

**Topic: Assessing the Impact of ESG administration on the
Financial Performance and Climate Risk Mitigation Strategies of
the Oil Industry**

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Abstract

This research aims to assess the impact of ESG the administration on the financial performance and climate risk mitigation strategies of the oil industry. The research has adopted quantitative methodology and taking the data from the secondary sources. The data has been gathered for 50 companies from the last 10 year period spanning from 2014 to 2023. The data has been checked for the presence of endogeneity and then GMM model was applied to evaluate the main findings. It was found that ESG scores are positively and significantly related to ROA. ESG Scores are positively and insignificantly related to ROE. ESG Scores are positively and insignificantly related to EPS. ESG scores are negatively and significantly related to Market Capitalisation. ESG scores are negatively and insignificantly related to climate risk

Keywords: *ESG, Climate Risk, ROA, ROE, EPS, Market Capitalisation*

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Chapter 01: Introduction

1.1. Background

Environmental, Social and Governance (ESG) standards have come to be seen as core drivers influencing the social responsibility of investments and companies. In the oil industry, the necessity of implementation of ESG factors for sustainable development and financial stability cannot be discussed separately from the company's key activity (Ramírez-Orellana et al., 2023). Since the industry plays an important role in the supply of energy resources globally while having numerous challenges in the sphere of environment. The awareness of climate change dangers and the emerging necessity to transition to sustainable business models have made ESG factors relevant to oil companies' financial and sustainability performance (Chen, Kuo and Chen, 2022). The oil industry controls a massive share of greenhouse emissions mainly because they are responsible for a large proportion of the emissions that occur around the world. The International Energy Agency (IEA) reported that the energy sector of the oil and gas industry emitted approximately 34, 929 Million Tons of CO₂ in 2021 (IEA, 2023). This underlines the fact that oil companies have the responsibility to act as leading agents in climate change risks' management and that they should move ahead to embrace sustainability.

ESG practices can assist the oil companies in controlling environmental hazards like oil leakages and emissions and social issues like the employees' strikes or any negative attitude from the public. According to (Galina, 2022), the proper management of these risks contributes to the prevention of major accidents and negative consequences for the company's image that can entail significant losses. For instance, the UK Britain petrochemical firm, BP incurred approximately 65 billion US dollars in managerial mistake of the Deepwater Horizon oil pollution in 2010 which includes clean-up expenses, penalties, and compensations (Whelan et al., 2021). Looking at the trends that are being embraced worldwide today, more investors today are canning to take ESG factors into consideration. The quality of those records may offer better access to capital because firms with better ESG scores are considered to be lower-risk firms. According to Harvard Business School research, it was discovered that sustainable firms perform better in terms of operation and have a low risk of large price reductions (HBS, 2021). This trend is proven by the increase in the amount of investment funds referring to the ESG criteria, according to the Global Sustainable Investment Alliance, the sustainable investment assets are soared to \$35.3 trillion worldwide in 2020, from 1.8 trillion recorded in 2018, being an inflation of 15% (IEA, 2023).

Optimisation of operations is also one of the vital aspects that imply the efficient utilisation of ESG-focused conceptual models. The organisation should, therefore, work at improving the efficiency of energy and the utilisation of resources in the process of manufacturing since this not only avoids harm to the natural environment but also leads to financial savings by the firm (Ali, Salman and Parveen, 2022). For example, ExxonMobil explained to investors that energy efficiency management reduced the firm's expenditure by half a billion dollars a year. Sustainability is also an essential aspect of any market positioning as companies must stick to their ESG initiatives (García-Amate et al., 2023). With increased consumers' consciousness towards sustainable products, firms that show such a policy will benefit from increased brand equity and a strategic position within the product market, and thus higher sales and profitability. A study revealed that 73% of consumers in the world would definitely or likely change their behaviours to minimise the effect on the environment (Cagli, Mandaci and Taşkın, 2023). Based on this background, it becomes necessary to examine multifaceted understanding of the problems and prospects surrounding the implementation of ESG standards in the oil sector which defines the problem statement of this research.

1.2. Problem Statement

The oil industry faced several problems when it comes to the integration of Environmental, Social, and Governance (ESG) criteria. While the consciousness and implementation of ESG continue forming, major barriers remain in regard to ESG principles' incorporation into the operational strategies of oil companies. The challenges problems impact to the environment like oil spills and greenhouse emissions, which are major threats for the companies as well as the environment (Chen, Song and Gao, 2023). Social factors such as community resistance and unionism make the operations to be tough. Moreover, organisations' governing frameworks to sustain ESG undertakings are generally poorly developed or absent. This research seeks to address these issues by assessing the possibility of using ESG strategies in the management of climate risks within the oil-capacity and enhancing sustainable practices. This research proposal will seek to determine the survival rates of oil companies based on ESG performance, and establish the best ways of managing climate risks. As a result, this study endeavours to supply the rational knowledge of concrete advantages and disadvantages of ESG integration with the purpose of supporting oil-oriented firms in the improvement of their sustainability strategies. These challenges are important to be solved for better future competitiveness in the context of meeting sustainability goals and investors' demands.

1.3. Research Aim and Objectives

This research aims to assess the impact of ESG the administration on the financial performance and climate risk mitigation strategies of the oil industry. The objectives of this study involves:

- To examine the impact of financial performance of oil companies including metrics such as Return on Equity (ROE), Return on Assets (ROA), and market valuation on ESG administration
- To investigate and evaluate the ESG-based climate risk management practices within the oil industry in order to outline the promotion of sustainable initiatives, decrease of greenhouse gas emissions, and increase of energy efficiency.

1.4. Research Question

- How does the ESG performance impact the financial performance of oil companies?
- What are the effective climate risk mitigation strategies for the oil industry, and how are they linked to ESG performance?

1.5. Research Rationale

Corporate discourses about the role of Environmental, Social, and Governance (ESG) criteria in firms' strategic management have raised awareness of the opportunities. Those opportunities associated with implementing or improving the use of ESG criteria in a range of industries and settings, including better financial performance and strengthened sustainability (Naeem and Çankaya, 2022). However, this research reveals a significant gap of literature on ESG administration which deals with the consideration of the concept's impact solely on the oil industry. Most of the prior literature has generally discussed ESG effects across different industries or a few key dimensions of ESG criteria without assessing the impacts specific to the oil industry (Ramírez-Orellana et al., 2023; Chen, Song and Gao, 2023; Galina, 2022). For example, some works stress cost saving coming from the enhancement of energy efficiency or branding advantages associated with high levels of ESG, while still others might miss a concrete distinctions of their connection within the scope of oil companies being under important environmental and social pressures. Moreover, in previous studies, these two factors are often examined independently, meaning that both financial performance and climate risk management are examined as different consequences of efficient ESG administration (García-Amate et al., 2023; Chen, Kuo and Chen, 2022; Shah et al., 2022; Shakil, 2021). This research will follow this approach to ensure that it addresses the existing gap of not only analysing the financial merits or demerits of ESG practices in the oil industry, but also examine how these practices can efficiently address climate risks. Therefore, by considering both dimensions this

study, it will provide a completeness of the positive and negative outcomes of ESG integration to the oil sector

1.6. Structure of the Study

Chapter 1: Introduction

This chapter provides an overview of the research topic, including its background, statement of problem, research aim, objectives and research question. It also sets the stage for the study by find out the gap of the study and outline the research rationale regarding ESG administration in the oil industry.

Chapter 2: Literature Review

The literature review will discussed the existing research on ESG performance, financial aspects, and mitigation of climate risk in the oil industry. It further highlights key findings, identify literature gaps, and establish a theoretical framework for the study.

Chapter 3: Research Methodology

This chapter deals with the design of the research including sources of data collection and methods used to analyse them. It also describes the quantitative and qualitative approaches employed to assess the impact of ESG administration on financial performance and climate risk mitigation.

Chapter 4: Data Analysis and Results

This chapter presents the findings from the data collected and provide complete analysis of them. It further include interpretations, statistical analyses and comparisons of ESG performance with financial outcomes and climate risk mitigation strategies in the oil industry.

Chapter 5: Discussion and Conclusion

This is the final chapter of the dissertation which interpret the key findings, discuss their implications for the oil industry, and provide recommendations for practice and policy. It also addresses the limitations of the study and suggest areas for future research. Moreover, this chapter will conclude the study by summarising the key insights and contributions to the research area.

Chapter 2: Literature Review

2.1 Introduction

The chapter provides an insight into the Environmental, Social, and Governance (ESG) criteria that have emerged as an outcome of the widening sustainability role and the ethical approach to assessing organisation performance. Initially, it provides the theoretical framework supporting this research, followed by the meaning and importance of ESG. It further provides the synthesis of the research performed for ESG and its impact on the oil company's financial position. It also details the strategies companies use for limiting climate risk, which are different findings of the scholars. Furthermore, it highlights the research gap before detailing the hypothesis set for this research. The justification for the development of these hypotheses is also provided.

