Corporate Environmental Performance and Corporate Financial Performance: Empirical Evidence from the United Kingdom

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ABSTRACT

The concept of environmental management and its related issues have received heightened attention in global discussions due to climate change, global warming and other environmental challenges over the last three decades. To abate and avert these challenges, efficient environmental processes, strategies, policies, initiatives and practices have been adopted by some companies and countries. As a result, research scholars have also highlighted the financial implication of engaging in such environmental management activities and have advanced investigations to understand the relationship between corporate environmental performance (CEP) and corporate financial performance (CFP). Nonetheless, results are inconsistent and contradictory, thus, leaving a gap in the literature that calls for further examination.

The primary aim of the study is to examine the relationship between CEP and CFP in listed firms in the UK. There are three sub-specific objectives strategically drafted to contribute to the existing literature on the subject matter. First, to investigate the impact of CEP (i.e., environmental operational performance (EOP) and environmental management performance (EMP)) on corporate financial performance (i.e., accounting-based and market-based measures) in the various sectors from 2009 to 2015. Second, to investigate the non-linear relationship between environmental operational performance and corporate financial performance in the carbon and non-carbon intensive sectors. Lastly, to explore the extent to which EOP mediates the relationship between environmental management performance and CFP.

In order to achieve the above-mentioned objectives, the study used a sample size of 196 listed firms on the Financial Times Stock Exchange (FTSE) All-Share Index from the year 2009 to 2015. The secondary data examined in the study was sourced from ASSET4 Environmental, Social and Governance (ESG), Companies' Annual Reports and DataStream. To begin with the analysis, an econometric model was developed to establish the correlation between the dependent variables (i.e., financial performance indicators) and the independent variables (i.e., EOP and EMP) with the use of Stata statistical tool. After which, the panel data regression fixed effect was utilised to explore the actual relationship between CEP and CFP.

The descriptive results from the analysis indicate that financial and industrial firms are the most dominant sectors represented in the sample. Despite its dominance in the sample, some existing studies seem to validate the opinion that including financial firms in analysis such as this would invalidate the final results due to their different reporting styles. In order to examine and provide empirical evidence regarding those arguments, the study further investigated the CEP-CFP relationship exclusively and inclusively of the financial sector. After such exploration, it was found that indeed excluding and including financial firms from the overall study sample did have significant impact on the overall results. For instance, when financial firms were included in the sample, ROS was not statistically significant in relation to any of the EOP measures. However, upon exclusion of the financial firms, scope 1 emissions were found to be significantly and positively associated with ROS. These results provide confirmatory evidence that indeed including/excluding financial firms in studies relating to environmental performance has to be done with the necessary caution.

The panel regression tests also revealed that Greenhouse Gas (GHG) emission, which is a measurement proxy for EOP, should be examined in their separate scopes and not together. The results support the multi-dimensional construct hypothesis emphasised in this study. It was also found that each scope of GHG emission affects accounting and market-based financial performance measures differently. Furthermore, grouping firms into carbon-intensive and non-carbon intensive showed a different perspective of the EOP and CFP relationship. In other words, a non-linear relationship was found for most of the EOP measures including Scope 1 and 2 GHG emissions, resource use reduction and water consumption when tested with the financial performance measures.

Additionally, when the mediation effect was tested, it was discovered that only the two scopes of GHG emissions out of the four environmental operational performance measures employed in this study mediated the EMP and CFP relationship. Regarding the EMP and CFP relationship, environmental policies, monitoring, processes and management systems were found to be signifcantly related with CFP. It was also discovered that scope 1 fully mediated the association between environmental policies, monitoring, management systems and Returns on Assets (ROA), Returns on Capital Employed (ROCE) and Stock Price. Likewise, scope 2 also demonstrated a full mediation effect on the relationship between environmental policies, monitoring, management systems, processes and Stock Price, ROCE and Returns on Sales (ROS).

The study contributes knowledge to existing literature and studies in a number of ways. First, the segregation of total GHG emissions into the individual scopes has brought additional insights into the policy development of GHG emissions reduction. For instance, there is evidence that scope 1 emissions are positively related to ROS whereas scope 2 emissions have a significant adverse impact. However, when financial firms were included in the sample, scope 2 showed a positive link with financial performance while scope 1 rather revealed a negative association with CFP. This suggests the need for the various sectors to advance different policies if they expect to improve their financial performance. Furthermore, the results enrich the literature on non-linear relationships between environmental performance and CFP. The current study's distinction of the non-linear relationship between carbon intensive and non-carbon intensive firms will help inform management in those sectors on the specific operational performance to focus on and how to utilise such relationship for enhanced performance. Lastly, the study contributes to the CEP literature by indicating the interrelationship between environmental operational and environmental management performance. Such mediated association will help researchers to appreciate the need to use both dimensions of CEP in order to ascertain the robust relationship that exists between both performances.

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DECLARATION

This thesis is submitted in fulfilment of the requirements for the degree of Doctor of Philosophy at the Bournemouth University, United Kingdom. I declare that this thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that this thesis has not been previously or concurrently submitted, either in whole or in part, for any other qualification at Bournemouth University or other institutions.

Renata Konadu

December 2017

DEDICATION

I dedicate this thesis to my wonderful husband, Felix Asiamah Yeboah who understood me inside-out and supported me immensely despite the geographical distance between us. You were comfortable with the fact that I had to go communication-silent on some days to concentrate on my research. This work would not have been completed without you (Popo).

LIST OF ABBREVIATIONS AND ACRONYMS

ABM	Accounting-Based Measures
APICS	American Production and Inventory Control Society
BATNEO	Best Available Techniques Not Exceeding Cost
BLUE	Best Linear Unbiased Estimates
BPEAO	Best Practical Environmental Options
BREEAM	Building Research Establishment Environmental Assessment Method
BSE	Bombay Stock Exchange
CCA	Climate Change Act
CDP	Carbon Disclosure Project
CEM	Corporate Environmental Management
CEO	Chief Executive Officer
CEP	Corporate Environmental Performance
CFP	Corporate Financial Performance
CG	Corporate Governance
CRC	Carbon Reduction Commitment
CSP	Corporate Social Performance
CSR	Corporate Social Responsibility
DEFRA	Department of Food and Rural Affairs
DWH	Durbin-Wu-Hausman
EA	Environmental Agency
EBIT	Earnings before Interest and Tax
EIA	Environmental Impact Assessments
EM	Environmental Management
EMAS	Eco-Management and Audit Scheme
EMP	Environmental Management Performance
EMS	Environmental Management System
ESG	Environmental, Social and Governance
EOP	Environmental Operational Performance
EP	Environmental Performance

EPA	Environmental Protection Agency
EPR	Environmental Permitting Regime
EPS	Earnings per Share
EU	European Union
FE	Fixed Effect
FGLS	Feasible Generalised Least Squares
FIDIC	Federation of Consulting Engineers
FTSE	Financial Times Stock Exchange
GBP	Great British Pound
GHG	Greenhouse Gases
GLS	Generalised Least Squares
GMM	Generalised Method of Moments
ICB	Industrial Classification Benchmark
IPC	Integrated Pollution Control
IT	Information Technology
KLD	Kinder, Lyndenberg, Domini Research
kWh	Kilowatts per Hour
LSE	London Stock Exchange
MBM	Market-Based Measures
NPV	Net Present Value
NRBV	Natural Resource-Based View
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary Least Squares
PAHO	Pan American Health Organisation
PCSE	Panel Corrected Standard Errors
PJ	Petajoules
PPC	Pollution Prevention and Control
PwC	Pricewaterhouse Coopers
R&D	Research and Development
RBV	Resource-Based View

RE	Random Effect
ROA	Returns on Assets
ROCE	Returns on Capital Employed
ROE	Return on Equity
ROS	Returns on Sales
SA	Sensitivity Analysis
SARA	Superfund Amendments and Reauthorization Act
SEA	Strategic Environmental Assessment
TA	Total Assets
TEMS	Total Environmental Management System
TMS	Total Environmental Monitoring Score
TRI	Toxic Release Inventory
UNEP	United Nations Environment Programme
VAR	Vector Auto-Regressive
VIF	Variance Inflation Factor
WRI	World Resources Institute

CHAPTER ONE

INTRODUCTION AND OVERVIEW OF RESEARCH

1.0 Introduction and Background

Environmental management and environmental performance have evolved as significant concepts in global discourse in the recent past. Over the past three decades, companies, communities and economies around the globe have been paying considerable attention to environmental and corporate social responsibility (CSR) issues (Lamond, 2008). In the United Kingdom, this has gained momentum to the extent that the government enacted a Climate Change Act (CCA) in 2008. The CCA places an obligation on the various sectors of the economy to reduce Greenhouse Gas (GHG) emissions by at least 80% in 2050. Out of the overall target, at least % is expected to be achieved by 2020. Such relatively ambitious target made the UK economy outstanding and much advanced in its quest to combat GHG emissions (UK GOV, 2008) in comparison with other countries in Europe and the world at large. To achieve these targets and goals, corporate institutions and organisations, most especially, the large companies have been identified by the government to be critical players since their operational activities could exacerbate or abate environmental emissions.

In addition to the CCA, the UK's Department for Food and Rural Affairs (DEFRA) also established voluntary guidelines for firms which intend to report their environmental performance voluntarily in 2009. After some further deliberations in the parliament and consultation of public opinions, the reporting of GHG emissions became mandatory and legalised for listed firms. The guidelines for the GHG compulsory emissions reporting were issued by DEFRA in 2013. In addition to the mandatory reporting requirement, companies were encouraged to voluntarily provide reports on the other aspects (i.e., water use, waste, materials and resource efficiency, biodiversity/ecosystem services, emissions to air, land and water) of their environmental performance. One of the primary underlying reasons for encouraging environmental performance reporting is to promote the proper and efficient management of environmental activities and practices (DEFRA, 2013). In light of these legal and conscious steps taken by the government, most businesses including large, medium and even small ones started embracing environmental policies, practices and strategies in order to help alleviate and avert the environmental challenges (Montabon et al., 2007).

It is phenomenal to underscore that the general interest of academic researchers to explore the reasons for improving environmental performance and the extent to which better environmental performance influence financial performance is growing at a faster pace. Majority of the researchers have attempted to answer one of the most common questions of whether better environmental performance improves financial performance (e.g., Albertini, 2013; Ramanathan, 2016; Trumpp et al., 2015; Nakao et al., 2001; Misani and Pogutz, 2015). Most of those studies investigated specific environmental outputs including GHG emissions, water consumption, waste produced and emissions to air and water, among others and their relationship with financial performance. Others also concentrated on environmental practices such as energy efficiency, water efficiency, reduction in waste generated, environmental monitoring, redesigning of production processes among others (Gossling et al., 2012; Molina-Azorin et al., 2015; Tanaka, 2012).

Despite such plethora of studies (e.g. Graham and Potter, 2015; Ambec and Lanoie, 2008; Reinhardt, 2000; Albertini 2013) addressing the relationship between environmental management and financial performance no consensus has been reached yet. Such inconclusiveness has been is because some researchers argue that EM and financial performance of firms is a win-win situation (Reinhardt, 2000) while others such as Eva Horváthová (2010) discovered a negative relationship after her study. The divergence in results both as regards the significance of the relationship and the coefficient sign could be attributed to many reasons including the difference in methodologies, geographic areas and varying time periods used (Moneva et al., 2007) among others.

