Kuzey, 2019a; Tauringana & Chithambo, 2015)
	Leverage (LEV)	Total liabilities to the total assets	(Bae Choi et al., 2013; Darus et al., 2019)
	Board Independence (BIND)	Percentage of independent directors to total number of board directors	(Kılıç & Kuzey, 2019b)
	Board Committees (BCOM)	Dichotomous variable: 1 if the firm has a sustainability or environmental committee, 0 otherwise.	(Kılıç & Kuzey, 2019b)
	GRI Adoption (GRI)	Dichotomous variable: 1 if the firm adopts GRI reporting standards, 0 otherwise	(Comyns, 2016; De Grosbois & Fennell, 2022)
	Environmental Performance Index score (EPI)	A score that ranges between 0 and 100 and assesses countries based on climate change performance,	(Caby et al., 2020)

3.6 Data Collection

To assign CCD scores, content analysis is performed on sampled firms' 2022 annual and sustainability reports using MAXQDA24 software. Whereas data of firm-specific characteristics, namely SIZE, AGE, ROA, LEV, BIND, BCOM, and GRI, are sourced from a database on the Refinitiv Eikon platform. Finally, EPI scores are collected from the 2022 Environmental Performance Index Report.

3.7 Chapter Summary

This study employs a quantitative research approach to identify carbon disclosure determinants of GCC carbon-intensive firms. It is worth noting that the study utilizes a cross-sectional dataset from the year 2022 and 212 firms. In order to address the first research question, content analysis is used whereby firms are assigned a score for their CCD based on an unweighted index that was adopted and modified to better assess disclosure within the GCC region. Thereafter, a multiple regression model that uses disclosure scores as a dependent variable is developed to identify CCD determinants. The model also incorporates eight independent variables that correspond to the eight research hypotheses.

Chapter Four

Results and Discussion

4.1 Chapter Introduction

This chapter is divided into two main sections. The first section is composed of five subsections that present the research findings. These include CCD within a geographical context, nature and extent of CCD, descriptive statistics of research variables, correlation and collinearity analysis, as well as regression results. Whereas the second section interprets research findings by analyzing disclosure patterns and discussing identified determinants within the context of theoretical frameworks used to explain disclosure drivers.

4.2 Results

4.2.1 CCD: Geographical Breakdown

Content analysis results indicate that while CCD is gaining traction in the GCC region, it has not yet become a mainstream practice. As presented in Table 4.1, out of 212 sampled firms, only 89 firms (42%) disclosed at least one disclosure item included in the index used to measure the extent of CCD. Most disclosing firms are located in Saudi Arabia which is attributable to the fact that the Saudi market is associated with a considerably larger number of listed firms compared to surrounding countries. Nevertheless, Qatar is found to be associated with the highest percentage of firms engaged in carbon disclosure, with 58% of its listed companies falling within the category of disclosing firms. Oman and the United Arab Emirates are ranked second with a percentage of 54%, followed by Bahrain (50%) and Saudi Arabia (40%). Notably, Kuwait is the weakest in terms of disclosure since only 6 out of the 33 Kuwaiti firms covered by the study are classified as disclosing firms.

Regarding the extent of CCD disclosure, the results indicate that the mean disclosure score of sampled firms is approximately 2.82. Even though Qatari firms are considered to be first in terms of engagement in CCD, further examination of the scope of disclosure reveals that the disclosure extent of firms in the United Arab Emirates is unequivocally superior, with a mean of 8.20. Consistent with the results of disclosure engagement, Kuwaiti firms also exhibit a narrower extent of disclosure with a mean of 0.27.

Table (4.1): CCD Geographical Breakdown

Country	Number of firms	Number of disclosing firms	% of disclosing firms	Mean disclosure score
Bahrain	6	3	50%	3.00
Kuwait	33	6	18%	0.27
Oman	24	13	54%	1.67
Qatar	12	7	58%	3.33
Saudi Arabia	102	41	40%	1.99
United Arab Emirates	35	19	54%	8.20
Total sample	212	89	42%	2.82