2.2 Theoretical Framework

The theoretical framework that backs this research are stakeholder theory and resource-based view (RBV) theory. Stakeholder theory recognises the various stakeholders who influence the organisation objectives (Freeman et al., 2010). It is suggested by stakeholder theory that use of ESG and its strong performance enables the company to attain the buy-in from the stakeholders (Wang, 2024). In the ESG research, the stakeholder theory is considered a theoretical bridge, which connects and constructs with different influencing factors contributing significantly to the academic realm (Lee and Raschke, 2023; Qiang, Gang, and Dawei, 2023). The scope of research on stakeholder theory has really evolved, shedding light on a broader theoretical approach that governs ESG and corporate performance. The stakeholder theory acknowledges different individuals who shape organisational goals and these include the customers, employees, shareholders, the suppliers, society, and the government (Freeman et al., 2010). The theory argues that a firm should create value for all stakeholders, not just shareholders. This implies that high ESG performance will engender stakeholders' support (Wang, 2024). At present, several scholars have already demonstrated the influence of ESG on the corporate performance from the perspective of stakeholder value, in which they reached the conclusion that ESG performance contributes to improving corporate performance (Wang 2024). However, the difference in the dynamics, approach and focus, necessitates investigating the impact of ESG and Climate risk mitigation strategies on corporate performance of the oil sector. It also can be concluded that business executives as well as potential investors consider ESG on a regular basis when making decisions regarding their operations and decisions that are strategic. Based on these factors the demand for transparency

in disclosures is trending especially on principles of sustainability and corporate social responsibilities (Lee and Raschke, 2023; Qiang, Gang, and Dawei, 2023). The focus of perception with regard to the impact of ESG aspects on the accountability of the companies is different from different stakeholders' perspective. Therefore, analysis of practices for ESG and its reporting would provide further insights for the value creations in long term for the stakeholders. The ESG performance indicators can have a major effect on the competitive success and financials; therefore, it means there are better decisions. Therefore one could infer that sustainability offers a platform from which stakeholders' value creation is to be achieved through the engagement of ESG.

Unlike earlier studies, for example, Sharma et al. (2019) argued that the external environment is the critical determinant of the performance of the industrial organisation. This is in line with the resource-based theory, which builds a view that the organisation's internal competencies and capabilities determine a firm's performance. Internal resources and capabilities of the firm can be improved to gain an advantage over the competitors (Gaya and Struwig, 2016). The resources of firms are valuable when these resources provide the firm with a competitive advantage, which can be exploited in the firm's environment (Barney, 1991). Resources cannot be considered in isolation from the external environment of marketing.

Another theory that is found to back this research up is resource-based value (RBV). It is said that a firm that invests in its environmental, social, and governance policy must also build its reputation (Lubis, 2022). A firm's good reputation will attract informed customer purchase decisions and increase shareholder value. As a result, ESG scores can be seen as a measure of companies' intangible resources, such as respect and reputation in consumers' and other stakeholders' minds. They reveal the environmental, social and governing policies. Consequently, ESG is a term that is often used for environmental, social and governance matters that may adversely affect firms' performance and value creation. Thus, ESG is used by lenders and investors to maximise the economic value of corporations along with financial indicators. (Nielsen and Noergaard, 2011). Thus, ESG relates to factors investors, lenders and other sources of capital used to evaluate the firm's p ethical and sustainable practices: environmental (how a company deals with environmental protection), social (connection of a company with the stakeholders' management) and governance. In the oil industry, implementing ESG strategies leverages these internal resources to enhance financial performance and mitigate climate risks. Investing in clean technologies and robust environmental management systems can reduce costs and regulatory risks. Strong health and safety protocols and community engagement foster a motivated workforce and positive local

relations, reducing social risks and enhancing reputation. These ESG-driven internal capabilities not only improve operational efficiency but also attract sustainable investments, thereby bolstering long-term financial stability.

2.3 Environmental, Social, and Governance (ESG)

Environmental, Social, and Governance (ESG) is a framework used to examine the ethics and sustainability aspects of the organisation and first appeared in the 2004 report, “Who Cares Wins,” prepared by the United Nations (Chen, Song, and Gao, 2023; Nirino et al., 2021; Martha and Khomsiyah, 2023). According to Chen, Kuo, and Chen (2022), human rights, labour norms, and community participation are examined concerning the social side of the company's influence on workers, communities, and stakeholders. Corporate governance includes executive remuneration, audits, internal controls, and shareholder rights. Moreover, Zhou, Liu and Luo (2022) further iterated that the oil industry is under pressure to meet strict ESG criteria due to its worldwide energy supply and environmental impact. Environmentally conscious consumers demand greater responsibility, investors are shifting their funds to companies with strong sustainability records, and regulatory bodies worldwide are tightening environmental and corporate governance requirements. Lastly, these forces have forced oil corporations to rethink their operational, strategic, and financial practices to meet ESG standards.

Additionally, there are uncertainties about ESG that force management to be sceptical (Pucker and King, 2022). The Security Exchange Commission (SEC) currently does not require firms to disclose ESG matters or impose financial punishments if firms do not. Firms that have chosen to report ESG information do so voluntarily. Lam (2023) reports that a survey among American corporate issuers, conducted by the sustainability-focused non-profit Ceres and the Climate Management and Accounting Platform 2 Company Persefoni, revealed that these companies spend an average of \$677,000 annually on climate-related disclosure activities (as cited in Lam, 2023). Approximately 39 corporate issuers across different sectors spent these funds on green initiatives such as climate scenario analysis, and internal climate risk management controls. Although disclosing ESG-related information can be costly, many firms are willing to spend more to report additional information related to their corporate standing based on their ecological footprint.

2.4 ESG and Financial Performance

There is a growing amount of research that shows that strong application of ESG standards is linked to higher financial gains. This link is mostly because of better risk

management and investment trust, which are very important in a field that is naturally full of political and environmental dangers (Daugaard and Ding, 2022). Moreover, Park and Jang (2021) further highlighted that ESG factors affect the oil industry's financial success and this is because the oil industry has always been criticised for environmental issues. For instance, Yu and Van Luu (2021) looked at data from over 2,000 real-world studies and found that companies with high ESG scores often do better financially. This is mostly because they are more efficient and people believe them more. Additionally, in the oil industry, companies like BP and Shell that have worked hard to improve their ESG frameworks have said that they are not only more resistant to changes in the market but also better able to attract investment than companies with lower ESG scores (Chouaibi et al., 2021). As a result, these companies show that effective ESG policies can give a competitive edge by making the business environment more profitable through sustainable practices and efficient operations. However, another paper from an Australian researcher Renard Siew (2018) found that a weak positive relationship between ESG score and financial performance suggests that ESG might not be sufficient to outright prove its effectiveness in predicting companies' financial performance. Chowdhury, Choim Ennis and Chung (2018) examine the corporate social responsibilities (CSR) activities of oil and gas companies listed on the S&P and TSX Capped Energy Index. They find that CSR is a value-enhancing initiative for oil and gas companies; socially sustainable activities are critical value drivers for oil and gas companies; and both environmentally and economically sustainable CSR activities are not value-destructive for oil and gas companies. Their findings suggest that these companies should not be reluctant in their pursuit of CSR initiatives.

Several theory models can be used to understand how implementing ESG can improve financial success as the idea of stakeholders is especially useful for understanding these results. Egorova, Grishunin and Karminsky (2022) asserted that businesses can do better if they make sure their management plans meet the wants and demands of many people, such as investors, workers, customers, and the areas where they do business. Similarly, in the oil industry, this means that companies that actively address shareholder worries about governance ethics, social duty, and environmental effect are more likely to lower the risks of government fines, damage to their image, and inefficient operations (Raghavan, 2022). According to Serafeim and Yoon (2022) the resource-based view (RBV) also backs up the idea that ESG practices can give companies intangible assets like brand image and employee happiness, which are very important for getting a competitive edge. Moreover, high ESG standards help oil companies hire and keep good employees, encourage new ideas for better technologies, and keep their

operating licences from government agencies therefore, in last, all of these things help the companies' long-term financial performance.

In contrary, Zumente and Lāce (2021) highlighted a good link between ESG and financial success, some studies show different results and further show the difficulties and possible negative effects of following ESG practices. Similarly, Zumente and Bistrova (2021) also highlighted that the high costs of meeting and keeping up with high ESG standards can cut into actual profits. Nirino et al. (2021) shared an example that transferring to cleaner technologies takes big expenses up front that might not pay off right away. Moreover, a study from the Carbon Tracker Initiative says that while there are clear long-term benefits, businesses may not see any short-term cash benefits because they have to pay a lot to comply with new rules and change how they do business (Chen, Kuo and Chen, 2022). Furthermore, the effectiveness and effect of ESG spending on financial results can be very different in different areas and with different rules. As such, Zhou, Liu and Luo (2022) claim that the financial effects of ESG compliance is not as strong in countries where the regulatory system is not as rigorous. This implies that the regulatory framework in a given area is very important for ESG practices and their impact on financial performance. On the other hand, ESG practices in oil industry are beneficial for the financial performance by minimising risks and better engagement with the stakeholders (Daugaard and Ding, 2022).

Yoon, Lee, and Byun (2018) provides examples of how ESG investment plays an important role in the markets of Asian countries. Focusing on corporate social responsibility in promoting market value, the results confirmed that CSR practices positively and significantly affect a firm's market. Surprisingly for environmentally sensitive companies, the value-creating effect of CSR is lesser than firms that do not belong to environmentally sensitive industries.

2.5 Relationship between ESG and Climate Risk Mitigation

The incorporation of ESG principles is fundamentally transforming the oil industry, especially through the use of technology and environmental stewardship. Yu and Van Luu (2021) explains that the adoption of clean ESG principles has driven the large oil companies to change their strategies from environment unfriendly fossil fuel exploration and processing for the sake of maintain profitability. For instance, Chouaibi et al. (2021) describe the introduction of new technologies, such as digital oilfield operations and high-efficiency flare systems, that facilitate the reduction of greenhouse gases, increase the efficiency of resources used, and reduce waste and impact on the environment. One of the leading industry advocates for the

environment is Royal Dutch Shell, which in its Canadian operations proceed to capture CO₂ emissions directly from their manufacturing processes with the help of Carbon Capture and Storage methods. For example, BP has put efforts in reducing methane emissions through equipment upgrades and technology development for leak detection (Zumente and Bistrova 2021). Zumente and Lāce (2021) has mentioned that oil companies are now investing in wind and solar owing to the need to attain their ESG targets while addressing the financial expectations of investors and other stakeholders who are focused on ESG.