Regarding the differences in methodologies, it is indisputable that many studies that set out to investigate the same relationship adopted different approaches in doing so. For instance, before delving into the direct impact of environmental management on financial performance, some researchers emphasised that the adoption of environmental management practices controls their operational impact on the environment (Doda et al., 2015). Hence, those with such viewpoints investigated the influence of the environmental management practices on environmental performance before attempting to explore its relationship with financial performance (e.g., Campos et al., 2015; Doda et al., 2015; Melnyk et al., 2003). Other academic scholars, on the contrary, put forward the claim that the CEP-CFP should be investigated directly instead of exploring the effect of environmental management practices. These groups of researchers from the two perspectives (Conlon and Glavas, 2012; Dahlmann et al., 2008; Ghabodian et al., 1995; Mckeiver and Gadenne, 2005) spanned their studies from large firms to the small and medium enterprises (SMEs). Nevertheless, neither group of researchers established a centrally conclusive result regarding the said relationship.

The current study argues that the fundamental research gap which has to be addressed in a concurrent investigation is the methodological approach used in studies. To begin with, this thesis supports Trumpp et al. (2015) and Trumpp and Guenther (2017) assertion of considering the multidimensionality of corporate environmental performance (CEP) and not just Corporate Financial Performance (CFP). Of course, CEP which is a construct cannot be measured directly but with the use of measurement proxies and therefore the two main dimensions should both be explored in one single study to yield convincing results. As a result, the study, unlike most existing researchers, employs the two main dimensions of CEP (i.e., environmental operational performance indicators and environmental management performance measures) to investigate the said relationship further. It is however, relevant to mention that since these two dimensions might be interrelated; assessing the mediational inferences would lead to a better conclusion on the kinds of environmental practices that could yield better CFP.

In addition to the multi-dimensionality measurement, this study also proposes a different approach to measuring GHG emissions by using the individual scopes of emissions instead of total emissions as seen in previous studies (e.g., Busch and Hoffmann, 2011; Delmas and Nairn-Birch, 2011; Gallego-Alvarez et al., 2015). This is because it would be relevant to capture the different sources of GHG emissions, especially, in a study like this where the relationship with CFP is pertinent for decision and policy making.

Furthermore, many studies that investigated the CEP-CFP relationship did so by examining manufacturing (e.g., Klassen and Whybark, 1999; Nishitani and Kokubu, 2012) and production sectors (e.g., Gupta and Goldar, 2005; Clemens, 2006;) with few investigating service sectors (e.g., Soana, 2011; Jo et al., 2014). Most other studies (e.g., Hatakeda et al., 2012; Misani and Pogutz, 2015) also mentioned the various sectors of businesses but did not analyse the impact of CEP on CFP from a sectoral perspective. As such, the final results are not linked to the sectors and how their financial performances could improve. For this reason, this study investigates the sectors thorough to identify which environmental practice and operational performance are important to the individual sectors without any form of generalisation.

1.1 Research Questions

To carry out an effective investigation, the following questions were coined in line with the objectives of the thesis:

First, what is the impact of CEP (i.e., environmental operational performance and environmental management performance) on corporate financial performance (i.e., accounting-based and market-based measures) from a sectoral perspective?

Second, is there a non-linear relationship between environmental operational performance and corporate financial performance in the carbon and non-carbon intensive sectors?

Lastly, to what extent does environmental operational performance mediates the relationship between environmental management performance and CFP?

1.2 Research Objectives

In an attempt to answer the research questions and the calls by previous studies on corporate environmental performance, the current study aims to investigate the relationship between organisational environmental performance and financial performance of firms listed on the FTSE All-Share Index. The specific objectives of the study are:

1. To investigate the impact of CEP (i.e., environmental operational performance (EOP) and environmental management performance (EMP)) on corporate financial performance (CFP) in the various sectors from 2009 to 2015.
2. To examine the non-linear relationship between environmental operational performance and corporate financial performance in the carbon and non-carbon intensive sectors.
3. To explore the extent to which environmental operational performance mediates the relationship between environmental management performance and corporate financial performance.

These objectives are necessary for academic purposes because though burgeoning present studies are focusing on environmental and financial performance, there is still the need to explore the distinct impact of EOP and EMP dimensions on corporate financial performance. The importance of understanding how both aspects of corporate environmental performance relate with CFP in different sectors and not only financial and non-financial sectors cannot be overlooked. This may be beneficial to companies in those sectors regarding their strategy development and adoption of environmental practices that would be favourable to their specific accounting and market-based financial performance measures. An inherent implication is that a particularly favourable performance results for one sector may not necessarily be the same for another sector though firms in both sectors might engage in the similar practice. As such, there is the need to highlight the fact that no two businesses are the same. The current study thus stands out from existing ones because of the detailed sectoral analysis it presents.

Furthermore, extant studies have explored the non-linear relationship between CEP and CFP (see Misani and Pogutz, 2015), however, there are fewer studies that have made a distinction between the carbon and non-carbon intensive sectors and the possibility of a non-linear relationship. To some researchers, just knowing that a non-linear relationship exists is enough justification. However, this study supports the suggestion by Fujii et al. (2013) that there are instances where issues like the carbon intensity level in a particular sector might influence the impact of financial performance to be non-linear. In addition to these reasons, the reported contradictions in results by existing studies is another indication that there is still much to be investigated and understood in terms of CEP and CFP relationship.

1.3 Relevance of UK Context in the Study

The current study explores the environmental performance of listed firms in the UK from 2009 to 2015. The primary reason behind the chosen period of study is to provide coverage on performance from 2009 when the voluntary environmental performance reporting guidelines were released to 2015 after the mandatory GHG reporting guidelines in 2013. The efforts made by the UK government towards achieving its climate change goals, reducing global warming and environmental impact could be viewed as impressive considering the performance rate. For instance, according to a report by Carbon Brief in 2017, CO_2 emissions in the UK dropped from 42% in 2015 to 38% below 1990 levels in 2016 (Carbon Brief, 2017). A mere look at the emissions performance could mislead the public into assuming that all stakeholders in the country including companies are contributors to such improved performance. However, from a researcher's analytical perspective, a thorough investigation into how these companies are contributing to the reduction in emissions could provide a comprehensive insight for government and policymakers.

Furthermore, the UK, before Brexit, was one of the first economies to implement a voluntary reporting guideline as well as the mandatory GHG emissions reporting for listed firms. Thus, by contextualising the study in the UK, the voluntary reporting period in 2009 and the GHG compulsory reporting from 2013 would be captured and matched against performance. From the exploration of companies' sustainability reports, it was discovered that many firms started to report on how they measured their environmental performance upon the release of the voluntary guidance by DEFRA in 2009. Till date, most companies still disclose such information. However, the mandatory GHG emissions reporting for listed companies might have possibly shot up the increase in disclosed environmental performance within the last three years. Such awareness created by these listed companies explicitly indicates their concern for environmental performance in the UK.

As a result, it is worthwhile to investigate whether the efforts of these companies in the UK are being paid off financially as they engage in activities to improve their environmental performance. The findings would be useful to businesses that are yet to join in disclosing their respective environmental performance. A positive discovery of the influence of environmental performance on companies' finances would attract other companies in the UK to follow suit. Nonetheless, a negative relationship would signal the government and legislators to provide adequate incentives to firms to ensure improved environmental performance since the UK intends to achieve its targeted emissions goal.

1.4 Synopsis of Research Methodology

To achieve the mentioned objectives, the study used a sample size of 196 listed firms on the FTSE All-Share Index from 2009 to 2015. Listed firms in the UK were the central focus of this study due to the recent opprobrium they have received from media regarding the pollution of the environment especially air and water (BBC, 2015). Notably, most of these firms have been fined huge sums of money over the years, and yet their operational damage to the natural environment persists. For instance, companies such as United Utilities and Wessex Water started reducing their water pollution levels only when more stringent standards were introduced in 2016 (Gov.UK, 2017). This proffers considerable justification to investigate these listed firms' attitude towards environmental performance.

The FTSE All-Share Index primarily represents all eligible companies listed on the London Stock Exchange (LSE)'s main market which comprises the FTSE 350 firms and the FTSE Small Cap. FTSE 350 is the combination of the largest 100 companies by market capitalisation and the next largest 250 companies in the mid-range market capitalisation. FTSE SmallCap, on the other hand, comprises companies with market capitalisation size which falls right behind those listed on the FTSE 350 index. These listed firms, according to DEFRA (2013) are under strict regulations to report on their GHG emissions in the UK.

Furthermore, the study includes firms from all sectors as listed on the FTSE without any partiality and preference to some specific sectors as done by other studies (e.g., Iwata and Okada, 2011; Nishitani and Kokubu, 2012). The financial performance data were extracted from the Companies Annual Reports and DataStream while environmental management/performance data were sourced from ASSET4 ESG. There were two main prerequisite sample selection criteria adopted in this study to arrive at the panel data. First, only firms with at least two years of data from 2009 to 2015 on environmental operational and management performance indicators were selected. It was imperative to start with this criterion due to limited data available for environmental performance. The final step was to eliminate firms with missing financial data such as those related to mergers and acquisitions and insufficient data for two years, at least.

Before following the sampling selection yardstick, there were 634 companies altogether listed on FTSE All-Share. However, after the two criteria were applied, only 196 listed firms were left to be included in the non-balanced panel analysis including financial firms. These 196 firms were spread across all the industrial classification benchmark (ICB) sectors. However, due to arguments in the previous studies against the inclusion of the financial sector on the grounds of the different prudential regulations (see Chithambo, 2013), the current study analysed the data exclusive and inclusive of the financial firms. The study makes use of panel data regression analysis to encompass the time series and cross-sectional dimension of the data collected. Using panel data has been argued to allow a researcher controls the effects of missing and unobserved variables from the explanatory ones (Hsiao, 2003). The researcher used a Fixed Effect approach due to the assumption that there is a correlation between individual specific effects and the independent variables. Though a linear panel model was initially developed to investigate the first research objective, the study further hypothesised a possible non-linear relationship to exist when carbon intensities are taken into consideration.

1.5 Contribution of the Study

This research has both policy and academic relevance due to the compelling role played by environmentally related issues in the economy. For policy developers and decision makers in corporations, they would benefit from the study's result while making efforts to maximise shareholders' wealth and improve their environmental performance. The study will contribute to the vast academic literature on environmentally related issues and financial performance of larger firms in developed countries, especially in the UK. Some specific contributions of the research are discussed below.

First, the study will contribute to the on-going debate on the relationship between corporate environmental management/performance and corporate financial performance in the UK by providing new evidence from a multi-sectoral perspective. To the best of the researcher's knowledge, only a handful of studies conducted in the UK have studied the sectoral environmental performance. Aside from the fewer studies, the results are ambiguous and uncertain due to the different approaches, measurement units of environmental performance and the sectors those researchers focused on. The current study consolidates all the ten sectors systemised by the ICB to present a holistic investigation of each sector's accomplishment. Also, the unifying framework of environmental management performance practices will furnish a better understanding of why some sectors opt for a particular environmental management practice. It is imperative to note that environmental conditions fluctuate across all sectors hence, understanding the distinctiveness of the environmental practices would expedite the critical insights imperative for company executives during design policies, implement and possibly attract investors (Gov. UK, 2012).

Second, the segregation of total GHG emissions into the individual scopes will provide additional insights into the policy development of GHG emissions reduction. Although there is a burgeoning study on GHG emissions and financial performance (e.g., Doda et al., 2015; Busch and Hoffmann, 2007; Stubbs and Cocklin, 2008; Iwata and Okoda, 2011), the majority focused on total GHG emissions. The few that strived to segregate total emissions into the scopes of GHG emissions usually opted for either scope 1 or 2 and sometimes, include another aspect of the environmental activity that leads to the emissions (see Busch and Hoffmann, 2011). To thoroughly grasp the relationship, this study uses both scopes 1 and 2 GHG emissions as measures to understand their individual effects on financial performance instead of the total emissions. For instance, the current study found evidence that scope 1 emissions are positively related to ROS while scope 2 emissions were negatively correlated. However, when financial firms were included in the sample, scope 2 records a positive link and scope 1, a negative association, thus, a reverse relationship. This finding would encourage managers in the various sectors to advance different policies that apply to their sectors should they expect to improve their financial performance and environmental performance simultaneously.