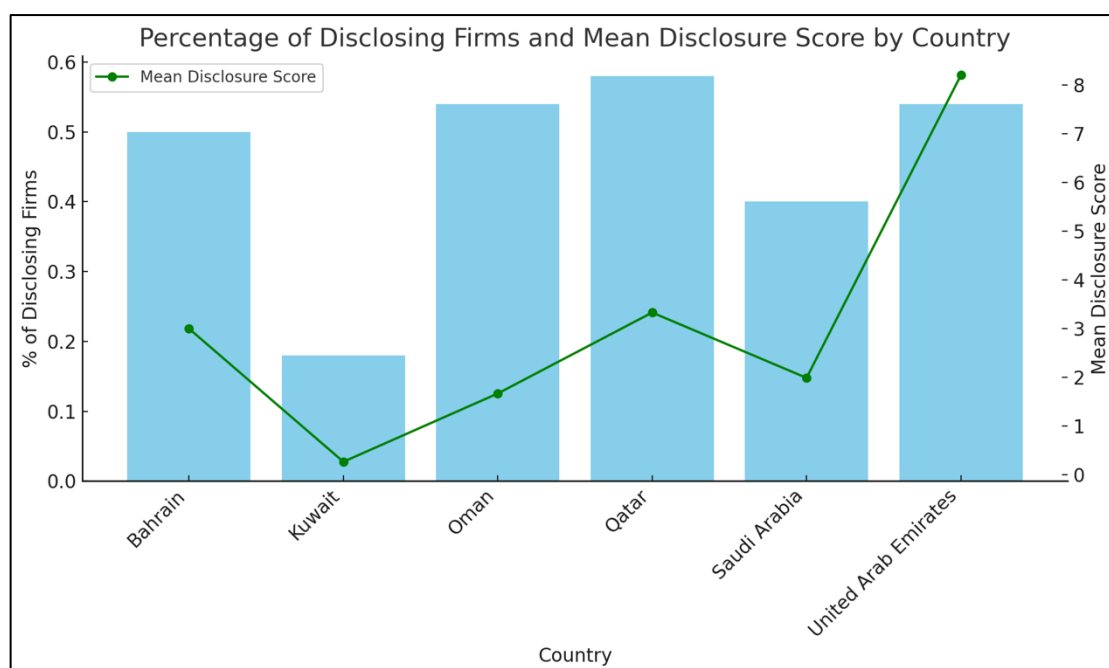


Figure 4.1): Percentage of Disclosing Firms and Mean Disclosure Score by Country

4.2.2 Nature and Extent of CCD

The number of firms disclosing each of the items included in the disclosure index is presented in Table 4.2. The results indicate that firms that voluntarily opt to engage in CCD are more likely to disclose the plans and strategies by which they are to mitigate GHG emissions (80% of disclosing firms). Interestingly, even though the vast majority of disclosing firms appear to be interested in communicating their efforts to reduce carbon emissions, the results of items falling within the category of “Climate change: risks & opportunities” suggest that such firms do not always recognize the significance of climate change and its associated risks and opportunities through disclosure. This is

because while 80% of disclosing firms disclosed their reduction plans, the percentage of firms that provided disclosure concerning the risks and opportunities of climate change ranges between 39% and 42%. It is to be noted that there is a fair percentage of disclosing firms (42%) who do not only communicate their emission reduction plans but are also committed to achieving specific emissions targets within a determined timespan. Also, it might be worth highlighting that around 40% of disclosing firms were committed to reporting the progress they made in terms of emissions reductions as well as costs incurred or savings generated as a result of their adopted GHG mitigation plans. In terms of carbon offsetting programs, the results suggest that firms' engagement in such practices is limited as just 9 firms, representing 10% of disclosing firms and 4% of the entire sample, disclosed their use of carbon offsets to compensate for their GHG emissions.

Furthermore, there is a limited number of firms that actively engage in GHG emissions accounting. Only 33 firms reported their Scope 1 direct GHG emissions, whereas 31 and 15 firms disclosed their Scope 2 and 3 indirect GHG emissions, respectively. Yet, the credibility of such disclosures is open to questioning since only 25 firms described the methods by which GHG emissions are being calculated, and only 7 firms mentioned that their GHG emissions calculations are verified by a reliable third party. Moreover, efforts to report information concerning energy consumption appear to be relatively weak as only 22 firms disclosed their total energy consumption, and 9 firms made an effort to quantify their energy consumption from renewable sources.

In relation to the disclosure concerning carbon emission accountability, it is evident that firms' possession of climate-related certification or climate-related awards is the most frequently disclosed item because it has been disclosed by 77 out of the 89 disclosing firms. Nevertheless, only 26 firms mentioned the relevant corporate-level body responsible for overseeing climate-related concerns.