2.6 Strategies for Climate Risk Mitigation in the Oil Industry

The actual financial consequences of these operations may not be the same, particularly in the short term and in places that comply with different rules. This complexity level makes adaptation even more important to the different business and regional realities faced by oil companies (Park and Jang, 2021). The ESG (Environmental, Social and Governance) is redefining how the oil industry operate in a huge way, mostly through the use of better technologies and good environmental management. Yu and Van Luu (2021) seems to indicate that clean ESG principles have prompted the large oil companies to have to change the way they extract and process fossil fuels without a doubt negatively impacting the environment and their own profitability. For instance, an article published in Journal of Cleaner Production demonstrates the use of new technologies like digital oilfield operations and high-efficiency flare systems (Chouaibi et al. , 2021). These technologies help to reduce the emissions of greenhouse gases as well as efficient use of resources, which in turn, leads to diminished trash and less harm to the environment. As a result, Royal Dutch Shell is one of the well-known environmental advocates. The Canadian operations of the company have deployed CCS methods to directly capture CO₂ emitted from their manufacturing processes. BP has also achieved tremendous progress in lowering methane discharge by upgrading the equipment and developing tools for locate the leaks (Zumente and Bistrova, 2021).

According to Zumente and Lāce (2021) Oil corporations are prioritising climate risk adaption in their business strategies and therefore, many are adding wind and solar energy to their oil and gas portfolios due to their ESG commitments. This change reduces fossil fuel consumption's climate effect and meets ESG-focused investors' and stakeholders' financial demands. ExxonMobil and Chevron employ internal carbon pricing systems to incorporate climate risk into their financial planning and investment choices, facilitating this strategic transformation (Serafeim and Yoon, 2022). These internal pricing techniques tax carbon emissions, integrating climate risk into strategic decision-making and encouraging investments

in emission-reducing technology. Raghavan (2022) asserted that emissions limitations and market-based incentives for greenhouse gas reduction are provided by regulations like the EU's ETS. Such regulatory policy mechanisms demand corporations to either improve their production efficiency or buy emission rights from cleaner filers to reach emission limits. Moreover, Egorova et al. (2022) repeated that market mechanisms, including green bonds and liquid investment assets, help to drive oil companies to embrace stronger ESG standards. Investors are gearing towards companies with strong environmental and social governance that they hope would deal well with future risks and regulations. Conversely, these standards of ESG have created a business environment with better environmental management and frequent adoption of technology in the oil business. Companies will carry out strategic changes as well as regulatory and market forces while noting these adjustments. However, these ESG-driven transformations are supposed to shift the industry's course toward sustainability and climate risk management as it develops in the future (Chouaibi et al., 2021).

This literature review brings together academic research and shows the impact of the oil sector's financial performance on Environmental, Social and Governance (ESG) practices and climate risks. The review delves into the research that links better ESG performance with financial outcomes, works out the theoretical framework that supports these findings, and discusses the opposing views that address the issues and barriers that may complicate ESG implementation. Also, it reviews the ways ESG agreements influence policies, such as a shift from technologically inefficient equipment to technologically advanced tools and the dispatching of strategic moves like investing in renewable energy or carbon capture and storage. This review will, moreover, provide a more detailed view of the ESG strategies and their impact on the oil industry, and so, in the end, it will help the decision-making process of the policymakers, investors, and top management staff to take in both sustainable and profitable decisions.

2.7 Hypothesis Development

Research indicates a positive correlation between ESG performance and financial outcomes in the oil industry. Similarly, Chouaibi et al. (2021) observed that firms like BP and Shell, which prioritise ESG, are more resilient to market fluctuations and attract more investment. However, Siew (2018) reported only a weak positive relationship, suggesting that further empirical testing is needed. These mixed findings highlight the necessity to test this hypothesis to clarify the strength and nature of the ESG-financial performance link. Also, according to "ESG and Stock Performance In the Oil and Gas Industry" (Arseni 2020) there is

no significant relationship between stock return and ESG scores. Other research by professors Peter Oti and Mbu-Ogar Geraldine suggests that disclosing environmental information has a significant positive effect on a firm's financial performance. Although these two studies are on the same topic, their results contradict one another.

H1: There is a positive correlation between the level of ESG performance and the financial performance of oil companies.

Research shows that companies with high ESG scores improve their effectiveness in combating climate change when it comes to the oil sector (Chouaibi et al, 2021; Zhou, Liu and Luo, 2022). In the recent years, large companies such as BP and Shell with firm ESG frameworks have implemented technologies like carbon capture and methane leak detection, and this has reduced their environmental impact significantly (Chouaibi et al, 2021). Moreover, the companies possibly in ESG criteria also tend to have a high degree of compliance with existing regulations as well as innovative sustainability strategies (Zhou, Liu and Luo, 2022). As Serafeim and Yoon (2022) correctly mention, the empowerment of internal carbon tax helps in the effective management of climate risk. The results obviously indicate a positive correlation between a good ESG score and better mitigation of the climate risk. Hence, it is necessary to put this relationship in a rigorous test, to materialise these results.

H2: Oil companies with higher ESG scores demonstrate more effective climate risk mitigation strategies than companies with lower ESG scores.

2.8 Research Gap

Although a large body of work looks into the ESG standards and their respective effect on the financial performance and risk mitigation of climate change, several research gaps need to be filled. In the first place, there is disagreement on the economic benefits of ESG investments, notably in the oil industry, as some studies have shown a strong positive correlation between ESG performance and financial success (Yu and Van Luu, 2021; Chouaibi et al., 2021), while others' result shows only a weak or vague relationship (Siew, 2018; Nirino et al., 2021). This inconsistency shows the reason for a more segmented and adequately sector-specific analysis that considers the diverse management issues and their regulatory environment. Also, most research focuses on big, popular oil companies like BP and Shell (Chouaibi et al., 2021). Therefore, smaller companies get badly neglected. The various-sized companies may have different capacities and strategies for implementing ESGs; such differences can influence their financial and environmental performances differently.

Eliminating this gap demands more in-depth research involving groups of oil companies of different structures and sizes.

The other significant gap is the uncertainty of regions in practice where ESG recorded effectivity. Some researches demonstrate that the total financial benefit that arises from ESG compliance may be higher due to the strict regulatory conditions (Zhou, Liu and Luo, 2022). However, others prove that the compliance cost in low-regulated regions can be more than the financial benefits (Chen, Kuo and Chen, 2022). On this account, research studies that elucidate how differing regional regulations affect the economic balance of the set-up in the spectrum of ESG as far as the oil industry is concerned are needed. Moreover, the current research mostly disregards the fact that this phenomenon can lead to substantial increases or decreases in this investment's long-term and short-term profits. Although a large body of research examines these short-term effects, there is a lack of knowledge about how they later affect one's long-term financial stability and resilience. Analysing the longitudinal effects of ESG investment well is an important part of a full picture of ESG investment benefits and limitations provision. Finally, the integration of cutting-edge technologies like digital oilfield operations (transmission installed in a short time on large distances, with high data processing capabilities) and carbon capture and storage (CCS) (Chouaibi and Bekir, 2021) (injection of huge carbon dioxide into deep geological formations and networks) in the green scheme is the emerging area which also These technologies while promising, have not been some breakthrough in terms of their implementation and effectiveness, particularly among oil companies operating in different oil fields. Some induced conditions, such as understanding that technologies are changing and their application, can be a door opening to showing the directions towards which sustainable business and environmental practices in the oil industry should move.

2.9 Chapter Summary

This chapter provided a comprehensive literature review on the role of ESG standards in the oil industry. It began by defining ESG and discussing its importance in promoting sustainable and ethical business practices. The review highlighted the significant ecological footprint of the oil sector and the increasing pressure on oil companies to adhere to stringent ESG criteria to mitigate environmental impact and enhance social and corporate governance. The chapter then explored the relationship between ESG performance and financial outcomes. Moreover, the areas that require further research have been highlighted and they include: stronger sectoral, focus, analyses for small firms, inter regional/areas analysis, short term/long

term effects of ESG practices, and effects of technological advancement. The above gaps can give a better understanding of implementation of ESG in the oil industry when filled.

Chapter 3: Empirical Design

3.1 Introduction

This chapter outlines the approach that has been used in answering the research questions formulated in this study, which is to analyse the effect of ESG on the performance of oil companies. It also seeks to look at efforts being taken by the companies under climate risk and its effect on the performance of the oil firms. The chapter contains information on how the research is designed, the nature and description of variables use in the study and the limitation of the study. It details the reasons for the selection of a particular method while providing evidence why it was preferred. Along with it, the chapter further details the limitations and ethical considerations.

3.2 Research Design

The research design is a structured framework that is made up of various research methodologies and techniques a researcher intends to use for addressing the research problem effectively (Creswell, 2014). For this study, a quantitative research design is preferred. Quantitative research design includes the systematic, empirical investigation of observable phenomena through statistical, mathematical, or computational techniques (Bryman, 2016). Although it is useful, it has weaknesses such as ignoring qualitative contexts and being data intensive which may not always be possible (Creswell, 2014). When considering the various reasons to select this specific approach, several important points stand out. Particularly, the focus of the research is directed to the role of such factors as ESG elements to take advantage of and the nature of climate risk management strategies in enhancing the operating performance of the oil industry which necessarily involves data analysis. Quantitative methods enable to gather and examine data in numbers from which conclusions can be drawn about the correlations between variables with full precision and accuracy (Kumar, 2018). This is the key in identifying the correlation or causality relationships between the ESG tendencies, climate initiatives, and the performance of firms.

Furthermore, quantitative research is based on the usage of different statistical methods to test hypotheses and verify the validity of results, which improves the transparency and trustworthiness of the findings (Creswell and Creswell, 2017). With such rigorous scientific method that the study adheres to, the results are likely to stand on a high, solid ground and give the conclusions from the study credibility.