Furthermore, the outcomes of the study augment the literature on non-linear relationships between environmental performance and CFP. The ongoing study's distinction of the non-linear relationship between carbon intensive and non-carbon intensive firms would notify and steer managers in those sectors on the specific operational performance to focus on to improve performance. Most of the existing studies have scrutinised the impact of corporate environmental management (CEM) on CFP ignoring the possibility of financial performance influencing environmental management as well as the tendency for such benefit to be for a while and eventually dwindle. Though such circumstance may result in a U-shaped relationship, Wagner et al. (2002) argued that the CEM-CFP relationship can also be represented by a bell-shaped curve (i.e., inverted U-shaped). Only a few studies have decided to investigate for the empirical existence of a non-linear relationship (curvilinear relationship). In response to the curvilinear relationship, Brammer and Millington (2008) provided an in-depth exposition by recommending two detailed models as a more articulated structure for this kind of relationship. The first model they suggested is that positive financial payoff to be realised from improving social performance would boost to a point and subsequently diminishes (i.e., an inverse U-shaped). The other model emphasised that positive and high financial payoffs would either be associated with very high or perhaps shallow social performance levels leading to a U-shaped relationship. The present research contends that such a non-linear modelled relationship as highlighted by Brammer and Millington could be the residuum after investigating the CEP-CFP relationship. From existing scholarship, it can be pointed out that a particular direction of the non-linear relationship would only be achieved when the analysis is not merely based on the sample size. Thus, it would be insightful to instead analyse such relationship from the firm's reliance intensity on natural resources.

Lastly, the study contributes to the CEP literature by indicating the interrelationship that exists between environmental operational and environmental management performance. Such association would accentuate the need to use both dimensions of CEP to ascertain the robust relationship that exists between financial and environmental performances. Drawing from a similar standpoint, Ramanathan (2016) found empirical evidence to support his argument that environmental performance relationship with CFP is moderated by environmental performance quadratic term in a curvilinear relationship. This study demonstrates that aside from the moderating effect, it is imperative for researchers to consider the mediating effect when analysing the relationship between CEP as a multi-dimensional construct and corporate financial performance.

1.6 Limitation of the Study

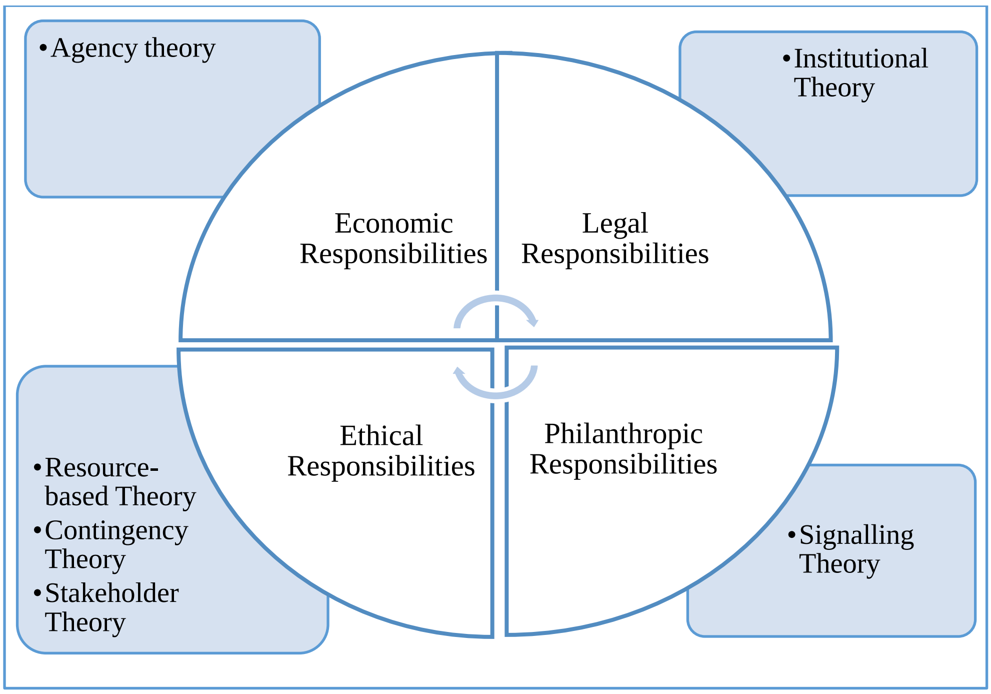
The study's primary limitation lies in the sample size used due to the lack of access to sufficient environmental performance data. As a result, the ICB sectors were not fairly presented regarding the number of observations which also led to the unbalanced panel data. Also, the present studies made use of a few practices are extensive to envelope all the environmental aspects pointed out by DEFRA (2013). This could be one of the reasons why only a few of the EMPs were found to be statistically significantly consequential on environmental operational performance. Another pertinent drawback that could inform future studies is to test for causality and not just the relationship. Due to the fewer observations in the unbalanced data, the researcher could not employ any statistical analysis tool in testing for Granger causality. Future studies could resort to using balanced data to test for aptly causality.

1.7 Structure of the Thesis

The thesis comprises eight chapters which are structured and grounded on conceptual and theoretical roots, arguments and analytically systematic discourse. The current chapter presents an overview of the research. It essentially reveals the introduction, background and justification of the study. It also identifies the three preeminent research objectives around which the present research revolves. Further to that, the distinguished and transcendent contributions to existing knowledge and policy advancement are outlined in this chapter. The last section in this chapter briefly touches on the study's limitations and proposition for future studies.

Chapter two, on the other hand, presents the theoretical frameworks within which existing literature has studied environmental and financial performance. The chapter covers the main underlying theories and their suitability for use in the present study. Some of the discussed theories are the agency theory, stakeholder theory, resource-based view theory, natural resource-based view theory, contingency theory and signalling theory.

Figure 1: Theoretical Composition adapted from Carroll (1991)



Source: Author's construction adapted from Carroll (1991)

Figure 1 above shows the underpinnings of each of the theories employed in this study. Using these theories as the underlying concepts, the chapter emphasises the extent to which all concerned external stakeholders, managers and other social and natural factors bring about improved environmental performance and financial performance.

In chapter three, existing empirical literature that investigated the relationship between corporate environmental and financial performance ranging from past to contemporary studies are reviewed. The multi-dimensional construct of CEP (i.e., environmental operational and environmental management performances) would be thoroughly presented as well. Also, corporate governance variables and firm characteristics used in extant studies are probed in this chapter. One prominent section in this chapter is the emphasis on the scanty literature on the multidimensionality of CEP and the different results that could be attained when tested in the UK. It is also noted in chapter three that GHG emissions, when used as a proxy for most existing studies, is analysed as the total emissions and not in the individual scopes as expected by the GHG Protocol Standards.

Chapter four discusses the nature and relevance of corporate environmental performance which covers the global and UK context. In this chapter, the literature on the evolution of environmental management concept and environmental performance are examined. Issues such as the specific aspects of environmental management and performance including GHG emissions, water consumption, waste, emissions to air, land and water, biodiversity and resource use are the main issues discussed. Other environmental performance concepts like environmental management systems and environmental performance reporting in the UK are also highlighted in this chapter.

Chapter five commences with the specifics of the methodology used in this thesis. The first section identifies the research philosophy that underpins the current study. The population of the study, sampling criteria, sampled size and the data descriptions are sketched in this chapter. In addition, the various statistical tests undertaken to ascertain the normality of the data are explained including the Pearson correlation matrix. Afterwards, the processes involved in running a panel analysis, dealing with heteroskedasticity and autocorrelation are all presented. The final section of this chapter provides the blueprint of how mediation test is conducted using the Baron and Kenny's (1986) four steps of mediation testing. The Sobel-Goodman statistical test was employed in evaluating the mediation effect of environmental operational performance on EMP and CFP relationship.

Chapter six, on the other hand, discusses the main hypotheses that were tested in this research. These hypotheses are discussed and drawn from literature in both chapters two and three. A total of fifteen hypotheses were developed altogether based on EOP measures (i.e., Scope 1 and 2 GHG emissions, water use, resource use), EMP measures (i.e., environmental monitoring, objectives, management systems, policies and processes), firm characteristics (i.e., firm size, gearing ratio, financial leverage, capital intensity) and corporate governance measures (i.e., board size, corporate social responsibility committee and board gender diversity).

The discussions of the econometric results are presented in chapter seven. This chapter first presents a graph that shows the distribution of the sample size according to the ICB sectors. It then discusses the descriptive statistic test results that aid appreciating the behaviour of the data set with regards to the mean, standard deviation and the minimum and maximum values. The panel regression analyses results are also considered in this chapter where the results are broken down into those excluding and including the Financial Sector. The results are further presented according to the various ICB sectors to show the relationship between CEP and CFP in those industries. Lastly, this chapter discusses the mediation test result of the influence of EOP as a mediator in the relationship between EMP and corporate financial performance.

Chapter eight concludes by summarising the whole thesis with a deliberate focus on the research method and results. It also discusses the main research contributions of the study by pointing out the implications and even limitations that need to be taken into consideration when interpreting and applying the results. This chapter also suggests avenues for future studies to concentrate and explore for a better understanding of the CEP and CFP relationship.

CHAPTER TWO

THEORETICAL FRAMEWORK

2.0 Introduction

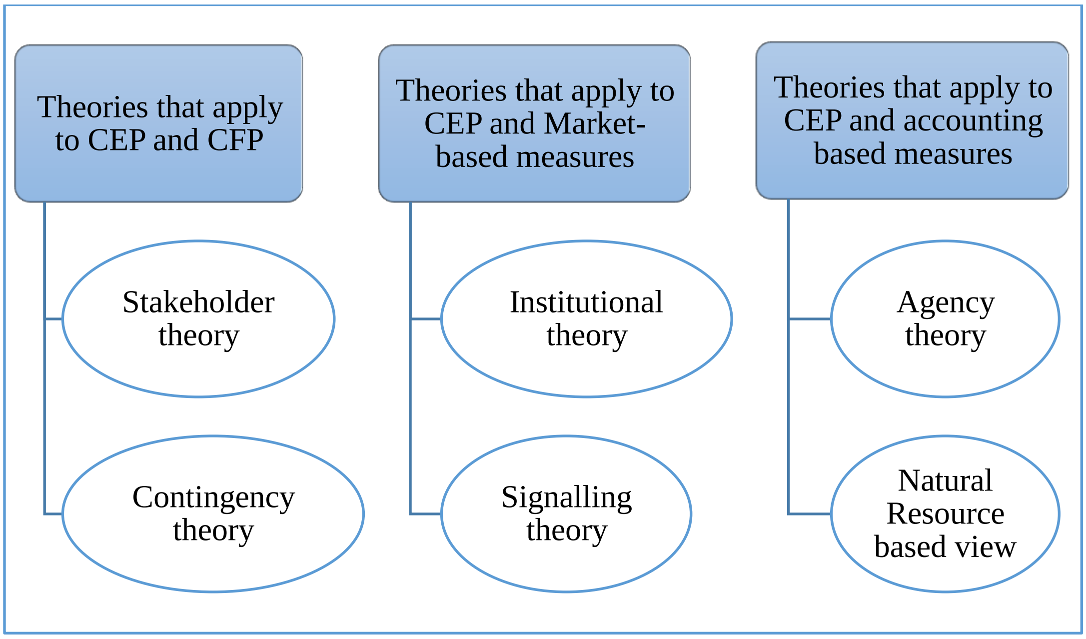
A critical aspect of every research is the underpinning theoretical framework of which the study's rationale, research results and contributions could be based on. Grant and Osanloo (2014) defined a theoretical framework as the entire research's "blueprint" which serves as the theoretical guide for a researcher to build a study on formal theories. In other words, a theoretical framework should include all selected theories that undergird researching thoughts and objectives. Impliedly, theories do not inform a researcher on what needs to be done but instead act as a lens for the researcher to see different possibilities for the study with a view from various angles. Corporate environmental management/performance and financial performance relationship have been investigated from different dimensional perspectives, and therefore the use of multi-theories would provide an additional comprehensive level of understanding (Gray et al., 1995).