Table (4.2): Content Analysis: Item Disclosure Absolute and Relative Frequency

Category	Code	Disclosure item	Absolute freq.	Relative (%) of the total sample (n= 212)	Relative (%) of disclosing firms (n= 89)
Climate change: risks & opportunities	CC1	Assessment/description of the risks (regulatory, physical or general) relating to climate change and actions taken or to be taken to manage the risks	35	17%	39%
	CC2	Assessment/description of current (and future) financial implications, business implications and opportunities of climate change	37	17%	42%
GHG emissions accounting	GHG1	Description of the methodology used to calculate GHG emissions (e.g. GHG protocol or ISO)	25	12%	28%
	GHG2	Existence of external verification of quantity of GHG emission– if so by whom and on what basis	7	3%	8%
	GHG3	Total GHG emissions – metric tonnes CO2-e emitted	23	11%	26%
	GHG4a*	Disclosure of Scope 1 direct GHG emissions	33	16%	37%
	GHG4b*	Disclosure of Scope 2 indirect GHG emissions	31	15%	35%
	GHG4c*	Disclosure of Scope 3 indirect GHG emissions	15	7%	17%
	GHG5	Disclosure of GHG emissions by sources (e.g. coal, electricity, etc.)	11	5%	12%
	GHG6	Disclosure of GHG emissions by facility or segment level	11	5%	12%
	GHG7	Comparison of GHG emissions with previous years	31	15%	35%
Energy consumption accounting	EC1	Total energy consumed (e.g. tera-joules or peta-joules)	22	10%	25%
	EC2	Quantification of energy used from renewable sources	9	4%	10%
	EC3	Disclosure by type, facility or segment	13	6%	15%
GHG reduction and cost	RC1	Detail of plans or strategies to reduce GHG emissions	71	33%	80%
	RC2	Specification of GHG emissions reduction target level and target year	37	17%	42%
	RC3	Emissions reductions and associated costs or savings achieved to date as a result of the reduction plan	36	17%	40%
	RC4	Cost of future emissions factored into capital expenditure planning	19	9%	21%
	RC5*	Use of carbon offsets, including the purchase of carbon credits or any other participation in emissions trading schemes	9	4%	10%
Carbon emission accountability	ACC1	Indication of which board committee (or other executive body) has overall responsibility for actions related to climate change	26	12%	29%

ACC2	Description of the mechanism by which the board (or other executive body) reviews the company's progress regarding climate change	19	9%	21%
ACC3*	Mention of certifications or awards relevant to climate change	77	36%	87%

4.2.3 Descriptive Statistics

While the highest attainable disclosure score based on the index used to measure CCD is 22, Table 4.3 indicates that the mean disclosure score is 2.82, suggesting that the extent of voluntary carbon disclosure of carbon-intensive firms in the GCC region is poor. Nevertheless, it might be worth mentioning that the CCD scores of firms included in the sample range between 0 and 21, with a standard deviation of 4.89. The average size of firms measured by the natural logarithm of total assets is around 20.06, with a standard deviation of 1.82. Overall, the age of sampled companies ranges between 2 and 69 years, with a mean of approximately 31 years and a standard deviation of 16.07, implying high variation in the number of years since the establishment of sampled firms. The mean profitability proxied by ROA is around 3%, with a minimum value of -215% and a maximum value of 38.7%. Also, leverage varied greatly across the sample since the minimum value is 0.6% while the highest value is around 1174%. With regard to board independence, the results indicate that, on average, the proportion of independent directors relative to the overall size of the board is around 14%. Furthermore, EPI scores range between 30.7 and 52.4, with a mean of 40.02 and a standard deviation of 6.43.

Table 4.4 presents the descriptive statistics of dichotomous variables, namely GRI adoption and board committees. The results reveal that around 13% of the sampled firms follow GRI Standards to report on their sustainability performance. Finally, only 24 out of the 212 firms possess a board committee devoted to addressing sustainability or environmental concerns.