3.3 Variable Description

3.3.1 ESG Performance Data:

The ESG performance scores were obtained from relevant and reliable sources including Bloomberg ESG Data services that offer a complete data series of ESG indicators related to oil companies. This indicator system helps assess multiple factors of the company's performance such environmental, social and climate change. Furthermore, data of ESG can come from company's annual reports which offer a deep insight into the extent of sustainability efforts by the company and their governance model. The ESG scores are the sum of occupation-based algorithms including greenhouse gas emissions, waste management, labor practices, community engagement, and board diversification, among others. Thus, the combination of all these develops a broad- approach that eventually helps to analyse a company's overall ESG performance in a comprehensive manner. It is vital for the evaluation of a company's sustainability and a business' ethical existence.

3.3.2 Financial Performance Data:

Financial performance is based on a number of critical parameters that provide a financial analysis of the overall real estate such as Return on Equity (ROE), Return on Assets (ROA), Earnings per Share (EPS), and market capitalisation. Diluted EPS is widely applied in the financial analysis to determine the company's profitability per share considering all possible dilutions (Core et al., 2002; Khan et al., 2014). Simply, it applies a worst-case view on the earnings per share, thus ensuring that the valuation benchmarks employed by investors are not overly optimistic. The data is gathered from the reputed databases such as Bloomberg Terminal and/or Thomson Reuters Eikon. ROE is a ratio concept that demonstrates the returns that management is making by utilising equity financing compared to shareholders' equity. ROA determines the level of efficiency with which the entity uses its assets to make an income on a net basis. Profits per share that a company allocates to each common stock that is currently available for the shareholders serves as an indication of the company's profitability on a per-share basis. Market capitalisation is the aggregate market worth of a company's shares outstanding, or what its shareholders value. It is considered as a gauge of a company's size and how investors value it. They are all either financial indicators which help understand the financial position of oil companies in terms of ESG efforts or financial issues related to investor loyalty such as financing, efficiency, and liquidity.

$$\text{ROA} = \text{Net Profit} / \text{total assets}$$

$$\text{ROE} = \text{Net Profit} / \text{total equity}$$

3.3.3 Climate Risk Data:

Climate risk evaluation is of utmost significance for oil companies as they possess an enormous risk attributable to climate risk induction. Collaborations with clean energy suppliers through organisations such as the Notre Dame Global Adaptation Index (ND-GAIN) can efficiently evaluate and measure such risks. When plotted on 2 x 2 quadrant chart, ND – GAIN score can help the designers and companies to devise specific interventions to minimise impact of climate change. What has been realised is that this map assists in the definition of zones of high risk and, low coping capability, which are necessary for intervention. On the other hand, areas with the lowest levels of risk but with the highest capability of responding to it are considered as less urgent for intervention. The ND-GAIN score is calculated using the formula: ((the adaptive capacity – the vulnerability coefficient +1) * 50) where adaptive capacity represents the degree to which investments are tailored to the needs of climate change adaptation at a given place, and vulnerability coefficient is the assessment of the potential effects of climate change on a given place. As a result, such information is valuable for assessing the espousal of climate-risks by oil companies and the strategies into control of mitigation of these risks.

$$\text{ND-Gain Score} = (\text{Readiness score} - \text{Vulnerability score} + 1) * 50$$

Incorporating climate risk data into decision-making involves data collection and analysis which obtain climate information and estimate the ND-GAIN scores for the concerned areas. The risk assessment aim at recognising the highest risk indicators and comparing them with the prioritised regions. By implementing strategies through the funds, cooperation and political actions as well as regular evaluation of the impact of those solutions already put into practice should be conducted and changes where necessary made. Additionally, the details given by ND-GAIN scores must prove useful for the oil companies that are trying to devise climate risk management plans. These strategies may include increasing the ability of structures and other fixed investments to resist climate shocks and impacts. Switching to renewable source of energy as a way of minimising the use of fossil fuels and consequently minimising on greenhouse gas emissions. Similarly, interacting with policy makers with a view of being able to support policies and laws that protect climate. According to Creswell (2014), working together with people and different levels of governance as well as with non-governmental organisations in order to introduce proper adaptation strategies. As a result, focusing on technologies that would enhance be exceptional performance in climate change and decrease effects on the climate.

NAME Of the mode	What's the formula	Formula explanation that is dependent variable independent variable	Citation	Reference paper
Regression Panel Mode	$ROE = \beta_0 + ESG\beta_1 + \mu$	<p>Dependent Variable: Return on Equity (ROE)</p> <p>Independent Variable: Environmental, Social, and Governance practices (ESG) measures</p> <p>Control Variables: Firm Size Leverage Growth Opportunities Industry Year R&D Intensity Capital Expenditure Profitability Board Size Ownership Structure</p>	Chen, H. M., Kuo, T. C., & Chen, J. L. (2022)	https://doi.org/10.1016/j.jclpro.2022.134951
Regression Panel Mode	$ROA = \beta_0 + ESG\beta_1 + \mu$	<p>Dependent Variable: Return on Asset (ROA)</p> <p>Independent Variable: Environmental, Social, and Governance practices (ESG) measures</p> <p>Control Variables: Firm Size Leverage Growth Opportunities Industry Year R&D Intensity Capital Expenditure Profitability</p>	Chen, H. M., Kuo, T. C., & Chen, J. L. (2022)	https://doi.org/10.1016/j.jclpro.2022.134951

		Board Size Ownership Structure		
Regression Panel Mode	EPS (Diluted) $= \beta_0$ $+ ESG\beta_1$ $+ \mu$	Dependent Variable: Earnings per Share (Diluted) Independent Variable: Environmental, Social, and Governance practices (ESG) measures Control Variables: Firm Size Leverage Growth Opportunities Industry Year R&D Intensity Capital Expenditure Profitability Board Size Ownership Structure	Chen, H. M., Kuo, T. C., & Chen, J. L. (2022)	https://doi.org/10.1016/j.jclpro.2022.134951
Regression Panel Mode	MarkCap $= \beta_0$ $+ ESG\beta_1$ $+ \mu$	Dependent Variable: Market capitalisation Independent Variable: Environmental, Social, and Governance practices (ESG) measures Control Variables: Firm Size Leverage Growth Opportunities Industry Year R&D Intensity Capital Expenditure Profitability Board Size	Chen, H. M., Kuo, T. C., & Chen, J. L. (2022)	https://doi.org/10.1016/j.jclpro.2022.134951

		Ownership Structure		
Regression Panel Mode	$NDGain = \beta_0 + ESG\beta_1 + \mu$	Dependent Variable: Climate Risk Mitigation Independent Variable: Environmental, Social, and Governance practices (ESG) measures Control Variables: Firm Size Leverage Growth Opportunities Industry Year R&D Intensity Capital Expenditure Profitability Board Size Ownership Structure	Chen, H. M., Kuo, T. C., & Chen, J. L. (2022)	https://doi.org/10.1016/j.jclepro.2022.134951

3.4 Limitations

One of the main challenges of the research is the use of secondary data sources, which could be somewhat outdated or incomplete in reflecting the current ESG practices and financial performance. The consistency and reliability of secondary data may vary considerably, which may affect the credibility of the results. Moreover, the selected ten-year period (2014-2024) may not include the most recent changes in ESG practices, regulatory environments, and market dynamics that have emerged after 2024. The sample consists about 50 companies in the European Union though aiming for the diversity of the companies likely limit the generalisability of the findings. This sample might not be representative of a huge diversity that exists in the global oil industry. The study may also struggle to isolate the outcomes of good ESG practices from other factors that determine performance such as geopolitical events, economic downturns or technological breakthroughs (Kumar, 2018). These restrictions thus imply that the study is intended to give an in-depth analysis, where the findings should be taken with care and examined in the light of the limitations.

3.5 Ethical Considerations

Ethical considerations in this research are extremely important so that the integrity and credibility of results remain intact. One important ethical aspect is the truthful and proper presentation of data. Researchers need to check firmly whether secondary data sources are reliable to ensure the data is not misleading or inaccurate (Kumar, 2018). Transparency of data sources and methodology is the basis of study credibility and enables its reproduction. Regarding this, ensuring the privacy and confidentiality of the companies including financial and ESG data is among the main issues. The researcher must also declare any potential interests that can affect the truthfulness of their findings because not doing so suggests the bias and unreliability. Maintaining an ethical research process includes public trust as well as the overall integrity of academic and business research. Thus, the ethical consequences of research results, especially with respect to the effect on stakeholders and policy recommendations, should be weighed, thus helping with the development of useful outcomes.

Chapter 4: Data Collection and Analysis

4.1. Introduction

This chapter focus on establishing the method for analysing the effects of ESG administration on the financial and climate change risk management of oil firms. While conducting the research, the study only uses secondary data with Bloomberg, Thomson Reuters, and MSCI as the major sources of obtaining the most accurate data on ESG and financial performance of the company. It highlights the sample comprises 50 oil and gas firms in the EU legal jurisdiction that encompasses 2014 to 2024 displaying ten-year comparison to ESG activities. This chapter aims to apply a detailed statistical methods such as panel regression as well as endogeneity tests to enhance the credibility of the results. As a result, it intends to explore how ESG factors influence the performance of firms in the oil industry whereby numerous ESG factors and firms' financial statistics will be evaluated at different regions of the world.

4.2 Data Collection

In this research, secondary data technique has been used to collect information covering ESG factors as well as the effectiveness of strategies of climate risk mitigation impacting performance of oil companies. Secondary data is data gathered because it can be easily accessed from many sources. This method was selected because it is the most effective, and also not very expensive providing a broad spectrum of data, which makes it possible to perform the analysis with the data available (Daniel, Kumar, and Omar, 2018). The principal data sources for this study include This consist of detailed metrics from sources like Bloomberg ESG Data Services for ESG performance and financial databases such as Bloomberg One Platform like Bloomberg Terminal where ROE (Return on Equity), ROA (Return on Assets) and EPS (Earnings per Share) are essential indicators, which are known to have a credible reputation. Financial reporting of oil companies, which is an important data, enables investors and other stakeholders to assess their performance levels metrics like revenue, profit margin, return of assets, and stock performance.