Environmental management and performance literature has adopted various theories such as the stakeholder theory (Hart and Dowell, 2011); theory of the firm (Jensen and Meckling, 1976); legitimacy theory (Patten, 1992); agency theory (Ness and Mirza, 1991); (natural) resource-based view theory (Hart, 1995) and institutional theory (Hoffmann, 1999), among others. This study, for instance, employs agency theory, institutional theory, stakeholder theory, natural resource-based view theory, signalling and the contingency theory in explaining the relationship between environmental management and financial performance in the UK. As the current study is targeted at establishing the direction of the relationship between CEP and CFP, these theories will be useful in explaining the inferred direction that might be discovered in this study.

2.1 Chapter Framework

In this chapter, the researcher agrees with the argument of Chithambo (2013) that no single theory can satisfactorily explain the outcome of the relationship between environmental and financial performance. It could be argued that the most of these theories are complementary in nature and depending on the standpoint and perspective from which an outcome is analysed. In order to underscore the need for the multi theories used in this thesis, the author has categorised the six theories into those that apply to the relationship between corporate environmental performance and market-based measures and those that apply to the same relationship with accounting-based financial performance. Figure 2 below shows the breakdown of the two categories that the theories employed in this study belong to.

Figure 2: Categorisation of the Multi-theoretical Framework



Source: Author's Construction

The chapter covers detailed theoretical discussion and is organised as follows: Section 2.2 covers the theories that apply to the relationship between corporate environmental and corporate financial performances; Section 2.3 examines theories that are useful in explaining the market-based financial performance and corporate environmental performance relationship; Section 2.4 explores the theories that apply to the relationship between accounting-based financial performance and corporate environmental performance; Section 2.5 provides the summary and conclusion of all the theories discussed.

2.2 Theories that Apply to CEP and CFP

Existing studies (see Gentry and Shen, 2010) found evidence that corporate financial performance is a multidimensional construct consisting of accounting-based and market-based measures. Though these two are not synonymous, stakeholder and contingency theories have been used to explain the relationship between CEP and CFP (i.e., accounting and market-based measures) due to their heterogeneous attributes.

2.2.1 Stakeholder Theory

Freeman (1983) defined a stakeholder as any individual or entity whose activities can affect an organisation's objective and possibly be influenced by activities of that organisation. A stakeholder can also be referred to an individual or entity who holds a stake in an organisations' activities and thus expects some level of consideration from that organisation. The concept of stakeholder theory was first used by Ansoff (1965) in his description of firm objectives. Later in the early 1980s, Freeman (1984) assessed the role of several players (i.e., stakeholders) in a firm's setting and highlighted two main groups namely the internal and external actors he believed can influence firms' behaviour. Ruf et al. (2001) added environmental constituents to the two main groups of stakeholders identified earlier by Freeman (1984). Regarding organisational behaviour, Donaldson and Preston (1995) pointed out that the stakeholder theory can be used to describe and even explain some specific organisational characteristics and behaviour. It can also be used to explain and direct management's behaviour in the market (Freeman et al., 2004).

The underlying assumption of the stakeholder theory according to Freeman (1994) is that values are unambiguously and inevitably part of business procedures thus rejecting the claim of separation. Segregation in this instant is the assertion that economics and ethics can easily be disconnected. Concerning the underlying assumption of stakeholder theory, it has been generally stressed that the corporations do have their ultimate goal of profit making; however, managers need to consider stakeholders' legitimate interests and other groups affected by the activities of the organisations (Donaldson and Preston, 1995, Freeman, 1994). In other words, stakeholders indirectly or directly demand their interests to be met by organisations and by so doing bestows societal legitimacy on such firms. A suggestion by Freeman (1984) directs firms to minimise societal costs while satisfying the demands of their stakeholders. Satisfying stakeholders' demands may not necessarily give a competitive advantage to a company providing all businesses in the same industry have the same types of stakeholders. It is pertinent that a company realises it is in a contract with multiple stakeholders and such relationship could aid in understanding the link between corporate social and financial performance.

For a firm to understand their multiple stakeholders, Clarkson (1995) grouped them into primary and secondary stakeholders. A primary stakeholder is the one whose halt in company's participation can cause the organisation to cease operating as a going concern (e.g., shareholders). Secondary stakeholders (e.g., employees) are those who are affected by the activities of an organisation and tend to in one way or the other influence that organisation's operations. However, the impact of secondary stakeholders is not critical to the extent of affecting a firm's survival (Metcalfe, 1998). It is vital to note that different needs and interests come with diverse groups of stakeholders creating some level of conflict to what managers should do (Neville and Menguc, 2005; Sen et al., 2006).

Some common attributes including as legitimacy, urgency and power are known to be critical attributes associated with stakeholders indicating the attention given them by management (Mitchell et al., 1997). Power in this context refers to the ability of a stakeholder's pressure to lead to a particular organisational behaviour which would not have naturally happened should there be no such pressure. Legitimacy is the perceived conception that all claims from stakeholders are socially acceptable and desirable to lead to legitimacy. Urgency has to do with the timing in response from organisations to meet the demands of stakeholders and value that stakeholders place on their claims. According to Reynolds et al. (2006), if these classes of stakeholders be appropriately managed, they might have significant impacts on financial performance. For instance, Berman et al. (1999) studied five essential stakeholders (i.e., natural environment, customers, workplace diversity, employees and community relations) and their impact on firm financial performance and found a positive direct relationship between them.

Existing literature has made it clear that not all stakeholders should be regarded as relevant to firms when considering their objectives. Impliedly, some stakeholders are more relevant at some point than others. Henriques and Sadorsky (1996) studied stakeholder influence on Canadian companies environmental management practices and found that government agencies had a more considerable influence on firms followed by customers, shareholders and the local community groups respectively. This supports the assertion by Mitchell et al. (1997) that the relevance of stakeholders is relative and can change with time depending on circumstances. To this effect, Kochan and Rubinstein (2000) identified three main criteria for capturing stakeholder relevance or influence. First, stakeholders should be considered relevant when they are able to contribute valued resources to the firm significantly. Second, those resources should present higher risks and costs to the company when stakeholders withdraw them from the company. Finally, stakeholder's power in addition to the pressure level exhibited by them alongside the consequences they have on organisational reputation would signify their degree of relevance. Nonetheless, whether salient or not, when all parties concerned are critically examined, it is likely that one may play a key role while the other stakeholder group may not thus none of the groups should be ignored for whatever reason (Berman et al., 1999).

To shed more light on the usefulness of stakeholder theory, Donaldson and Preston (1995) stressed on three primary forms (i.e., normative, instrumental and descriptive) that the theory can be analysed from. Letza et al. (2004) pointed out that, out of the three theories proposed by Donaldson and Preston above, two main types (i.e., normative and instrumental) are popular in academic literature. The three aspects outlined by Donaldson and Preston are discussed in the subsequent paragraphs to ensure that the underscoring stakeholder theory concepts are fully grasped.

Descriptive or Empirical: From viewpoint, the theory has been used by some scholars to explain and describe the nature of firms as evidenced by Brenner and Cochran (1991) in their research. Also, managers' thoughts about management policies and what the board considers as corporate interests as well as how some businesses are managed can be explained by the stakeholder theory (Clarkson, 1991; Wang and Dewhirst, 1992). Though a few studies have been carried out on descriptive stakeholder theory, Jawahar and McLaughlin (2001) delve into the descriptive aspect in detail. They developed a descriptive stakeholder theory based on resource dependence and prospect theory in addition to organisational life cycle models. They initially proposed that at different organisational levels, a particular stakeholder may be critical for business survival and therefore new strategies would have to be advanced at each development stage. At the end of their research, they found that businesses might also use different strategies to deal with the same stakeholders at various organisational life cycles.

Instrumental: The instrumental viewpoint emphasises that in aggregation with the descriptive aspect, the theory can be used to detect the possible relationship between stakeholder management and corporate goals achievement (e.g., profit maximisation and growth). Letza et al. (2004) pointed out that the instrumental stakeholder theory is only interested in the ‘means’ through which stakeholders’ value could be used to improve corporate performance and efficiency. Several studies have empirically concluded that corporate goals can be reached should firms adhere to stakeholder principles and meet their interests (e.g., Preston and Sapienza, 1990; Waddock and Graves, 1997; Aupperle et al., 1985; Kotter and Heskett, 1992). As advanced by Jones (1995), an instrumental stakeholder theory proposes that managers of firms that have an established cooperation and trust with their stakeholders will have a competitive advantage over those that do not. There was, however, no attempt to clarify what and how that trust could be built.

Normative: The basis for this form of stakeholder theory is to present an organisation from its moral and philosophical procedures for the management of that organisation (Marcus, 1993). In this instance, the stakeholders are to be regarded and treated as “ends” of “means” rather than a means to an end and therefore should be involved in the future direction of the organisation (Letza et al., 2004; Evan and Freeman, 1988). There is no critical measure of the association between performance and stakeholder management in this sense. Instead, it attempts to interpret the function of the association based on moral and philosophical principles. For instance, property rights given to a person does restrict their use of the property in a manner that does not harm other people close to that property. In order words, more is expected from companies by stakeholders than their standard legal requirements to operate their businesses. Such moral obligations can be placed on firms and not only on individuals, according to Quinn and Jones (1995). Firms can, however, be treated as moral “persons” as their internal decision structures enable one to describe the actions of managers as those intended for their business operations. Despite the arguments to support normative stakeholder theories, Wijnberg (2000) pointed out none of the studies has made any apparent ethical principles from which norms could be aligned to. Donaldson and Preston (1995) made it clear that these three forms of stakeholder theory are dependent on each other and interrelated. To them, the normative form which is related to how managers’ deal with corporate stakeholders is the most relevant and fundamental to the stakeholder theory.

Aside the extensive use and various attempts by scholars to investigate, the validity of stakeholder theory have been questioned. There is the argument that the influence of stakeholder on firms’ performance has no theoretical background and that Freeman (1984) only developed management techniques from the theory. Also, critics have pointed out that apart from identifying the external and internal stakeholders, stakeholder theory has failed to explain the dynamics within the relationship as expected (Key, 1999). In essence, there is no logic or causality reasoning from stakeholder theory to explain or predict firms’ behaviour (Jones, 1995). Another argument raised by Key (1999) is that stakeholder theory wrongly considers the business environment as static ignoring the systems and processes involved. As suggested by Wagner et al. (2011), the static idea should be dealt with since other factors can influence firm performance.

Notwithstanding the criticisms, stakeholder theory has been used by researchers to explain the relationship between interested parties and companies’ environmental performance. Kassinis and Vafeas (2002) investigated the relationship between stakeholder pressures and corporate environmental performance. They argued that organisational dependence on different groups of stakeholders would vary due to heterogeneity within groups. They focused on pressure from the local community and regulatory bodies with the expectation that they may influence organisations environmental performance. They tested for the impact of stakeholder pressures on industrial emissions studying 5043 distinct plants from chemical, primary metals and electric utilities in the USA and found that the higher the stakeholder pressure, the lower the toxic emitted. Sharma and

Henriques (2005) also examined how perceptions of different stakeholder groups by managers influence sustainability practices of the forestry industry in Canada. They found that industries and their respective stakeholders have moved beyond earlier practices like eco-efficiency and pollution control to a much-advanced practice redefining treatment processes. Murillo-Luma et al. (2008) explored the relationship between firms' effort to protect the environment and stakeholders demand environmental sustainability. They discovered that environmental pressure from stakeholder groups lead to an environmental proactivity on the part of firms but could not establish a link with firms' economic performance.