Table (4.3): Descriptive Statistics of Continuous Variables

Variable	Obs.	Mean	Std. Dev.	Min	Max
CCDscore	212	2.816	4.891	0	21
SIZE	212	20.055	1.824	16.091	27.221
AGE	212	30.906	16.071	2	69
ROA (%)	212	.028	.202	-2.151	.387
LEV (%)	212	.516	.814	.006	11.744
BIND (%)	212	.142	.27	0	1
EPI	212	40.018	6.425	30.7	52.4

Table 4.4): Descriptive Statistics of Dichotomous Variables

Variable	Code	Frequency	%
GRI	1	28	13%
	0	184	87%
BCOM	1	24	11%
	0	188	89%

4.2.4 Correlation and Collinearity Analysis

Table 4.5 presents the correlation matrix of the variables used in the study. According to the matrix, the dependent variable (CCD) is positively correlated with all independent variables except for age. Furthermore, the matrix did not reveal significant multicollinearity among the independent variables. This is because all correlation coefficients fall below 0.8, which is assumed to be the threshold that suggests the existence of multicollinearity. Similarly, Table 4.6 confirms the lack of multicollinearity since all variance inflation factors (VIFs) are below 5.

Table (4.5): Pairwise Correlation Matrix

Variables	CCDscore	SIZE	AGE	ROA	LEV	BIND	BCOM	GRI	EPI
CCDscore	1.000								
SIZE	0.622*	1.000							
AGE	-0.005	0.054	1.000						
ROA	0.081	0.165	0.012	1.000					
LEV	0.134	-0.029	-0.098	-0.310*	1.000				
BIND	0.543*	0.405*	0.077	0.043	-0.051	1.000			
BCOM	0.627*	0.520*	0.020	0.117	-0.031	0.545*	1.000		
GRI	0.686*	0.504*	-0.010	0.104	-0.036	0.590*	0.652*	1.000	
EPI	0.381*	0.140	0.101	-0.115	0.141	0.373*	0.295*	0.383*	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table (4.6): Collinearity Statistics

Variables	VIF	1/VIF
GRI	2.230	0.449
BCOM	2.020	0.496
BIND	1.740	0.573
SIZE	1.520	0.658
EPI	1.310	0.764
ROA	1.160	0.865
LEV	1.150	0.872
AGE	1.040	0.963
Mean VIF	1.520	

4.2.5 Regression Results

A multiple regression model is developed to test the hypotheses of the research. The model has been found to be significant, with an F-statistic of 32.32 and a p-value of

0.00. Also, the model's adjusted R^2 is 0.627, indicating that the model explains around 63% of the variation in the dependent variable (CCD). As per the regression results, H1, H4, & H7 are accepted at the 1% significance level. Accordingly, size (SIZE), leverage (LEV), and GRI adoption (GRI) are found to be significant factors that positively influence CCD. Also, sustainability or environmental committee (BCOM) and EPI scores are perceived to be determinants of CCD that exercise a significant positive impact on the extent of disclosure. Yet, it is worth noting that H6 and H8 are accepted at the 10% significance level only. While H2 states that there is a significant positive relationship between age and CCD, the findings reveal that these two variables are inversely related. Nevertheless, their relationship is not statistically significant. Finally, H3 and H5 are also rejected since the positive relationship between both profitability (ROA) as well as board independence (BIND) and CCD is not statistically significant.

Table (4.7): Linear Regression

CCDscore	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
SIZE	.855	.142	6.03	0	.576	1.135	***
AGE	-.008	.013	-0.63	.528	-.033	.017	
ROA	.822	.645	1.28	.204	-.449	2.093	
LEV	.943	.149	6.31	0	.648	1.238	***
BIND	1.882	1.356	1.39	.167	-.791	4.555	
BCOM	2.603	1.395	1.87	.064	-.148	5.354	*
GRI	4.498	1.395	3.22	.001	1.746	7.249	***
EPI	.086	.051	1.68	.094	-.015	.186	*
Constant	-19.186	3.458	-5.55	0	-26.005	-12.367	***
Mean dependent var		2.816	SD dependent var		4.891		
R-squared		0.641	Number of obs		212		
Adjusted R-square		0.627	F-test		32.320		
Prob > F		0.000					