These reports are audited and in some cases at least made public, making a high level of trustworthiness and credibility (Harris and Brown, 2019). Sustainable reports and ESG ratings which are mostly published by the organisations themselves or by well-known rating agencies help to observe how the companies take care about their ESG practices and initiatives. Furthermore, data from databases such as Bloomberg, Thomson Reuters, and MSCI is incorporated for the purpose of acquiring ESG rankings and fund performance statistics. They

are the high-level sources, comprising large sets of data from all company sectors and industries, and, thus, provide investors and security analysts with comparable metrics for conducting precise statistics.

The use of secondary data helps to draw conclusions, which apply to a larger audience increasing the universal validity of the results (Neuman, 2014). Supported by data sources from multiple oil firms, the study can possibly highlight recurring patterns and industry-wide trends. Consequently, it also provides historical context of the subject that allows analysis of developed trends and impacts in a long run (Kumar, 2018). Since this data is already reviewed, it helps to avoid time and resource-consuming process of data collection, as well as focus on the analysis and interpretation.

4.3 Sampling

The sample is composed of 50 oil and gas companies present in European Union. It comprises firms that belong to both major and medium types listed by market capitalisation and operating level. The study is based on a large scale of localisation practices as well as ESG to ensure the overall results depicting the industrial-wide trends.

Data for the study ranges from 2014 to 2024 years. This time frame covers an interval of ten years to illustrate the long-term development and the consequences of ESG approach on financial position. The time period is divided in the oil market being oversupplied, so the corporate performance was solely based on the new regulations (Kumar, 2018). A decade's long data analysis will identify the patterns that reflect the sustained success of ESG initiatives. Hence, the data does not affect the research outcomes by short-term market fluctuations.

Geography, being the main aspect of the research, covers Europe, Asia, North America, and the Middle East. This geographical diversification is especially important as it contributes to the understanding of how various regulatory settings, economic conditions, and weather patterns affect ESG practices and firm functioning. This comparison allows the study to highlight differences and similarities among the varied regions and recognise how those common regional and divergent approaches affect ESG implementation.

By choosing diverse companies and areas of the industry, the study creates results that will be restricted to specific industries, in this case enhancing the generalisability of the results. A selected period in time (short and long impact periods), for the analysis, ensures that the study remains relevant and reflects major changes that occur over the longest period. It is this comprehensive sampling method which is crafted to allow for deeply profound investigation into the effect of ESG productivity on the oil companies' results.

4.4 Data Analysis

To study the linkage between ESG activity and financial performance, regression techniques is used, giving the possibility to control possible causal relationships and the measure of the quantity of the ESG in financial metrics. The study would involve evaluating the panel regression which is the technique used to evaluate the impact between the variables when data taken is panel in nature i.e. considering both time series and cross sections. It involves evaluating first the random effect model and fixed effect model which would then be tested for their suitability using hausman specification test. Further diagnostic and tests would be conducted to check robustness of the model and hence final model will be considered for analysis which include robust outcomes.

Equation 1:

$$ROE = \beta_0 + ESG\beta_1 + \mu$$

Equation 2:

$$ROA = \beta_0 + ESG\beta_1 + \mu$$

Equation 3:

$$EPS \text{ (Diluted)} = \beta_0 + ESG\beta_1 + \mu$$

Equation 4:

$$\text{MarkCap} = \beta_0 + ESG\beta_1 + \mu$$

Equation 5:

$$\text{NDGain} = \beta_0 + ESG\beta_1 + \mu$$

In these equations;

ROE= Return on Equity

ROA = Return on Assets

EPS = Earnings per Share (Diluted)

Mark Cap= Market capitalisation

ESG = ESG framework

ND Gain= Climate Risk Mitigation.

μ = error term

Table 1 Variables

Dependent Variable

Independent Variable

- *Return on Equity (ROE)*
- *Return on Assets (ROA)*
- *Earnings per Share (EPS) (Diluted)*
- *Market Capitalisation*
- *Climate Risk Mitigation*

- Environmental, Social, and Governance practices (ESG) measures

4.5 Addressing Endogeneity

The two method of endogeneity is an Instrumental Variable (IV) model as well as a Gaussian Mixture Model (GMM) policy. IV model finds out the variables that harmonise with the endogenous variables and independent of the error term and thus is consistent. For example, changes in regulation or the ESG score values of the previous period can be used as instruments. In addition, GMM has the ability to deal with unobserved individual characteristics and endogenous variables by estimating the data as a mixture of several distributions of the Gaussian type, which keeps record of the complex relationships within the data.

4.6 Robustness Check

These tests help in making sure that the results obtained from the regression test are valid and reliable. This can be achieved by conducting:

Sensitivity analysis: Checking the model robustness against different model assumptions.

- **Subsample analysis:** Interpreting the outcomes of the related sub-samples (for example, according to the industry or location).
- **Alternative measures:** Where one or more of the variables has been measured, using different proxies for the same variable.
- **Heteroscedasticity tests:** That is imposes conditions on qualifying that error terms are consistently distributed.
- **Multicollinearity tests:** Examining for presence of multicollinearity in the independent variables.
- They assist in confirming that the conclusions arrived at are not as a result of any given expectations or skewed data.

4.7 Performing Regression Tests and Presenting Results

To perform the necessary regression tests, this research has adopted:

- **Estimate Models:** Run panel data regression models for each dependent variable using the specified control variables.

- Endogeneity Tests: Apply Hausman tests to detect endogeneity and use IV or GMM if necessary.
- Robustness Checks: Perform sensitivity analysis, subsample analysis, alternative measures, heteroscedasticity, and multicollinearity tests.

Chapter 04: Results and Analysis

4.1 Introduction

The chapter presents the findings of the research related to the impact of ESG practices on the financial performance and climate risk management within the oil industry. This chapter involves an evaluation of the collected data to explain the impact of ESG practices on financial performance and the industry's approach towards managing climate risks. The results are arranged in such a way to respond to the main questions of the research and hypotheses stated in the previous chapters. Furthermore, this chapter enlarges on the description of the obtained data and explains descriptive statistics of the study variables, with reference to the ESG scores, financial performance measures and climate risks. Subsequently, in this study, the correlation analysis is carried out to examine the existing relationship between ESG performance and probably the financial performance which may include Return on Equity (ROE), Return on Assets (ROA) or Earnings per Share (EPS).

Similarly, the results from regression analysis is presented to identify the strength and significance of the relationships between ESG administration and financial performance, as well as the effectiveness of climate risk mitigation strategies. Additionally, the regional and company site variations to understand the broader applicability of the study's main findings. This chapter further interprets the results in the context of existing literature, highlighting any deviations or confirmations of prior research, and discussing the implications for stakeholders in the oil industry. As a result, this comprehensive analysis aims to provide a clear understanding of how ESG practices can drive both financial success and environmental responsibility in the oil sector.

4.2 Descriptives

Table 2 Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
ESG	500	29.66	12.19	-8.99	56.7
Climate Risk	500	2.14	2.39	-3.19	21.79
ROA	500	5.40	11.38	-23.47	194.35
ROE	500	9.85	19.99	-144.54	123.2
EPS	500	4.87	12.15	-32.81	194.35
Market Capitalisation	500	2.00	3.58	-6.45	28.45
Leverage	500	1.93	1.19	0.15	8.66
Firm Age	500	48.24	30.25	15	117
Firm Size	500	12.10	0.86	0.95	14.73
Sales Growth Rate	500	0.24	-1.25	3.38	4.10

Table 1 indicates the descriptive statistics of the variables of the study. The mean of the ESG score is 29.6, with a standard deviation of 12.19. This shows that the overall ESG score of the organisation is approximately 30, and therefore, the variance of ESG scores appears to be of a moderate value which means that companies' scores vary to a moderate degree. Moreover, the climate risk mean score is 2.14 with an SD of 2.39. The changes in mean deviation shows that climate risk has significantly differs in various oil companies around the world and therefore, the margin of values from -3.19 to 21.79 also highlights an existing difference in the management of climate risk. The mean ROA is 7.40 with an SD of 11.38. This means that the ROA is highly unpredictable, implying that, while some companies are very efficient and productive, others are not. The average ROE is 9.85% on average. As a result, this high variability shows how the equity is being utilised by the companies and the returns being generated out of it very highly.

By taking into account of increased ESG scores in combination with high volatility of the financial performance indicators (ROA, ROE, and EPS) it has been integrated that the variability of such variables might differ across companies. According to Shakil (2021), some of the firms with high ESG scores could be enjoying moderate to high levels of performance differently. Relatively high standard deviations for ratios of financial performance comparison tools (ROA, ROE, and EPS), as well as the market capitalisation of companies, also give evidence to the fact that financial success or the market value of the companies is not equal in this industry. These indicators as returns and earnings per share can have higher values of

market capitalisation. A higher standard deviations relative to means suggest that there is considerable variation in both ESG scores, and financial performance as well as climate risk management among the analysed companies. Therefore, the effect of ESG practices on financial performance and climate risk management is not universal and it varying its effect from one firm to the other.

Thus, the average of all the 500 observations in terms of leverage is 1.93, which essentially means that, on average, the cross-sectional data for the firms portray them as having nearly double their equity in debt. The SD of 1.19 indicates that values are dispersed evenly around the mean, or in other words slightly above and below it. This means that while many firms have leverage close to the average of 1.93, there is fluctuations some firms has higher leverage ratio than others and some has lower one. Delving deeper into SDs on the moderate level in coverage ratios mean that firms' debt/equity ratios differ, which can be explained by industry standards, financial management styles or operating risks. That is why high leverage might have higher financial risks, and low leverage might be less risky from the financial point of view. The age of the firm's average is 48.24, presumably implying that the sample mainly includes experienced companies. The SD of 30.25 is relatively high, suggesting that within the sample, the ages of the firms vary greatly. Some are relatively youthful while others are considerably older, and this piece of information is crucial for realising the reality of the previously mentioned divergence. Given that SD in firm age was high, it implies that the sample was diverse in regard to the maturity experience of the firms.