Extant literature has asserted that being proactive towards environmentally related issues can lessen compliance costs and other environmental related regulations fines (Hart, 1995; Shrivastava, 1995; Dechant and Altman, 1994). Also, firm efficiencies according to Shrivastava (1995) and Russo and Fouts (1997) can be improved when companies respond to their environmental issues in a positive way which could lead to a reduction in their operational costs. Other researchers have also pointed out that companies enjoy a competitive advantage when their products are recognised as eco-friendly by customers. Also, environmental proactiveness enhances corporate image and status as a way of highlighting the firm's loyalty to their key stakeholders. Some studies investigated customer reactions to product recalls by firms and found the relationship to be negative consistently except those in the auto industry (e.g., Bromiley and Marcus, 1989; Davidson and Worrell, 1992). This implies that customers would react to such announcement as well as companies' irresponsible activities which tend to cause legal fines, reduction in product patronage among others.

Waddock and Graves (1997) support the positive relationship where customers' perception of quality and safety of products may lead to increase in sales and a possible decrease in costs. In the UK for instance, consumers and environmental groups are increasingly made aware of the devastating impact of Greenhouse Gas emissions from corporate activities. Investors have made demands for environmental performance to be appropriately disclosed as well as initiatives by those companies to avert negative externalities. The government as a corporate stakeholder has required all large listed firms in the UK to report on their GHG emissions (DEFRA, 2013) where failure to comply attracts fines.

In a nut shell, since stakeholders such as owners, customers, employees, community, competitors, suppliers, social activist groups, and the general public among others do react distinctively towards poor environmental performance of companies; it is difficult to conclude the particular dimension of financial performance that could be affected. As already emphasised, customers might react by reducing purchases which will affect the company's sales. Competitors on the other hand might use that opportunity to backlash the company and perhaps even develop products that will snatch customers from the company involved. Suppliers are likely to withdraw supplies to a company with a poor environmental performance in order not to be associated with the performance. These possible actions by these groups of stakeholders would impact on the accounting-based measures such as Return on Assets and Return on Sales. Other stakeholders such as the owners (i.e., shareholders), social activist groups are likely to react by withdrawing their shares, ownership and alerting investors to deter from investing in such a company with poor performance. Considering these diverse effects, the current study thus employs stakeholder theory to investigate stakeholders influence on both environmental and financial performance.

2.2.2 Contingency Theory

Contingency theory as pointed out by Donaldson (2001) is a subset of the scientific contingency approach. According to him, contingency approach is where the influence of a variable on another depends on the impact or effect of a third variable. Thus, the change in the third variable or factor would influence the relationship between the two variables under study. With this knowledge, companies tend to adopt the structure that is suitable for their level of contingencies. In other words, there is a hypothesised association between contingency and organisational structure (Donaldson, 2001). Donaldson also posited that organisational structure changes when the contingencies variation in contingencies. In addition, organisational performance is affected when contingencies and organisational structures are fit.

Though many studies have investigated the relationship between environmental and financial performance, only a few have taken into consideration contingency theory (O'Higgins and Thevissen, 2017). According to Fridman and Ostman (1989), there is a logical explanation for the interrelationships among the sub-systems of organisations and also between corporate environment and the organisational system. Wherefore, no single organisational strategy can be applied to all organisations as there is no specific best way to structure an organisation when considering the contingency framework (Islam and Hu, 2012; Scott and Cole, 2000). For companies to be profitable, they need to structure and design their systems to be congruent with the contingent circumstances, especially, of their external environment. Contingencies in this instance include issues such as stakeholders' strategic relevance, economic conditions among others. Contingent theorists in the early 1960s were concerned of two main perspectives which are the organisational structure and leadership (O' Higgins and Thevissen, 2017).

However, recently, contingency theory has embraced other aspects such as decision making, strategic subsystems, managerial systems, economic crisis and circumstances among others. The underlying question is, would the relationship between environmental and financial performance lead to beneficial outcomes when any of the above-mentioned circumstances change? A hint to answering this question is given by Flynn et al. (2010) who suggested that the environment in which an organisation operation could shape its structure and processes towards a particular direction. In other words, an organisation's performance will be better if the demands of the environmental performance are being met adequately by aligning strategies, systems and processes. Such alignment has been interpreted in the strategic literature to be the interactive effect of the structural variables on organisational profitability (Van de Ven and Drazin, 1984).

Further, other contingencies such as environmental, natural resources and management variables have been pointed out in literature to have a significant influence on corporate performance (Luthans and Stewart, 1977). Similarly, Flynn et al. (2010) highlighted that these contingencies are imperative and could be considered as independent variables that affect organisational structure and systems which is likely to impact on the overall corporate performance. Specifically, existing literature refers to such independent effect as a 'fit' between the organisation and its contingencies when high performance is realised (Donaldson, 2001). According to Zona et al. (2013), the better the fit, the more effective and improved the organisation becomes.

A considerable amount of empirical and theoretical studies adopted contingency theory in their analysis. For instance, some studies examined board management (Zona et al., 2013), marketing (Zeithaml and Zeithaml, 1988), accounting systems (Waterhouse and Tiessen, 1978), performance measurement (Rejc, 2004) and corporate social performance (Ganescu, 2012) from the contingency theory lens. To understand and analyse contingencies, Donaldson (2001) emphasised that three main contingencies are involved when considering this theory on organisational structure. They are the environment, organisational size and strategy contingencies of an organisation. The environmental contingency, according to Pennings and Harianto (1992) affects the mechanistic structure of the organisation. Due to the efficiency in routine operations, having a mechanistic structure fits a stable environment and vice versa. In such a circumstance, managers and high-level staff are deemed to have the sufficient and requisite knowledge that is needed to make centralised decisions which foster efficiency.

Regarding the size contingency, Donaldson (2001) argued that the size of an organisation has a high probability of affecting its bureaucratic structure. That is to say that in the case of a large organisation, having a bureaucratic structure fits due to the tendency of repeating operations and administration which makes decision making to be efficient and inexpensive (Child, 1975). The converse is also true wherein small organisations, unbureaucratic structures will enable top managers to make decisions effectively and quickly as possible (Child, 1975). Therefore, a large company should not misfit by using a simple structure and a small company should not overwhelm itself by having a complicated structure in order for both sizes of organisations to become effective. The strategy contingency, on the other hand, affects the divisional structure of an organisation. Under an undiversified strategy, efficiency is enhanced in a functional structure when all the activities of the organisation is directed to provide a particular service or produce a single product. However, due to the diverse nature of activities within a divisional structure, a diversified strategy fits to ensure that various products and services are effectively coordinated their related divisions to meet the customers' requirements (Galbraith, 1974). These three aspects of contingency theory have to fit into the organisational structure in order to produce a corresponding output.

In relation to the current study where the relationship between environmental and financial performance is thoroughly analysed, contingency theory as discussed above appears to be germane and applicable. Husted (2000) and Ganescu (2012) both support the assertion that contingent theory is relevant in drawing strategies from environmental and social issues to respond to stakeholder and institutional pressures. O'Higgins and Thevissen (2017) also studied the financial effect of stakeholder activities before and after the crisis in industries. Their study drew on contingency and stakeholder theory to examine the circumstances under which corporate social performance influences corporate financial performance. They found that by working together with key stakeholders, companies CSR would lead to mutual value creation. The present study applies the contingency theory in construing the underlying reasons behind the empirical results.

2.3 Theories that Apply to CEP and Market Based Measures

It is no doubt that despite the relevance of having a multi theoretical framework, there is the need to specifically outline which aspects of the relationship a specific theory would be useful in its analytical application. As such, the researcher posits that the relationship between corporate environmental performance and market-based financial performance could be explained and analysed from some key theoretical perspective. This section will thus present the two theories (i.e., institutional and signalling theories) that are relevant to discussing the said relationship.

2.3.1 Institutional Theory

According to Meyer and Rowan (1977), institutional theory posits that the behaviour of firms' is influenced by the social context in which those organisations operate causing them to adopt related practices and structures. In other words, this theory explains the extent to which institutional norms and pressures affect the social change in firms. Scott (1995) added that building legitimacy and acceptance from external stakeholders are some main pressures that the institutional theory assumes firms encounter to accept norms in the society. In such case, legitimacy concerns compel organisations to adopt managerial practices that are expected to yield social value to them (Deephouse, 1999; Scott, 1995). In other words, by sticking to institutional guidelines, firms' end up reflecting their alignment to societal and corporate values (Meyer & Rowan, 1977).

Institutional theory suggests that firms benefit from their conformation to community expectations as managers also have the adequate motivation and capacity to repel such institutional pressures to the extent of creating financial ambiguity. Due to these reasons and with the issue of social pressure in mind, DiMaggio and Powell (1983) identified three main institutional isomorphic changes. Isomorphism in this context is described by Hawley (1968) as a form of process that constraints an entity or a unit to copy actions of other entities in the same population or environmental setting because of the similar conditions they face. From a corporate viewpoint, it can be referred to the similarity of the way things are done either procedural or structural of organisations in a particular sector by imitating each other or naturally occurring due to similar constraints (DiMaggio and Powell, 1983). According to DiMaggio and Powell, the three isomorphic changes (i.e., coercive, mimetic and normative) are empirically similar and not distinct from each other. Nonetheless, they are based on different institutional conditions and settings, thus resulting in different outcomes.

2.3.1.1 Mimetic/Imitative Institutional Pressures (Isomorphism)

Mimetic isomorphism, according to Mizruchi and Fein (1999), has attracted increased attention from academic researchers. In recent times, mimetic isomorphism occurs when a particular firm models its structure and practices after other organisations because it perceives that organisations' practices to be more appropriate and widely accepted. The crucial opinion is that there is uncertainty on the part of the business that imitates from others. A company that models itself on other companies usually have ambiguous corporate goals and might end up adopting imitated technologies and techniques they have little knowledge about (March and Olsen, 1976; DiMaggio and Powell, 1983). For instance, a study by

Ashworth et al. (2007) highlighted that the adoption of specific practices (e.g., environmental related practices) by management as a result of mimetic forces had an insignificant impact on corporate performance.

Usually, imitator firms regard those they want to imitate as high ranking (i.e., regarding success) in the society or to perform better than them in several ways and thus feel pressurised to mimic those practices in order to gain competitive advantage. Such mimicking behaviour could happen in several ways under different circumstances. Consequently, industry followers tend to adopt similar strategies like those of industry leaders in the face of new phenomenon of modern threats. Suchman (1995) argued that firms might no longer be motivated to imitate other companies socially accepted practices if the inflow of economic benefits ceases or decreases. However, it is likely that some firms might not necessarily consider the economic benefits but rather how the society accepts those practices. There could be an instance where a particular innovation in the provision of customer services implemented by a successful firm tends to be copied by other firms who also have the desire to be successful in the industry. In such instance, whether innovation brings about an improved financial performance or not, it might not necessarily be the primary concern of the imitator firm but rather to gain societal acceptance by letting the people know that they have similar innovation in place.

From an environmental management perspective, Cormier et al. (2004) highlighted that management policies such as environmental management policies and practices adoption are usually mimicked by firms especially those in the same sector whose operational practices are known to affect the environment adversely. Providing empirical evidence in support of mimetic isomorphism, Abrahamson (1996) also pointed out that, reporting on environmental practices and employing the services of consultants and management gurus have become accepted socially by firms that intend to improve their environmental performance. Recent institutional theorists (Westphal et al., 1997; Ansari et al., 2010) have focused on the aftermath of the adoption and implementation of imitated practices and strategies. They believe that the effectiveness of adopted strategy or practice under social pressure circumstance as discussed earlier on is likely to cause less attention to the management efficiency issues. It is, however, worthy to note that not all firms are influenced by such social pressures which imply that the social environment does not govern the operations of all the companies in the society.