*** $p < .01$, ** $p < .05$, * $p < .1$

4.3 Discussion

4.3.1 Discussion of Nature and Extent of CCD

Despite the widespread of corporate carbon disclosure across the world, the extent of CCD of GCC carbon-intensive firms remains extremely low as the mean disclosure score of sampled firms is around 2.82 out of 22 (i.e., 13%). It is evident that item ACC3 of the disclosure index, which corresponds to the possession of climate-related certification or other relevant awards, stands out as the most disclosed item. It is assumed that there are two primary facets driving such disclosure, one of which is that

most certifications (e.g., ISO 14001) require entitled firms to establish communication channels with both internal and external stakeholders (Rankin et al., 2011). On the other hand, firms might be incentivized to voluntarily disclose such information because acquiring these awards and certifications is perceived to be a key strategy to obtain legitimacy (Zhang et al., 2020) as they convey a commitment to environmental concerns. Nevertheless, it seems that the credibility of climate-related disclosure is subject to question since only 8% of firms that are engaged in CCD mentioned that they obtained external assurance over their carbon disclosure, especially for information concerning carbon accounting. Accordingly, users of CCD must be prudent while utilizing climate-related information since disclosed information might be subject to bias or error in light of the limited third-party verification.

While disclosure levels are generally low across the region, it is important to underscore that in comparison to other GCC countries, firms in the UAE are showcasing a larger scope of disclosure as their average disclosure score is 8.20, whereas the mean disclosure score of the entire region is 2.82. It is notable that the UAE is also associated with the highest EPI score across the region. In 2022, the UAE obtained an EPI score of 52.4, whereas the region's 2022 average score was around 40, indicating that the UAE's environmental efforts are better than other GCC countries by approximately 31%. It is noteworthy that the high EPI score implies greater efforts and better policies to address environmental concerns. Thus, it appears that UAE's environmental initiatives and climate-driven policies have spurred corporate CCD, supporting the institutional theory, which assumes that the institutional environment plays a vital role in shaping corporate behavior. On the other hand, Kuwaiti-listed firms are clearly ranked lowest in terms of active engagement in CCD. This is because the percentage of listed firms that are found to be engaged in carbon disclosure in Kuwait is 18%, whereas the average country-wise percentage of disclosing firms across the GCC is around 46%. In this regard, further research and investigation might be essential, considering the significant difference in the percentage of listed firms that are classified as disclosing firms in Kuwait and other countries within the region.

4.3.2 Discussion of CCD Determinants

Regarding determinants of CCD, our statistical results provide evidence that supports H1, which assumes a significant positive relationship between size and CCD. While the

statistical significance does not fully explain the positive effect of size on voluntary carbon disclosure, both legitimacy theory and stakeholder theory can be used to interpret the relationship. On the one hand, from the standpoint of the legitimacy theory, the great visibility of large firms along with the immense press pressure act as drivers that motivate large firms to use voluntary disclosure in order to create an image that conveys that the firm is a good corporate citizen (Gonzalez-Gonzalez & Ramírez, 2016). On the other hand, the stakeholder theory assumes that large firms are more likely to voluntarily disclose climate-related information in response to the great scrutiny from their broad range of stakeholders including regulators and investors (De Grosbois & Fennell, 2022).

While some empirical results surrounding the effect of leverage on CCD indicate that debt financing has an inverse impact on CCD (Ben-Amar et al., 2017; Faisal et al., 2018; Tauringana & Chithambo, 2015), our results are consistent with a Saudi-based study that reveals a significant positive relationship between the degree of leverage and voluntary disclosure (Boshnak, 2022). Jensen and Meckling (1976) state that firms that possess a capital structure that is composed of a high proportion of debt tend to voluntarily disclose non-financial information to alleviate agency costs attributable to heavy reliance on debt as a primary source of capital. This is because creditors view voluntary disclosure as a valuable communication channel that provides them with a deeper insight into firms' overall risk, thus contributing to more informed decisions (Leftwich et al., 1981).

Consistent with the findings of Toukabri and Mohamed Youssef (2023), the model provides statistical evidence surrounding the positive effect of the presence of environmental or sustainability committees on CCD. It is argued that committees that are dedicated to sustainability concerns are usually formed to gain or maintain legitimacy through promoting sustainability practices (Yunus et al., 2016). Accordingly, the committees' commitment towards environmental concerns is usually demonstrated via climate-related disclosure (Toukabri & Mohamed Youssef, 2023).

The normative pressure placed on listed firms to follow GRI guidelines for sustainability reporting has also been found to be effective in expanding the scope of carbon disclosure. This can be explained by the existence of two GRI topic standards that provide guidelines for disclosing a wide range of climate-related information,

namely “*GRI 305: Emissions*” and “*GRI 302: Energy*”. While the former standard’s primary focus is emissions reporting (GHG accounting), the latter relates to climate change by holding firms accountable for their energy consumption.