Concerning firm size, the mean value is 12.10, however the scale or units on the firm size is not clearly defined. If this is on an arithmetic scale or a simple average then it means that overall firms are big assuming this is on a logarithmic scale or a composite index. The SD of 0.86 is still small; it implies that the spread of the size of firms is small and is closely grouped around the mean. A low SD for the firm size means a high level of homogeneity regarding the size of operations of the firms under analysis within the sample group. This could be advantageous for comparative analysis since the coarseness of size data is eliminated reducing on variability. The mean value of actual multiplication rate or sales growth rate is 0.24, it is illustrated that the average growth rate in sales is positive but little. The SD of 1.25 shows that it is still quite possible to have a relatively high percentage of firms that might be experiencing a rather high or even increasing rate of sales growth or, on the contrary, might experience a sales decline. This means that when the SD of firms' performance is calculated, specifically for sales growth rates, higher values indicate the dynamism of the respective firms. High growth rates may mean the firm is in expanding markets or has some form of competitive

advantage whereas the negative growth means the firm may be facing some challenges or is in a saturated market.

4.3 Correlation

Table 3 Test of Correlation

	ESG	Climate Risk	ROA	ROE	EPS	Market Capitalisation	Leverage	Firm Age	Sales Growth Rate	Firm Size
ESG	1									
Climate Risk	-0.211*	1								
ROA	0.116*	-0.006	1							
ROE	0.012	0.146*	0.454*	1						
EPS	0.068	0.141*	0.118*	0.265*	1					
Market Capitalisation	-0.170*	0.397*	-0.079	-0.004	0.069	1				
Leverage	0.064	0.105*	0.175*	0.223*	0.050	-0.0001	1			
Firm Age	-0.272*	-0.169*	-0.049	0.026	-0.046	0.022	-0.009	1		
Sales Growth Rate	0.002	-0.006	0.009	0.033	0.013	-0.05	0.010	0.061	1	
Firm Size	0.106*	0.042	0.026	0.125*	0.041	-0.002	-0.029	0.166*	0.032	1

The correlation table on ESG scores, climate risk, ROA, ROE, EPS and Market Capitalisation highlights the nature of the relationships between all these variables. The correlation coefficient between climate risk and ESG is -0.2119 showing weak and significant relationship between the variables. Therefore, it is clear that the impact of ESG on ROA, ROE, and EPS variates and therefore their correlation coefficients turned out to be very low at 0.0119, and 0.0677, respectively. Besides that, for market capitalisation as the target variable, a correlation coefficient is negative but insignificant relationship (-0.1707*) which implies that higher ESG scores are possibly linked to less market capitalisation. As a result, by calculating the value of the coefficient of correlation it is revealed that it is very low almost insignificant and negative (- 0.0061).

In contrast to the above, if the climate risk is assumed to increase, using a positive and significant coefficient of 0.1464* it can be hypothesised as increased in ROE can be expected out of increased climate risk. The correlation coefficient between EPS and ESG is weak positive 0.1408*, this suggests that higher climate risk slightly corresponds with higher EPS.

Moreover, the correlation of market capitalisation is moderate and positive 0.3965* which shows that companies with a high level of climate risk have a high level of market capitalisation. In last, the above results demonstrated that there is a relatively higher correlation between climate risk and the firms' Market capitalisation (0.3965*), between ROA and ROE (0.4542*), and similarly, for climate risk and EPS (0.1408*) and climate risk and ROE (0.1464*). Based on the following results, it can be concluded that the findings show weak negative correlations between ESG scores and climate risk and market capitalisation whereas the financial performance indicators have stronger correlations between one another (ROA, ROE and EPS).

The correlation coefficient between ESG and leverage is 0.105, which indicates a weak but significant as well as positive relationship. The correlation coefficient between leverage and ROA is 0.175, presenting a weak but significant positive relationship. This specifies that higher leverage is rather associated with higher returns on assets. The correlation coefficient between leverage and EPS is 0.050, indicating a very weak positive relationship. This shows that leverage has insignificant effect on earnings per share. The correlation coefficient between leverage and market capitalisation is -0.0001, representing an almost non-existent relationship. The correlation coefficient between leverage and ROE is 0.223, indicating a weak to moderate positive relationship. This recommends that as leverage increases, the return on equity tends to increase as well, potentially due to higher financial risk and reward.

The correlation coefficient among firm age and climate risk is -0.169, indicating a weak but significant negative relationship. This proposes that older firms incline to have lower climate risk exposure. This specifies that older firms might have slightly lower returns on assets. The correlation coefficient between firm age and market capitalisation is 0.022, indicating a very weak positive relationship. The correlation coefficient between firm age and ROE is 0.026, defining a very weak positive relationship. This proposes that firm age has a negligible impact on the return on equity. The correlation coefficient among firm age and ROA is -0.049, viewing a very weak negative relationship. The correlation coefficient between firm age and EPS is -0.046, representing a very weak negative relationship. As a result, this advocates that older firms might have slightly lower earnings per share.

The correlation coefficient among firm size and climate risk is 0.042, indicating a very weak positive relationship. This highlights that a larger firms might have a slightly higher exposure to climate risk. The correlation coefficient among firm size and ROE is 0.125, showing a weak but significant positive relationship. The correlation coefficient between firm size and EPS is 0.041, indicating a very weak positive relationship. The correlation coefficient

between firm size and ROA is 0.026, indicating a very weak positive relationship. This suggested that larger firms have a negligible impact on their return on assets. This suggests that larger firms have a negligible impact on their earnings per share. The correlation coefficient between firm size and market capitalisation is -0.002, indicating an almost non-existent relationship.

4.4 Test for Endogeneity

Table 4 Test for Endogeneity

Model	Model 1: ROA	Model 2: ROE	Model 3: EPS	Model 4:	
				Market Capitalisation	Model 5: Climate Risk
Durbin	5.414 (p = 0.02)	5.551 (p = 0.018)	0.135 (p = 0.71)	6.616 (p = 0.01)	3.391 (p = 0.06)
Wu-Hausman	5.395 (p = 0.02)	5.532 (p = 0.019)	0.133 (p = 0.71)	6.610 (p = 0.01)	3.363 (p = 0.06)

The null hypothesis in these tests is always that the model is exogenous; the alternative hypothesis on the other hand is that the model is endogenous. As can be deduced from the above results, the p-values for both the Durbin and Wu-Hausman tests are below 0.05, it can reject the null hypothesis. This means that we have endogeneity in Model 1 (ROA). For Model 2 (ROE), as in Model 1 (current ratio), the calculated p-values for both the test are less than 0.05. For that reason, we fail to support the null hypothesis, stating that there is endogeneity in Model 2. In Model 3 (EPS), the calculated p-values for both the tests are greater than 0.05. Therefore, due to the removal of all endogenous variables, we do not reject the null hypothesis in Model 3. In case of Model 4 (Market Capitalisation), the p-value of both tests is less than 0.05. Therefore, our quasi-SLS estimates also suggest that we should reject the null hypothesis, meaning that we have found a case of endogeneity in Model 4. As in the previous model (Model 4), the p-values for both tests in Model 5 (Climate Risk) are slightly bigger than 0.05. In conclusion, there is no sufficient evidence to support the nullity of the hypothesis thus the null hypothesis cannot be rejected for Model 5.

4.5 GMM Estimate

Table 5 GMM Estimate

Model	Model 1: ROA	Model 2: ROE	Model 3: EPS	Model 4: Market Capitalisation	Model 5: Climate Risk
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First Lag					
ESG	0.0921	-0.0282	0.0549	-0.0628	-0.0618
Leverage	1.6792	3.8946	0.3955	-0.0316	0.1916
Firm Age	-0.0111	-0.0036	-0.0180	-0.0048	-0.0225
Sales Growth Rate	0.2786	0.5068	0.2556	-0.1933	-0.0085
Firm Size	0.2511	3.1570	0.6140	0.0771	0.3513
AR(1) in first differences:	-1.38	-1.63	-1.55	-1.82	-1.08
AR(2) in first differences:	-1.10	-2.49	-1.30	1.38	1.00
Hansen Test of Over identifying Restrictions	chi2(93) = 46.96	chi2(92) = 45.48	chi2(93) = 46.50	chi2(93) = 48.78	chi2(85) = 49.13

For model 1, ESG scores are positively and significantly related to ROA and the leverage is positively and significantly related to ROA. Moreover, the firm age is not significantly related to ROA. Similarly, the sales growth rate is not significantly related to ROA firm size is not significantly related to ROA. Additionally, AR (1) in first differences shows no significant first-order serial correlation in the differenced residuals. AR (2) in first differences shows no significant second-order serial correlation in the differenced residuals, indicating that the instruments used are valid. Moreover, Hansen Test of Over identifying Restrictions indicates the null hypothesis that the instruments are valid cannot be rejected. The instruments are valid as the p-value is very high, indicating no over identification problem.

For model 2, ESG scores are not significantly related to ROE and the leverage is positively and significantly related to ROE. Similarly, the firm age is not significantly related to ROE. In addition, the sales growth rate is not significantly related to ROE as well as the firm size is positively and significantly related to ROE. Moreover, the AR (1) in first differences shows no significant first-order serial correlation in the differenced residuals. However, the AR (2) in first differences shows significant second-order serial correlation in the differenced residuals, indicating some issues with the instruments used. In last, the Hansen Test of Over identifying Restrictions indicates the null hypothesis that the instruments are valid cannot be rejected. The instruments are valid as the p-value is very high, indicating no over identification problem.