Anderson et al. (1999) stressed that customer-supplier relationship had led many businesses to mimic environmental quality management standards. A study done in the USA by Khanna and Anton (2002) pinpointed customer focused firms which sell final goods to have a much comprehensive environmental management system than those who sell intermediate goods. Further, Christmann and Taylor (2001) found that increase in developed countries consumption of China goods influenced Chinese companies to adopt environmental management system (EMS) standard of ISO 14000 and improved compliance with environmental regulations. Another motivation such as the desire to be recognised as a good “neighbour” by companies according to Raines (2002) was also one of the primary incentives for businesses across fifteen countries to pursue ISO 14001 certification.

2.3.1.2 Coercive/Regulative Institutional Pressure (Isomorphism)

Pressures from both formal and informal forces whether internally and externally on organisations have a high tendency to lead to coercive isomorphism (DiMaggio and Powell, 1983). Most often, such pressures emanate from government bodies or other organisations those firms depend on for support in one way or the other. Scott (2005) pointed out that the imposition of sanctions and deployment of regulatory mechanisms on organisations by a government body tend to induce conformity by affected firms. Circumstances such as the imposition of taxes, reporting regulations, environmental regulations among others are mostly seen as political pressure and not technical and would coerce firms to conform and stay legitimate. In the United Kingdom, for instance, the mandatory environmental reporting by all large listed firms (DEFRA, 2013) could be regarded as political pressure in nature forcing firms to report on their environmental performance from a set standard. Since fines are attached to these pressures, managers will have to comply to avoid legal costs mostly and other possible adverse impacts on their reputation in the society, investor relations and market performance at large (Eesley and Lenox, 2006; Mitchell et al., 1997; Deephouse, 1999).

Considering the fact that environmental issues have become a primary social concern, firms in the polluting industries have attracted strong governmental regulations, increased attention from the media and an upsurge in environmental activism (Berrone and Gomez-Mejia, 2009). Such environmental activism like that of a competent environmental group in a society can point out the lapses in companies' environmental responsibility thus causing heightened social concern for that firm to improve their environmental performance (Delmas and Toffel, 2004). Berrone and Gomez-Mejia (2009) further argued that organisations operating in sensitive environmental sectors but with improved environmental performance tend to enjoy improved social legitimacy, organisational survival capabilities, which also lead to CEOs getting awarded financially. There is also another argument that property rights affect the extent to which corporations behave in socially responsible ways (Campbell, 2004). According to Berrone et al. (2013), compliance on the part of companies to protect the environment could shelter them from close monitoring of government bodies and stringent laws and regulations.

However, some researchers have argued that coerciveness may not necessarily be an effective means to lead to sustainable behaviours, but its implementation could also affect the outcome. For instance, Campbell (2007) mentioned a classic example which was pointed out by Lundqvist's (1980) earlier research on air pollution regulations in the US and Sweden in the late 1960s and the early 1970s which yielded different results. The Swedish authority included experts such as environmentalists, political parties, and business analysts among others in the negotiation process before implementing the regulation. The US, on the other hand, did not have such a rigorous process of consultation and thus set an impractical regulation that made corporations fought against the laws.

Most large listed firms such as those on FTSE All Share index are multinational companies and are required by regulatory bodies to comply with sustainable pressures as argued by Henriques and Sadorsky (1999) and Porter and Van der Linde (1995). Such compliance leads to firm legitimacy and ensures access to resources and organisational survival (DiMaggio and Powell, 1983; Zucker, 1987). The core of the coercive isomorphism argument is to enforce regulations that will induce firms to adopt similar practices and strategies. It is pertinent to note that majority of the environmental regulations are aimed at resolving environmental issues and not to squirm firms (e.g., air pollution, water and soil contamination). In the USA, the Environmental Protection Agency (EPA) for instance regulated the chemical and Oil and Gas industries to strongly rely on best technologies available to prevent their adverse impacts on ecosystem and the environment at large (Hoffmann, 2001). It is germane that coercion does not encourage voluntary activities from firms and thus should not be used in isolation of the other aspects of the institutional theory. Pfarrer et al. (2008) emphasised strongly that businesses are tempted to hide deviant behaviour for fear of being punished for non-compliance but not because they believe those practices are beneficial to their firms and the society.

2.3.1.3 Normative/Social Institutional Pressure (Isomorphism)

Normative isomorphism is primarily from professional associations and attainments. Professionalism, in this case, can be from two essential sources as identified by DiMaggio and Powell (1983). The first is from formal education and professional training which refers to those who received the training to act as trained. Also, since people with the same formal education level are selected for similar posts, their strategies and practices tend to follow a particular pattern which may shape organisational behaviour. The second aspect of professionalism is the span of professional networks, groups and bodies that model similar opinions and actions to be the acceptable procedure. This also breeds the exchange of information among people who are under the same “umbrella”. Their policies and practices are copied among themselves because of their joint association. This explained further that as the future of professionals in a company is tied to the success of the business itself, they end up adopting practices that fit their professions and are beneficial to the businesses.

Again, when companies have cultural or normative institutions in place, they become incentivised to engage in socially responsible attitudes as emphasised by Galaskiewicz (1991). Societal norms cannot be overemphasised when discussing this kind of institutional pressures. Norms are simply the set of standards for appropriate behaviour driven by appropriateness logic to receive societal acceptance according to the perceived practices and social expectations. Norms can override motives of material and economic interest which may aid in solving intractable problems vis-à-vis opposition to regulations. Also, norms are subject to deliberated change processes which may assist in resolving issues arising from unassailable cultural practices. It is vital to note that norms can obstruct or support compliance with government regulations (Tyler, 2006). Some scholars have argued that some types of norms are more influential in changing organisational behaviour than some other forms of pressure (Elster, 2009). For example, professionals with deeply rooted religious and ethical background especially influence and promote a particular behaviour in the organisation much more than they would have typically done.

Another instance is where organisations associated with charitable institutions would engage in socially responsible activities or philanthropic or moral actions due to their affiliation. A cross-national comparative study by Maignan and Ralston (2002) explored the motivations for socially responsible behaviour by firms in the UK, France and the Netherlands. They found three main motivations where the first one focuses on the value managers’ place on such behaviour. Second, they found managers to be motivated by the assertion that socially responsible behaviour improves their firms’ financial performance. Last, pressures from stakeholders such as community groups, regulators, environmental Non-Governmental Organisations (NGOs) and regulators were found to influence the adoption of sustainable practices. The differences in these institutional pressures imply that under different circumstances, one or two of the above-discussed isomorphism may affect a particular behaviour significantly than the other. For instance, Berrone et al. (2013) found that normative institutional pressures have a more significant impact on environmental innovations than that of coercive pressures from regulatory bodies.

Like most theories, the institutional theory has received a significant share of criticisms from researchers for being focused on isomorphism and homogeneity with less attention to heterogeneity. Delmas and Toffel (2008) posed a question of why organisations that face common institutional pressures adopt different management practices. They found out that due to different external stakeholder pressures that firms encounter differently, even under normal pressure, managers tend to adopt practices that appease their external stakeholders. This, therefore, brings to bear that other factors may lead to heterogeneity and not necessarily homogeneity as stressed by institutional isomorphism by DiMaggio and Powell (1983). Berrone et al. (2013) also emphasised that heterogeneity could arise when firms discover new methods which are idiosyncratic to that of the focal firm.

Other critics also raised the issue of language and individual role in the organisational processes which have been ignored by institutional theory. It has been pointed out that in the quest to determine an organisation's reaction to pressures most importantly environmentally related issues; management plays a crucial role as they take the final decisions. This is supported by Rao and Giorgi's (2006) view of the fact that organisations are interpretative and need the directors to decode, filter and translate information in the social system.

Despite the criticisms, institutional theory has been used by extant literature (e.g., Aragon-Correa, 1998; Delmas, 2002; Lawrence and Morell, 1995; Jennings and Zandbergen, 1995; Russo and Fouts, 1997; Delmas and Toffel, 2004) to examine why firms adopt environmental management practices. They all emphasised the importance of institutional theory in understanding the implementation of environmental management from all three perspectives (i.e., mimetic, coercive and normative). Large listed firms in the UK have been compelled by DEFRA (2013) to report on their environmental performance which was enforced after the voluntary reporting was initiated in 2009. This study thus intends to employ institutional theory in explaining how institutions could have influenced listed firms in the UK to improve their environmental performance (i.e., after the year 2013), or mimetic and normative (i.e., before the year 2013).

2.3.2 Signalling Theory

Signalling theory primarily addresses the issue of information asymmetry in a corporate environment. The signalling process goes through four main phases. First of all, there is a 'signaller' who sends a 'signal' to a 'receiver' who then gives a 'feedback'. Most often, the signallers are the insider members of staff, especially, senior employees who have access to obtain information on a product, organisation, individual, structure and other information that is not available to outsiders. The information gathered by the signaller may be negative or positive, and therefore communication should be done circumspectly. The receiver then accepts the information, assesses and analyses it and then send feedback to the signaller through their actions (Connely et al., 2011). Spence (1973), indicated in their seminal work that job applicants have a peculiar way of signalling prospective employers in the labour market by distinguishing their resumes and education papers from low-quality applicants. The intrinsic point he emphasised is that employers only get to know of prospective employees' qualification and suitability by going through the quality and distinct information produced by employees themselves. Making available such information reduces the information asymmetry.

In terms of corporate environment, signalling model and theory has been applied to differentiate between high quality and low-quality firms (Kirmani and Rao, 2000). For instance, it is possible that an organisation could be doing very well but perhaps because the company is not listed on the stock market, customers and investors might not be aware of such better performance. In order to bridge such information asymmetry gap, it would be beneficial for those companies to signal their performance by finding other means to make the information available. As emphasised by Chithambo (2013), information is a crucial and critical aspect of the relationship between a buyer and a seller. It is evident that a buyer would only patronise a product when they have the adequate information on the perceived expectations and the relevance of that product before the exchange is made (Morris, 1987). Due to competition in the market, signalling customers by emphasising on the quality of a product will attract a customer to change whom they would buy from immediately.

In the same vein, there are a number of ways through which organisations can signal information about their environmental performance. One of the popular signalling methods is the voluntary disclosure of CSR and environmental issues (An et al., 2011; Watson et al., 2002). By disclosing the voluntary environmental performance, firms are signalling investors and shareholders on their corporate performance which could be a basis for an investor to make an investment decision. Thus, for environmentally conscious investors and shareholders, the signalling of improved performance through disclosures and reporting might motivate them to invest more in a company. Such signalling of information will also notify regulators and government agencies on the compliance nature of the organisation to either attract intervention or stringent deadlines.

Regarding firm financial perspective, Connelly et al. (2011) pointed out that a reduction in organisational debt and dividend may give mixed signals to investors. For instance, reducing firm's debt might imply that the financial inflows of a company is being improved and thus signifies a positive performance. In contrast, reduction in dividends sends a signal to shareholders that they would not be earning so much and therefore might assume that the company's performance could be dwindling. Signalling theory provides a fundamental basis to predict how the stock market would react to news of environmental performance and management. According to Bergh and Gibbons (2011), the above average financial performance information could present an impression of a commitment to improving their factors which would lead to higher performance.

On the other hand, below average financially performed firms might also signal on a particular improvement, for example, adopting a particular environmental practice and that could signal the stock market of a potential improvement in the future value. Undoubtedly, managers of high performing companies would choose policies that allow their higher performance to be disclosed in their annual reports and media platforms whereas low performing firms will instead hide their poor performance from the public scrutiny and awareness (Morris, 1987; Cai et al., 2007). It is also possible that some managers disclose information on their companies improved performance to suit their personal interests as well and not necessarily for the benefit of the company (Campbell et al., 2001). Since companies' stock prices are used as a proxy for financial performance in the current study, it is pertinent to adopt signalling theory when investigating the possible relationship between environmental performance and stock prices.