Besides firm-specific determinants of CCD, corporate carbon disclosure is found to be affected by efforts to tackle environmental challenges at the country-level. The results show that the extent of CCD tends to increase when the firm is operating in a country that places high emphasis on environmental concerns. This is consistent with the findings of Caby et al. (2020) whereby they have found that EPI is associated with greater carbon disclosure. It is to be noted that the positive association between EPI and CCD can be explained through the lens of the institutional theory since voluntary carbon disclosure can be viewed as tool that is used by firms to comply with the institutional environment in which they are operating.

It is usually assumed that a high proportion of independent directors who are not affiliated with the management of the company allows the board to objectively perform their oversight duties. Thus, exercise pressure to improve the quality of reporting and increase the extent of voluntary disclosure (García-Meca & Sánchez-Ballesta, 2010). Nevertheless, our regression model does not identify board independence as a significant influencer of CCD. Similarly, the developed regression model rejects H2, which assumes that the age of a company positively influences its carbon disclosure. Finally, H3 concerning the positive impact of ROA on CCD is also rejected. This is consistent with the findings of several studies that reject the existence of a significant relationship between profitability and voluntary disclosure (Bae Choi et al., 2013; Halkos & Skouloudis, 2016; Taurigana & Chithambo, 2015).

4.4 Chapter Summary

Content analysis results indicate that CCD levels are extremely low and suffer from limited external verifications. Hence, there appears to be an urgent need for enhanced carbon disclosure practices across the region. Furthermore, regression results suggest that variables including size, leverage, established sustainability or environmental committee, GRI adoption, and countries’ EPI scores are key factors that increase the scope of corporate CCD.

Chapter Five

Conclusions and Recommendations

5.1 Chapter Introduction

This chapter summarizes the key findings of the study and discusses the research contributions and implications. Also, the chapter provides some practical recommendations based on drawn conclusions besides underscoring the limitations of the study and offering suggestions for future research.

5.2 Conclusions

The importance of the research is driven by the significance of climate change besides the proven effectiveness of CCD in mitigating the problem through encouraging disclosing firms to adopt environmentally cautious behavior (Kim et al., 2022). Hence, the research examines the extent of CCD of carbon-intensive firms in the GCC region and identifies its key determinants. The study is based on a sample of 212 listed firms that operate within sectors that are associated with heavy carbon emissions. An examination of climate-related disclosure of sampled firms unveils a prevailing weakness in the extent of carbon disclosure that is also characterized by limited external verification. Therein lies the importance of a prompt plan that is devoted to elevating CCD in the GCC. Notwithstanding the limited disclosure across the region, it is imperative to highlight that the UAE undoubtedly demonstrates better disclosure compared to its peers. In contrast, the practice of CCD is found to be most concerning in Kuwait, given the limited engagement in carbon disclosure by Kuwaiti listed firms in addition to the extremely low disclosure levels of firms that voluntarily opt to disclose.

The developed multiple regression model provides evidence of the significant influential role of various firm-specific characteristics on CCD. The results provide support for the positive impact of firm size, the proportion of debt, board committees, and GRI adoption on corporate carbon disclosure. Yet, it is worth pointing out that the results fail to confirm the effect of firm age, board independence, and profitability on disclosure levels. In addition to firm-specific variables, EPI is a vital country-level determinant that is found to have a significant positive relationship with CCD, indicating that national landscapes that are characterized by a strong concentration on environmental concerns encourage improved corporate CCD.

Overall, factors including the minimal CCD revealed by the study, the findings of Bazhair et al. (2022) regarding the scant CCD research in the GCC, along with GCC countries' low average EPI score can imply that climate change is not being perceived as a vital issue that warrants serious consideration within the region.