For model 3, ESG scores are not significantly related to EPS as well as the leverage is not significantly related to EPS and the firm age is not significantly related to EPS. The sales growth rate is not significantly related to EPS. Firm size is not significantly related to EPS as

well as AR (1) in first differences shows no significant first-order serial correlation in the differenced residuals. AR (2) in first differences shows no significant second-order serial correlation in the differenced residuals, indicating that the instruments used are valid. Moreover, the Hansen Test indicates the null hypothesis that the instruments are valid cannot be rejected. The instruments are valid as the p-value is very high, indicating no over identification problem.

For model 4, ESG scores are negatively and significantly related to Market Capitalisation as well as the leverage is not significantly related to Market Capitalisation. Moreover, the sales growth rate is not significantly related to Market Capitalisation. In addition, the firm size is not significantly related to Market Capitalisation. Similarly, the AR (1) in first differences shows no significant first-order serial correlation in the differenced residuals. However, the AR (2) in first differences shows no significant second-order serial correlation in the differenced residuals, indicating that the instruments used are valid. In last, the Hansen Test indicates the null hypothesis that the instruments are valid cannot be rejected. The instruments are valid as the p-value is very high, indicating no over identification problem.

For model 5, ESG scores are negatively and significantly related to Climate Risk and the leverage is positively and significantly related to Climate Risk. Similarly, the firm age is negatively and significantly related to Climate Risk. Moreover, sales growth rate is not significantly related to Climate Risk as well as the firm size is positively and significantly related to Climate Risk. The AR (1) in first differences shows no significant first-order serial correlation in the differenced residuals. In addition, AR (2) in first differences shows no significant second-order serial correlation in the differenced residuals, indicating that the instruments used are valid. In last, the Hansen Test indicates the null hypothesis that the instruments are valid cannot be rejected. The instruments are valid as the p-value is very high, indicating no over identifications problem.

4.6 Hypothesis Assessment

H1: Superior ESG performance positively impacts the financial outcomes of oil companies.

H1 aims to discuss the correlation between strong ESG scores and financial results specifically in the oil company. Concerning the evaluation criteria, the findings are based on the provided data and present financial performance benchmarks including ROA, ROE, EPS, Market capitalisation, and Climate risk. The regression analysis shows that the ESG performance has a strongly positive impact on the ROA. This implies that organisations with a higher figure of ESG ratings exhibit superior ROI on their assets. The proper management of

ESG issues would mean that organisations get better utilisation of assets, potentially due to better operational methods, fewer negative impacts or losses, and a better image, which would bring in more business and partnerships (Shah et al., 2022). In the case of ROE, the results of the study further indicate that there is a non-significant negative association with ESG scores. This means that there is no conclusive evidence pointing to the fact that ESG practices explain how efficiently equity is being utilised to generate profits in a company. It implies that there is a possibility of other variables driving ROE and the level of ESG practices does not notably affect the returns that businesses make from shareholders' equity (Martto et al., 2023).

A moderate correlation of ESG performance with EPS shows that even though better ESG scores may just enhance the earnings per share to a very low level, they could not significantly influence LPA. This might be because the structures required to be put in place in order to support ESG measures might be costly, therefore, reducing the possible increase in EPS in the short run. Unusually, this analysis reveals a negative correlation between ESG performance and the market capitalisation of the companies (Dye, McKinnon and Van der Byl, 2021). This goes further to imply that the companies or organisations that have higher ESG scores are those that will have lower market valuations. The market may for one reason or the other consider the cost of implementing strict ESG standards to outweigh the benefits, and similarly, this is the fact that the market may be slow in accepting and appreciating superior ESG performance (Chen, Song and Gao, 2023). Analysing the data in terms of correlation, both ESG scores and climate risk are negatively related yet strongly connected. This means that firms with higher ESG performance report less climate risk and hence it can be concluded that good ESG practices relate to improved climate risk management.

H2: Strong ESG practices enhance the investor attractiveness of oil companies.

Regarding H2, this analysis tries to test the understanding that better ESG performance increases investor appeal of oil firms. The factors are Investor Attractiveness based on financial performance indicators like Return on Assets (ROA), Return on Equity (ROE), Earnings per Share (EPS), Market Capitalisation, and Climate Risk Management. This hypothesis discusses the indicators to establish if companies with higher ESG scores are less attractive to investors than other oil firms. The positive relationship of this study established that firms with effective ESG performance exploit their assets to generate better returns (Naeem and Çankaya, 2022). This efficiency and effective asset utilisation are the things that investors look for that define how effectively the firm is attempting to get the most out of its assets. This conclusion can be attributed to the hypothesis that the enhancement of ROA as a result of high ESG practices is suggestive of better asset utilisation and therefore, the firm has greater appeal to its investors.

Therefore, the fact that ESG practices did not have a substantive impact on the ROE means that it cannot be inferred that these practices affect the efficiency with which a firm deploys equity to create profits. This result goes against the hypothesis since ROE appears to be significantly unchanged by ESG performance, therefore, it might be concluded that investor appeal driven by equity returns is not improved by ESG consumption.

H3: Effective ESG administration mitigates physical climate risks in the oil industry.

This hypothesis analyses how good ESG management reduces physical climate risks in the oil sector. Physical climate risks are the direct manifestations of climate change through the effects caused by extreme weather occurrences, increases in sea level and fluctuating temperatures that have the potential to disrupt the business concerning physical assets, and financial positions of the oil companies (Palacios, 2021). It is tested by comparing the firm's climate risk scores with the financial and risk standards such as ROA, ROE, EPS, and MC. This means that the climate risk is lower in companies with higher ESG scores, and thus the conclusion of the negative coefficient is drained. ESG administration should be associated with certain measures to mitigate environmental effects which include sourcing for renewable energy and enhancing energy conversation besides practicing sustainability. This substantiates the hypothesis heavily given that actual and good ESG implies the decrease of physical climate risk.

H4: Transitioning to low-carbon practices through ESG strategies reduces the financial risks for oil companies.

This research analyses the proposition of shifting to low-carbon initiatives environmentally via ESG release financial risks to oil firms. In this hypothesis, the financial risks include aspects like ROA, ROE, EPS, MC, and Climate risks. The next sections disaggregate these indicators to establish if ESG-led low-carbon transition effectively reduces the risks for oil firms. The negative correlation implies that if the low-carbon factor, which relates to a higher ESG score in this case, is embraced more in a firm, climate risks will be lower (Weber, 2023). This is because the implementation of low carbon strategies can avoid the direct consequences of climatic shocks such as intensity and calibre of storms, and compliance costs arising from legislation on carbon emissions. Therefore, the finding supports the hypothesis claiming that the shift to low-carbon practices using ESG strategies minimises the level of climate-related financial risks. The fact that overall, ESG has a pretty strong positive correlation with ROA suggests that the firms that invest in low-carbon activities have a higher rate of making their assets work (Jinga, 2021). This efficiency could originate from energy efficiency, less wastage, and efficient processes, which in the process lower risks about

finance. The outcome explains the hypothesis of this research, as efficient use of assets through ESG operations reduces risk costs.

The low considerable effect on the ROE implies that while ESG strategies release some business risk, they cannot much affect the financial profit derived from equity. That could be because of the up-front costs which are likely to be incurred in the change towards cleaner operation (Galina, 2022). This result denies the hypothesis since the financial risk is not reduced by looking into equity return. The insignificant and positive correlation on EPS implies that while adopting low carbon practices through the strategies of ESG may enhance the earnings capacity the impact is not very enormously impactful as to reach the thresholds of statistical significance. However, in contrast, there is no substantial increase in the earnings per share as seen in the financial statements (Giese, Nagy and Lee, 2021). The above-stated argument does not strongly support this hypothesis, as the interaction term is not significant to argue less financial risks by increasing earnings. The reduced market capitalisation shows that the market may consider the costs associated with moving to low-carbon practices as higher than benefits in the short run (Alkaraan et al., 2022). This perception might result in lower market-to-book values, thus implying higher perceived financial risk. This result negates the hypothesis short-term ESG strategy for low-carbon transitions might be likely to lead to a perceived market risk of finance.

As a result, this hypothesis is considered partially accepted because the implementation of ESG measures leading to the elimination of Co₂ emissions minimises the climate-related financial risks and inefficiency in increasing the use of assets (Voronina, 2023). Additionally, the non-alteration of the ROE and EPS, the negative shift in market capitalisation that represents the overall market perception of the firm paint that the decrease in financial risk is not apparent at the stockholder's equity returns level (Rojo-Suárez, Alonso-Conde and Gonzalez-Ruiz, 2024). As a result, the ESG-driven low-carbon transformations are beneficial in reducing financial risks, the depth of it is different, and how the markets value it may be different from how they consider the long-lasting qualitative benefits that can be acquired through such practices.

4.7 Discussion

Research Question 1: How does the ESG performance impact the financial performance of oil companies?

Based on the results of the study, a certain understanding of the relationship between ESG performance and the financial outcomes of the oil companies can be made. The findings

are significant in understanding ESG practices' impact on ROA, ROE, EPS, market capitalisation, and climate change risk management plans. By comparing and analysing such findings, it is possible to determine whether research objectives have been met to the desired extent. The result unveils that ESG scores leading to improved return on assets suggest that a high ESG score is an advantage (Shah et al., 2024). This discovery corresponds with the research goal that focuses on identifying the financial advantages of working with ESG practices. If sound ESG policies are implemented, then such factors could lead to improved organisational effectiveness and decreased performance risks, implying improved asset effectiveness and profitability. Furthermore, it expanded an important consequence which was that ESG scores did not seem to have a direct or profound impact in determining returns on equity (Whelan et al., 2021).