2.4 Theories that Apply to CEP and Accounting-Based Measures

Accounting-based measures are equally important when considering short term economic performance of firms (Gentry and Shen, 2010). In order to fully comprehend the underscoring reasons that could lead to a positive or negative relationship between CEP and accounting-based measures, agency theory and natural resource-based view theory are employed by the researcher in this section to explain further.

2.4.1 Agency Theory

According to Ross (1973), agency theory is one of the oldest and yet commonly accepted theories used to explain the interactions of organisational relationships in corporations. Jensen and Meckling (1976) referred to agency relationship as a contract established where one party known as the principal appoints another called the agent to carry out some services on his/her (i.e., the principal's) behalf. In doing so, the decision-making authority is being handed to the agent to conduct his/her assignments. The fundamental problem here is with the separation of control and ownership which is termed as the agency problem mainly from the different interests exhibited by owners (shareholders) and agents (managers) of businesses (Jensen and Meckling, 1976). Agency problem arises because it is impossible for the agent to be perfect in his decisions keeping in mind his/her welfare and that of the principal (Brennan, 1995). Some researchers are of the assertion that most corporations are being managed to benefit the managers' interests and not that of the owners (Berle and Means, 1932). Such belief could be linked to the fact that managers tend to benefit the least from pursuing shareholder objectives rather than theirs. Kirkbride and Letza (2008) emphasised that managers tend to only work towards corporate goals when those goals also serve their interests. Even when managers pursue the goals of shareholders, they bear the entire cost of whatever decision was taken (Bowie and Freeman, 1992). As a result, managers feel mistreated and are thus motivated to achieve their personal goals which in turn intensify the agency problem and increases agency costs.

According to Jensen and Meckling (1976), agency costs can be classified into three broad categories which are the monitoring, bonding and residual costs. Other researchers have also intertwined these agency costs with issues of moral hazard, risk aversion, earnings retention and residual loss agency conflicts (see Ross, 1973) which are embedded in the three main aspects and discussed in the succeeding paragraphs.

Monitoring cost: This is where the principal bears the costs to observe, control and measure the actions of an agent. It is mainly as a result of the need to mitigate the loss of share value as well as ensuring managers act in alignment with shareholders' interests. McColgan (2001) emphasised that monitoring costs could include audit costs, the cost of signing compensation contracts for executives or the even the cost of firing a manager. Though these expenses are directly borne by the principal as said earlier; they have been argued by Fama and Jensen (1983) to be paid by the agents through adjustment of their compensation. Thus, the role of monitoring is usually placed in the hands of the board of directors (Fama and Jensen, 1983). Different classes of principals have distinct incentives and strategies to monitor their agents as stressed by Kumar (2004). This is because some shareholders may use various ways to monitor directors (i.e., principals) to ensure an increase in firm performance. It has been established in existing studies that shareholders with significant investments in a company are highly involved in monitoring management's performance than those with small investments. For instance, Sarkar and Sarkar (2000) found evidence in their study that foreign equity ownership has a beneficial impact on the value of a company. Their empirical evidence was supported by Kumar (2004) who also found that equity ownership by dominant group influences firm performance. In this case, it is straightforward for shareholders with significant holdings to join forces and influence board of directors' decisions.

Apart from the regular monitoring from principals, there could be some regulatory pressures to monitor the behaviour of managers (McColgan, 2001). For instance, UK companies are obliged to provide their corporate governance report, and where they are not compliant with the regulations, they have to explain their reasons in the report. Such disclosure of compliance or non-compliance calls for increased monitoring of the behaviour of managers in those firms.

Monitoring is beneficial in many ways to both the owners and for the survival of the business. It has been reiterated that surveillance assists in averting the issue of moral hazard which may be posed by managers. Moral hazard, in this case, could be exhibited by managers when they resolve to pursue principals' objectives by investing in projects that suit their skills (Shleifer and Vishny, 1989). Studies have shown that managers do this to increase their replacement costs since their qualifications would be required to sustain such investment project. The possibility of such kind of behaviour being discovered and averted is through an effective monitoring system. Jensen (1993) made it clear that the problem of moral hazard is likely to be more paramount to larger companies like the FTSE 350 firms which are used in this research as compared to smaller companies.

Despite the necessity of monitoring, it becomes tedious especially in the case of large listed firms to externally monitor companies as their size expands. Also, when managers become accessible to substantial funds without any substantial investment requirements, monitoring the utilisation of such funds becomes a difficult task. Especially, investing in environmental efficient equipment and processes may not be a priority for managers in such position should they believe their activities have no direct impact on the environment.

Bonding Costs: These are costs borne by the managers as they develop structures and strategies to act in the best interest of shareholders. These costs are not always in financial terms but could also be costs related to the disclosure of additional information. McColgan (2001) emphasised that when the marginal decrease in monitoring equals the minimal increase in bonding costs, managers cease to bear any more bonding costs. Denis (2001) also argued that through optimal bonding contract, managers could be enticed into making decisions that only have the shareholders' interest as the focus. However, it is impossible for managers to do everything that satisfies only shareholders and therefore writing a binding contract that is less than perfect will encourage them to a large extent to pursue managers' goals.

In the UK, it is intriguing to find that a bonding structure places a requirement on managers that it is only after meeting business requirements that incomes from closely held companies can be distributed (McColgan, 2001). According to Jensen (1986), managers prefer retained earnings whereas shareholders expect higher dividend distribution usually when investments opportunities have positive net present values. Jensen in his analysis highlighted that managers benefit more from retained earnings as their firm grow to gain much power and ability to overpower the board to award themselves higher remuneration levels. The fruition of such enhanced power tends to strengthen their job security while shareholders, on the contrary, suffer losses in their wealth. This has been empirically evidenced by Lang and Stulz (1994) in their study where they found out that shareholders' wealth declines and tend to be on the verge of damage when managers decide to retain earnings for their personal future benefits.

Residual Loss: Though monitoring and bonding are meant to ensure agents act in the best interest of principals, their interests are still unlikely to be aligned fully. Thus, there are other losses that could arise from their relationship and these losses are known as the residual loss (McColgan, 2001). Such losses occur when the cost involved in enforcing a full principal-agent contract far outweighs the derived benefits from that contract from both managers and shareholders perspective.

Further, the issue of time horizon conflict in agency contract may arise between managers and shareholders when shareholders are concerned about cash flows for the foreseeable future whereas managers tend to be concerned about cash flows during their term of employment. According to Dechow and Sloan (1991), this problem is heightened when top directors approach their retirement period. They argued that directors in such circumstance, for instance, opt to cut down on the company's research and development expenditure with the perception that they would not profit from the perks of the investment in the future.

Regarding the adoption of environmental management practices, agency theory could shed some light on how managers employ those practices for their benefits and shareholders satisfaction. Managers prefer that financial benefits of engaging in those environmental practices should outweigh the cost of engaging in environmental practices (Ness and Mirza, 1991). This could be as a result of their quest to reduce agency costs because they bear the entire related expenses as according to Jensen and Meckling (1976). No matter the decision managers arrive at either improving their corporate environmental performance or not, shareholders expect to live in a safer environment. Simply put, when operational activities of a company cause harmful effect on the environment such as oil spills, air pollution among others, shareholders tend to put pressure on corporate directors to rectify those problems no matter the costs.

Moreover, such a company would also be expected to report its environmental and social performance in official public documents. The publication of the information would have to depict the actual picture of the firms' performance and not fiction. It is no doubt that information is regarded as a commodity with a price tag. Nevertheless, company directors and managers need to invest in efficient information systems to relay issues occurring in the organisation to the shareholders. It is also inevitable that the future of firms is uncertain regarding their success, bankruptcy or intermediate outcomes and the relevant factors such as governmental regulations which are environmentally related may affect the firms' outcome and performance.

Hirsch and Friedman (1986) mentioned that the main performance measure that could be explained by agency theory is a company's stock price. According to them, extant studies advanced investigations into firms' performances where agency theory was used as the underlying premise of why companies stock prices do fluctuate. Because this study focuses on listed companies in the UK, applying the agency theory would demonstrate a clearer picture of how the Stock market reacts to environmental management practices of firms. For instance, the Stock market value may decrease if shareholders perceive managers to be damaging the environment and refusing to halt their actions. In case such an event happens, , an opportunity may be created for another ownership team to acquire enough shares to select new representatives on the board for monitoring and changes in policy to suit owners' interest and realised the real potential of the company.

Nonetheless, there is no certainty on how both interests would be satisfied. As stressed by Nilakant and Rao (1994), the relationship between managers and the consequences of their decisions may be weak no matter the state of the relationship. For instance, the outcome of an organisation investing in or developing new technologies and processes could be unclear and uncertain when environmental changes occur. A typical example is the case of the mass production system which became obsolete after the introduction of the "lean production system" in the automobile production industry (Womack et al. 1990).

Notwithstanding, agency theory has been used to determine the influence of Chief Executive Officers (CEO) and board directors on environmental management strategies. Berrone and Gomez-Mejia (2009) investigated whether good environmental performance tends to increase CEO pay and vice versa. By using a longitudinal data of 469 US companies, they found out that firms with specific environmental pay policies and even a corporate environmental committee do not reward their CEOs more than those without such policies. However, their results indicated that CEOs long-term pay incentivise them to establish pollution prevention strategies. Heleblian and Finkelstein (1993) also examined 47 companies and discovered that companies with large board size tend to perform better environmentally than those with dominant CEOs.

Analytically, the current study reasons that CEOs with dual role may influence their firms' environmental strategies to gain long-term pay but not necessarily because of their commitment to environmental safety. The flip side of this research's argument is that, agency theory presents some reasoning and deductions which point out that though shareholders want their wealth to be maximised, they also prefer companies to be rid of environmental compliance fines and improve their environmental performance.

2.4.2 Natural Resource-Based View Theory

The NRBV is said to be an extension of the resource-based view (RBV) theory which was developed through an earlier work by Penrose (1959) who made significant contributions towards it. Her main argument was that the growths of firms depend largely on the management of bundled available resources. Wernerfelt (1984) theorised in his research the "RBV" theory with evidence to support how a business success is much affected by its resources. There are two fundamental assertions by the earlier theorists of RBV after the work of Wernerfelt (1984) which are the heterogeneity and immobility of resources. The underlying assumption of this theory is that companies' resources and capabilities influence their competitive advantage. Resources in this instance simply refer to companies' possessions, physical, financial, employees' skills and even organisational processes while capabilities, on the other hand, refer to those actions a firm can perform drawing from its resources.

Most studies concentrated on intangible resources (e.g., managerial skills) of a firm ignoring other resources such as buildings, finance. Some scholars (e.g., Andersen and Kheam, 1998; Foss, 1997) have stressed the relevance of enlarging the scope of resources beyond just the intangible ones. For instance, Foss (1997) claimed that tangible physical assets could aid firms to gain competitive advantage. Regarding capabilities, Galbreath (2005) conducted an exploratory study by surveying 56 managers on the MBA course at the Curtin University of Technology in Australia. He used managers' capabilities (e.g., manager expertise), intellectual property assets (e.g., trademarks), organisational assets (e.g., contracts), reputational assets (e.g., customer service reputation) and tangible assets (e.g., buildings, financial investments) as the main variables. His findings show that capabilities contribute more to the success of firms than the other intangible and tangible assets. In general, the intangible resources were found to be significantly relevant to firms' success than the physical ones.