5.3 Research Contributions and Implications

Unlike most CCD research that is centered on developed nations (Bae Choi et al., 2013; Ben-Amar et al., 2017; Hollindale et al., 2019; Karim et al., 2021; Tauringana & Chithambo, 2015; Toukabri & Mohamed Youssef, 2023), this study investigates the matter from the standpoint of emerging countries, specifically within the context of the GCC. Hence, the study acts as a stride in addressing a clear gap in accounting literature, considering the lack of research concerning CCD within the GCC region. The study builds on extant literature not only by assessing the current status of CCD in the GCC and providing empirical evidence of its determinants but also by providing an index that is suitable for GCC countries. While the study uses the index of Bae Choi et al. (2013) to measure the extent of CCD, the index is adapted by incorporating some disclosure items that are meant to enhance the disclosure assessment process, given their relevance to the GCC context. Moreover, in contrast to most prior studies that focus on the disclosure of a single country to identify determinants of carbon disclosure (Bae Choi et al., 2013; Ben-Amar et al., 2017; Darus et al., 2019; Faisal et al., 2018; Hollindale et al., 2019; Karim et al., 2021; Kılıç & Kuzey, 2019b, 2019a; Tauringana & Chithambo, 2015; Toukabri & Mohamed Youssef, 2023), this study is based on the entire GCC region. Studying the matter within the context of the GCC region is crucial due to the economic dependence of GCC countries on extractive activities such as oil and gas drilling, which is perceived to be a significant contributor to climate change. Furthermore, the insight provided by the study regarding the current status of CCD, besides its key drivers, can be used by different parties, including policymakers, to design suitable regulations and standards aimed at improving corporate carbon disclosure and businesses to further enhance their disclosure.

5.4 Recommendations

The research findings underscore a pressing need for improvement in CCD within the GCC region. The understanding gained from the study regarding the scope and influencers of CCD can be utilized by businesses to improve their disclosure practices

and by regulatory bodies to design relevant regulations and guidelines that best fit the GCC context.

As stated in Chapter Two, stock exchanges across the GCC provide reporting guidelines that promote sustainability reporting. Yet, there appears to be a significant discrepancy between these guidelines and firms' actual disclosure. In fact, the findings of the study suggest that such guidelines are rarely followed since CCD is minimal despite climate change being one of the most profound sustainability concerns. While most GCC sustainability reporting guidelines reference the GRI Standards to provide disclosure recommendations, only 13% of sampled firms report in accordance with GRI. It is recommended to build on current efforts aimed at encouraging sustainability reporting by exploring other effective means to incentivize firms to adopt GRI. This will not only contribute to a broader scope of disclosure but also improve the comparability of firms' disclosure across various industries and countries. Also, the lack of external assurance over CCD raises concerns over the credibility and reliability of disclosed information. Thus, firms are advised to utilize the expertise of reliable third parties to verify their CCD in order to boost users' confidence in relevant disclosure.

Furthermore, drawing from the institutional theory supported by the evidence pertaining to the positive effect of countries' EPI scores on CCD, it is deemed important to develop strategies aimed at cultivating an environment that demonstrates ecological awareness at the national level. This is because GCC countries' low average EPI score (40.02 out of 100) elicits concerns about their commitment to environmental issue. Additionally, it appears imperative for regulators to focus on corporate governance elements since the results suggest that strong corporate governance exemplified by the existence of a sustainability committee is a significant factor that is associated with greater disclosure. Accordingly, efforts made by authorities to promote the incorporation of sustainability committees as an integral part of listed firms' governance structure are highly recommended.

5.5 Study Limitations and Suggestion for Future Research

In spite of the insight the research provides regarding the extent and determinants of GCC carbon-intensive firms' CCD, the research remains subject to some limitations including the sole reliance on firms' annual and sustainability reports to measure the

extent of firms' disclosure. It is notable that firms usually utilize various communication channels to disclose climate-related information such as press releases, their websites, and other online platforms. Also, the research findings cannot be generalized to the entire region as it only focuses on carbon-incentive sectors. While such sectors are chosen to be the center of the study due to their significant contribution to climate change, it is believed that future research that study the matter using a broader sample that covers a wider range of sectors can provide valuable empirical evidence pertaining to the effect of sector on carbon disclosure. Furthermore, the timespan of the study is perceived to be critical since the GCC region is assumed to be in a transition phase in light of initiatives and regulatory reforms aimed at mandating sustainability reporting. However, future research can utilize the findings of this research to assess the effect of regulation on disclosure. Additionally, since this study provides a foundational understanding of CCD determinants within the region using variables that cover several dimensions, future studies can focus on studying the effect of certain aspects that are beyond the scope of this research (e.g., committee characteristics) on CCD. Finally, the study adopts a quantitative approach towards identifying determinants of CCD and ignores other qualitative methods. It is assumed that combining empirical results with the findings of other qualitative methods, such as interviews with firms' managers, can reveal other influencing factors that cannot be directly observed and quantified, thus providing a more comprehensive view of the underlying motives of corporate voluntary disclosure.