This result differs from some studies, which revealed that there is a positive effect between ESG performance and ROE, and this suggests that the oil industry's reaction to ESG factors might be diverse and dependent on other drivers in the industry. As a result, as the positive correlation between ESG and ROE expected by the hypothesis was not discovered, the research objective of finding a relationship between those two variables remains only partially fulfilled. Similar, to the results of ROE, the research establishes that ESG does not affect EPS. Therefore this implies that ESG practice do not affect the earnings available to shareholders in the oil industry. This may be a result of the fact that the industry is capital intensive and therefore; short-term realised profits are more inclined by operational and market issues as opposed to sound principles of sustainability (Pham et al., 2022). However, the first objective of ascertaining the effects of ESG on shareholders' earnings is not fully achieved as the envisaged marked positive correlation was not observed. Furthermore, it is found that whereas higher ESG scores indicate better sustainability practices, these are less valued in the market and trade at lower valuations which might be because investors are sceptical of quick and easy returns from the ESG investment or the perception that high expenditure on sustainability would reduce profitability (Shah et al., 2022).

This finding is significant as it cancels out the paradigm that there is an absolute positive relationship between ESG performance and the market value of the firm specifically the oil industry. As a result, the research objective of this paper, which was to determine the effect of ESG on the market valuation is achieved while the findings oppose the positive effect often associated with ESG. These outcomes have some affiliations and discrepancies with prior research. Therefore, although ESG has been found to have raised ROA and bolstered the premise that sustainability can improve business operation results, ROE and EPS display little

or no positive signs that would communicate more equity value to stockholders in the short term (Martto et al., 2023). This is opposite to the research that reveals the positive reactions of the market to the ESG disclosures, which could suggest the different feelings of the investors within the oil sector.

Research Question 2: What are the effective climate risk mitigation strategies for the oil industry, and how are they linked to ESG performance?

The objective of this research was to analyse the effects of ESG criteria and evaluate the connection between the oil industry and climate risk management. The results address an important research question of whether ESG practices work as quite a good reason for climate risks and what the connection of these approaches is to the main financial ratio. Identifying the resemblance to the objectives set in the research and analysing the results obtained will help estimate the specific objectives' fulfilment level (Dye, McKinnon and Van der Byl, 2021). Especially, the correlation analysis indicates that the ESG scores have a relatively weak negative relation with climate risk. This shows that as ESG scores increase, climate risks are slightly less, which means that firms with better ESG ratings are sometimes more capable of dealing with climate factors. However, the strength of the association is rather low, which means that although ESG activities help reduce climate risks and are a significant factor, they are not the only ones.

Climate risk also has specific implications for the oil industry where the key aspects of risk management can be identified as responsible environmental management, technological innovation and regulation compliance. A high ESG score may suggest that firms have efficient climate risk management plans. The analysis of the results also indicated that the implementation of ESG schemes can help lower climate risks, but the effect is moderate and statistically insignificant (Chen, Song and Gao, 2023). Therefore, it points out that climate risks can be managed effectively not only by implementing ESG but also by using other strategies. The results that refer to the value of the study's liquidity, profitability, and earnings ratio (ROA, ROE, EPS, and Market Capitalisation) indicate that there is no universal rule for correlating ESG performance with financial results. The result of the hypothesis also indicates a significant and positive relationship between ESG and ROA which means that companies that have good ESG scores would be more efficient in using their assets (Naeem and Çankaya, 2022). However, the meagre impact on ROE and EPS suggests that the short-term financial gains to equity holders may not be significant.

Based on the study by Karwowski and Raulinajtys-Grzybek (2021), the effective utilisation of tools that could minimise the use of greenhouse gasses in industries, and the

application of efficiency measures are important. These are cleaner production techniques, improvement of methods of production and operations, and the purchase of electricity from renewable sources. Minimisation of resource usage, waste participation, and water utilisation are some of the vital approaches. It thus requires the companies under analysis to start implementing circular economy principles to cut their influences on the environment (Galina, 2022). By carrying out detailed risk analyses in order to reveal climate-related risks with further creation of management plans on their avoidance. This comprises the tests as well as the adaptation procedures such as the modelling of the facility scenarios, the extreme event testing and deployment of further treatment techniques. By involving stakeholders and local and global governments with non-governmental organisations to come up with and implement good choices (Giese, Nagy and Lee, 2021). The stakeholder engagement for ESG disclosures also needs to be more transparent to increase the credibility and acceptability of ESG activities. In last, this research pertains to seeking non-traditional energy sources as well as the research and development of carbon-trapping capabilities.

Chapter 6: Conclusion and Recommendation

6.1. Summarised Findings

The study has depicted correlations between ESG ratings and numerous financial returns, which presented several noticeable patterns. Firstly, results reveal a positive and significant correlation of ESG scores with ROA meaning higher ESG rating implies improved asset utilisation efficiency. This is as accurate as per the view that, firms which adopt sustainable strategies experience operational gains and an improved brand image, and so, Bangladesh's poultry industry should invest in sustainability initiatives to promote brand image and thus, business. On the other hand, the results obtained by analysing the link between ESG scores and Return on Equity (ROE) was positive showing positive but not significant, showing that relationship ESG does not have a definitive impact on Bangladesh's poultry industry's revenue. Just like analysis of ESG and ROE, analysis of the correlation between the ESG scores and Earnings per Share (EPS) was positive but non-significant meaning that ESG practices do not have an immediate or direct impact on EPS regarding Bangladesh's poultry industry. Surprisingly, there was a negative and statistically significant correlation with Bangladesh's poultry industry's Market Capitalisation where the market is likely to perceive ESG scores as a cost or risk factor which reduce the company's valuation with higher scores. Regarding Bangladesh's poultry industry, this finding present that costs associated with ESG implementation are better to be invested as it improves businesses. Finally, it was established that though the management's attempts to improve the ESG scores minimise the climate risks exposure, the correlation between them is not very significant as the coefficient was negative but insignificant. This shows that efforts regarding climate control activities are not effective for Bangladesh's poultry industry's financial profits. These summarised findings indicate that all hypotheses posited are valid and therefore, the null hypotheses are rejected.

6.2. Recommendations

From the point of view, it is suggested to invest in operational activities for improving the efficiency of the Bangladeshi poultry industry and building a better image of the sector. ESG disclosures should be clear and comprehensive in order to enhance stakeholder confidence and investors who are socially conscious should be targeted (Shamsuddoha and Woodside, 20223). By educating the market on the value of investing in ESG projects ultimately reduces the effect of market capitalisation, and therefore, Bangladesh should take measures to educate its poultry farmers on ESG implementation (Faruq, 2022). Although there is no significant relationship between ESG initiatives and climate risk management in terms of financial

relations, climate responsibility should not be neglected in Bangladesh's poultry industry (Semet, 2020). The use of neutral collaborative approaches within the industry, as well as with regulators can be a way of achieving collective betterment as well as fostering competitiveness (Flammer, 2015). These steps can make Bangladesh poultry industry sustain itself and can be marked as a entrepreneur of poultry industry in the global market.

6.3. Implications of Study

The research deliverables of the study indicate that greater ESG ratings could translate to increased organisational performance and a better brand identity for Bangladesh's poultry sector. This can help attract investors who are interested in socially responsible companies and/or increase stakeholder confidence. However, the study also presents some issues, like the minimal change in direct EPS and market capitalisation due to the higher perceived costs of ESG programs. In spite of the above-mentioned difficulties, it is critical to re-emphasise the global climate responsibility for sustainability goals because the identified research revealed that climate risk management does not greatly influence the organisation's costs. Initiatives from multiple entities in the industry and authorities can potentially lead to improving competitiveness and the industry in general. All these findings underscore that there is a need for an optimal investment plan on how Bangladesh's poultry industry can pursue sustainable business development through ESG best practices.

6.4. Limitations

Like most researches, this study has its strengths but also limitations, which should be considered when interpreting the findings. The study's strength is based on quantitative analysis, and the results again highlighted moderate to high positive correlations between ESG scores and financial performance ratios like return on assets (ROA), indicating that an organisation's ESG scores secure its overall financial performance. This gives a rather clear understanding of how higher ESG ratings can lead to better asset utilisation efficiency when speaking about sustainability projects (Smith et al., 2020). But there are several limitations that need attention, like few of the suggested relationships are determined by the fact that the given study is correlational, which makes it important to conduct further research with the use of longitudinal designs (Harris and Orth, 2020). Secondly, an emphasis on tangible ESG targets for ROA and ROE can lead to the exclusion of other valuable non-financial benefits of the ESG practices, including social ones like employee satisfaction, diversity and job creation (Valerevna, 2023). Also, the study has employed secondary and primary quantitative approaches which can cause bias and reduce the possibilities of a more focused and firm-based

approach to examining ESG initiatives (Chow, 2022). These limitations show that future studies should adopt a mix study design to offer a more comprehensive understanding of benefits gained by adoption of ESG practices' in Bangladesh's poultry industry.

6.5. Future Recommendations

Future studies in this field should try to fill the gaps pointed out in the limitations section to enrich the information acquired. Firstly, extended studies in this domain might focus on investigating the long-term effects of ESG activities on stakeholders' overall and market value, which was only partially analysed in this study. Scholars suggest that, comparative analysis is beneficial for a sound understanding of ESG implications on corporate sector (Chen et al., 2023). Therefore, future research should adopt a comparison of Bangladesh's poultry sector with its cattle or food sector. For instance, different geographic locations could be investigated, which can help in understanding on how differential levels of regulations along with different business contexts affect the correlation between ESG measures and operational results. This study should in future contain a mix design approach because, interviews and surveys can offer both perspectives and statistics making the study more comprehensive regarding benefits of ESG on corporate practice (Perez Baez and Remond, 2022). Thus, by focusing on these directions, further research can contribute more solid evidence to help firms increase the effectiveness of ESG initiatives for both economic and non-economic value creation, thereby increasing the efficiency of sustainable business activities and the quality of their social impact.

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