5.6 Chapter Summary

This chapter summarizes the main findings of the study including the limited extent of CCD of GCC carbon-intensive firms in addition to the identified positive impact of firms' size, leverage, board committees, GRI adoption, and countries' EPI scores on CCD. Also, the chapter makes some recommendations aimed at improving CCD within the region. These include seeking external assurance for CCD, furthering current efforts to encourage GRI adoption, and incorporating sustainability committees into firms' governance structure.

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جامعة البحرين
كلية إدارة الأعمال
قسم المحاسبة

العوامل المحددة للإفصاح الطوعي عن تغير المناخ: دراسة تطبيقية على القطاعات كثيفة الانبعاثات الكربونية في دول مجلس التعاون الخليجي

أطروحة مقدمة كجزء من متطلبات الحصول على درجة الماجستير في المحاسبة

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الخلاصة

تهدف هذه الأطروحة إلى دراسة طبيعة ومدى الإفصاح عن تغيّر المناخ في الشركات العاملة بالقطاعات كثيفة الانبعاثات الكربونية في دول مجلس التعاون الخليجي، وتحديد العوامل الرئيسية المؤثرة في هذا الإفصاح. تستند الدراسة إلى بيانات مقطعية لـ 212 شركة لعام 2022. تم تحليل الإفصاحات المتعلقة بتغير المناخ في التقارير السنوية وتقارير الاستدامة لهذه الشركات باستخدام مؤشر إفصاح مُصمم ليتناسب مع سياق دول مجلس التعاون الخليجي. وتكشف النتائج عن انخفاض مستوى الإفصاح عن تغير المناخ في جميع أنحاء المنطقة، إلى جانب محدودية الضمانات الخارجية المتعلقة بالمعلومات التي يتم الإفصاح عنها.

لتحليل العوامل المؤثرة على الإفصاح، تم استخدام نموذج الانحدار المتعدد لاختبار تأثير المتغيرات التالية: حجم الشركة، عمرها، أرباحها، نسبة الرافعة المالية، نسبة استقلالية مجلس الإدارة، وجود لجان متخصصة في الاستدامة أو البيئة، تبني معايير المبادرة العالمية للتقارير (GRI)، والأداء البيئي للبلدان، على الإفصاح عن تغيّر المناخ.

تشير نتائج الانحدار المتعدد إلى قبول الفرضيات المتعلقة بوجود علاقة إيجابية بين مستوى الإفصاح عن تغير المناخ وكل من: حجم الشركة، مستويات الدين، وتبني معايير المبادرة العالمية للتقارير (GRI) عند مستوى دلالة 1%. كما تم قبول الفرضيات المتعلقة بالتأثير الإيجابي لكل من لجان الاستدامة أو البيئة، ومؤشر الأداء البيئي للبلدان، ولكن عند مستوى دلالة 10% فقط. في المقابل، تم رفض الفرضيات المتعلقة بتأثير كل من: عمر الشركة، أرباحها، واستقلالية مجلس إدارتها على مدى الإفصاح عن تغير المناخ.

تُسهّم هذه الدراسة في إثراء مجال البحث المتعلق بالإفصاح عن تغير المناخ من خلال تقديم أدلة تجريبية حول العوامل المحددة لهذا الإفصاح في دول مجلس التعاون الخليجي، وهي منطقة لم تنل حظاً كافياً من الدراسات السابقة في هذا المجال. وتُعزز الدراسة الفهم المتعلق بطبيعة ومدى الإفصاح عن تغيّر المناخ في المنطقة، مما يساعد المستخدمين على تقييم هذه الإفصاحات بشكل نقدي. علاوة على ذلك، يمكن للجهات التنظيمية الاستفادة من نتائج هذه الدراسة في وضع سياسات وخطط تهدف إلى تعزيز الشفافية والاستدامة في الشركات العاملة في المنطقة.

المصطلحات الرئيسية: تغير المناخ، الإفصاح عن تغير المناخ، الإفصاح الكربوني، الغازات الدفيئة، تقارير الاستدامة.