To further investigate the use of RBV, Barney (1991) pointed out that resources must be valuable, not able to be imitated, rare and supported by tacit skills for a firm to sustain its' competitive advantage. He further explained that a resource could be said to be valuable if it can increase the willingness of customers to pay for its related product or service. The rareness of the resource will give the company premium and strong competitive superiority over its competitors as well as inimitability of that resource. Also, the skills with which an organisation manages resources may add value to that company. Much relevance has been placed on firm capabilities and environmental factors in playing a critical role in corporate sustainable competitive. Due to its relevance, several other studies have employed the use of RBV in their investigations. In fact, RBV has become a pivotal theoretical perspective in most strategic management literature till date (see, e.g., Dierickx and Cool, 1989; Barney, 1991).

Nonetheless, the theory is constraint by its omission of the natural environment contributes to sustained competitive advantage. It is vital to note that the natural environment affects significantly by growth in population in that as population increases over the years, environmental impacts (e.g., toxic emissions, water and air pollution, chemical spills) of corporate activities also upsurges. It is thus inevitable that businesses cannot survive on their own shortly without the use natural environment (ecosystem).

From this shortfall of the RBV theory, Hart (1995) introduced a conceptual framework of the natural resource-based view (NRBV) theory to incorporate the natural environment impact on a firm's competitive advantage. He posits three main relevant strategies under the NRBV are the pollution prevention (e.g., reduction of waste and effluents), product stewardship (e.g., reduction of cost in product lifecycle) and sustainable development (e.g., minimisation of environmental burden about business growth). According to him, each of these three has a distinct source of competitive advantage, built on different critical resources and had separate environmental driving force.

Pollution Prevention: Due to previous and recent environmental issues, firms have been pressured to reduce and avert emissions from their operations. For instance, the Superfund Amendments and Reauthorization Act (SARA) enacted in 1986 by the US government required large companies to disclose their toxic emissions level. In 1988 alone, US businesses that reported through the Toxic Release Inventory (TRI) discharged 10.4 billion pounds of toxic substances into the environment. Such awareness of the danger companies' emissions caused on the environment by the public influenced managerial decisions. For example, managers of the automotive, pulp and paper, electronics and the petrochemicals industries among other "dirty" industries were influenced to redevise their pollution abatement mechanisms. The abatement of pollution can either be achieved through pollution control or pollution prevention. Pollution control deals with the "end-of-pipe" emissions proposing that emissions through the use of pollution control devices be stored, trapped or disposed of. Pollution prevention, on the other hand, is concerned with measures to reduce total waste at the end of a process by adopting process innovation, material substitution, recycling or even keeping an improved housekeeping.

As pointed out by Hart and Ahuja (1994), companies can gain a proportion of cost advantage by realising significant savings through pollution prevention compared to their competitors. Smart (1992) for instance emphasised that not only does pollution prevention help save costs of investing in expensive pollution control equipment but also it increases firms' efficiency and productivity. Also, there is the perception that as less waste is produced; it implies that companies are properly utilising inputs and raw resources. Rooney (1993) highlighted that organisations could avoid compliance and legal costs if they cut their emissions below the set levels. Cutting down on pollution-related charges improves financial cash flows and corporate profits. Empirical evidence (Hart and Ahuja, 1994; Rooney, 1993) has made it clear that companies that invest in pollution prevention strategies reap the "low hanging fruits" benefits. However, it is important to note that emissions reduction could be more difficult as corporate environmental performance improves because it requires significant changes in production processes and technology for product development. According to Hart and Dowell (2010), pollution prevention simply seeks to prevent emissions and waste rather than cleaning waste "at the end-of-pipe" plus associated costs.

Product stewardship: Product stewardship is the expansion of pollution prevention in the products life cycle. Thus, through stakeholder pressures, the product design can absorb environmental conservation measures to be advantageous to that company. Hart (1995) emphasised that activities at all levels of the value chain ranging from accessing the raw material, through the various production processes to the end products should have what is termed as the "environmental voice". In other words, environmental impacts should be assessed at each stage of the product development. It is for this reason that some organisations such as Green Cross and Green Seal rate products based on their impacts on the environment. Green products for that matter should have low environmental life-cycle costs by reducing the usage of non-renewable products; avoid the use of toxic substances while using renewable resources instead. Studies on product stewardship and firm performance have advanced in strategy, marketing and operations management literature with some interesting findings. Some scholars (e.g., Lave et al., 1998; Fowler and Hope, 2007; Linton et al., 2007) employed case studies in exploring this relationship while others (e.g., Pujari et al., 2003) used surveys.

A recent study by Pujari et al. (2003) found that top management's support, as well as coordination of different departments, was significant factors for the success of the improved environmental performance of new products. Matos and

Hall (2007) also used grounded theory to explore product stewardship using life cycle analysis as their focus. They emphasised that organisations that approach product lifecycle as disconnected are less likely to develop successful strategies for their product stewardship. They also argued that organisations should understand the interdependence of product development processes to develop strategies for product stewardship. Investigating into oil companies, Sharma and Vredenburg (1998) also discovered that companies with higher stakeholder integration competencies could motivate proactive environmental strategies and components of product stewardship.

Sustainable development*:* As Brundtland Commission (1987) defined; sustainable development is ensuring that the needs of the present generation are met without compromising the needs of future generation to be completed by them. Sustainable development constitutes the social (i.e., people), economic (i.e., profit) and environmental principles (i.e., planet) principles popularly referred to as the 3P's (Muschett, 1996). These three core principles need to be considered simultaneously should a company want to develop sustainably. In other words, they can be integrated in such a way that strategies are developed towards achieving sustainability. However, since the greater part of the environmental feature has already been covered by pollution prevention and product stewardship, Hart (1995) emphasised more on the social and economic aspect. Thus, all adverse links between social activities and overall performance (i.e., financial and environmental performance) of companies need to be severed.

Economic and social activities may not necessarily be sustainable with existing technologies and production systems and need to be adequately monitored. Companies pursuing sustainability should develop strategies that will commit to developing their long-term market and investments goals. Sustainable development strategy should create the opportunity for firms to achieve sustained competitive advantage through the use of rare, inimitable, valuable and non-substitutable resources. The use of technology and competency play a vital role in developing sustainable strategies. Porter (1985) for instance evidenced in his work that competition standards in an industry can be raised through the use of information technology (IT) to create a competitive advantage for firms with an improved IT system. Rivard et al. (2006) also found evidence that IT system, directly and indirectly, supports both firm performance and organisational strategies. Directly, information technology used to reinforce companies' valuable resources tends to improve corporate financial performance while indirectly it can contribute to the formulation and implementations of practical strategies that influence market performance.

Both the RBV and the NRBV have been used extensively by researchers in management literature over the years across different sectors (e.g., Barney, 1991; Walls et al., 2008; Aragon-Correa and Sharma, 2003; Chan, 2005; Coates and McDermott, 2002; Rivard et al., 2006; Menguc and Ozanne, 2005). Employing RBV, Russo and Fouts (1997) found evidence of a positive relationship between economic and environmental performance of 243 firms with industrial growth as a moderator. They found that as companies grow, their environmental performance also improves thus, supporting the viewpoint of "it pays to be green". However, they were careful to note that the level to which a firm can prevent pollution is primarily based on their resource base.

NRBV has recently emerged as a dominant paradigm in the field of assessing the relationship between the natural environment and strategic management (Walls et al., 2008). According to Walls et al. (2008), it is the general perception that companies which incorporate proactive environmental management into their corporate strategies have a sustainable competitive advantage over those who do not have any. Aragon-Correa and Sharma (2003) for instance used the NRBV to propose how competitive environment dimensions can influence management's strategies. They supported the assertion of a positive relationship between proactive environmental strategies and firm performance and pointed out that in addition to pollution prevention and control technologies, organisations need to identify and analyse crucial human and organisational resources. They also recognised that corporate environmental strategies might be influenced by organisational, managerial, stakeholder and institutional pressures and advocated that policymakers should provide enough incentives for pollution prevention innovations while eliminating fossil fuels and other non-renewable materials subsidies. However, they made it clear that the adoption of few environmental practices or proactive approaches may not necessarily cause a firm to have a competitive advantage over its competitors. In Australia, Menguc and Ozanne (2006) studied the impact of natural environmental orientation (i.e., commitment to the natural environment, corporate social responsibility and entrepreneurship) on corporate performance of 140 manufacturing firms. They found evidence to support the underlying conception that valuable organisational resources have a positive impact on overall performance.

The use of NRBV is very critical to the current study which primary objective is to investigate the relationship between corporate environmental performance and financial performance. The tangible and environmental resources of firms would be analysed in the current study with much stress on the natural resources. The impact of many variables on natural resources cannot be overemphasised, especially, as the human population grows. For instance, the UN has estimated that a population around 8 to 12 billion could have a catastrophic impact on the natural environment including soil erosion, air pollution, deforestation among others. Consequently, corporations would have to advance strategic environmental policies in reducing their emissions level. Through the assessment of a company's commitment to protecting the natural environment, it could be described as environmentally friendly or not (Henriques and Sadorsky, 1999). Since the current study seeks to identify the environmental management practices corporations employ, the NRBV can highlight those key resources firms place importance on before venturing into a particular environmental practice.

2.5 Summary and Conclusion

Extant literature on corporate environmental and financial performance relationship analysed their studies from different theoretical angles. Some scholars investigated why companies adopt environmental management practices in the first place (Montabon et al., 2007) even before assessing the theoretical perspective from which their environmental and financial performances are linked. Some researchers believe that economic and social reasons could be the rationale behind the adoption of environmental management practices. It is because of these reasons that some theories have been pointed out to be crucial in investigating the relationship between environmental and financial performance.

The impact of stakeholders on the adoption of environmental management practices is very critical for consideration in this aspect and cannot be overlooked. As discussed above, customers, government bodies, and other stakeholders have influenced companies in adopting various environmental practices to sustain their competitive advantage. Though stakeholders would suffer a loss in their market investment when their businesses are publicly known for damaging the environment, the survival of the firm is also at stake which poses a security risk to executives' jobs. An overlap between institutional theory and stakeholder theory at some point cannot be disregarded. This is because institutions are also seen as part of stakeholders making them a subset of stakeholders.

Contingency theory aids in understanding the circumstances under which environmental performance and financial performance would be related. For instance, since environmental performance measurement have been categorised into two main dimensions, it would be beneficial for interpretation purposes that some vital contingencies are taken into consideration. Signalling theory is also employed in this study due to its conceptual emphasis on how information to external stakeholders might impact the overall performance of a company. Most importantly, as stressed by Bergh and Gibbons (2011) impact of corporate performance information on stock prices can mainly be explained from the signalling theory standpoint since stock prices oscillate a lot within a market day.

Also, the institutional theory assumes multiple external pressures constrain the organisational choice and that organisations are concerned with building legitimacy and acceptance vis a vis external stakeholder. It describes how an organisation adopts practices that are considered acceptable and legitimate within its organisational field (Scott, 1995). The main thesis of institutional theory is that organisations enhance or protect their legitimacy (Scott, 1995) by conforming to the expectations of institutions and stakeholders (Aldrich and Fiol, 1994; DiMaggio and Powell, 1983). There are the regulative, normative and cognitive dimensions of the underlying institutional environment. About regulation, the level of regulatory complexity of the institutional environment represents significant barrier to managers. The cognitive, institutional environment relates to the subjectively held values and beliefs that limit behaviour and tend to operate on the level of culture and language (Bruton et al., 2010). Using institutional theory in environmental management studies is very common in existing literature to help explain the reasons behind improved environmental performance (Delmas, 2002; Hoffman and Jennings, 2015).

Agency theory has been mentioned to be a relevant concept behind this relationship. The agency theory deals with the impact that separation of ownership and control has on the shareholder-manager relationship (Jensen and Meckling, 1976). Agency conflict arises when managers tend to pursue their interests ignoring shareholders' goals. Such conflicts could be in the form of moral hazard, time horizon, earnings retention and risk aversion. In events of these conflicts, agency costs cannot be overlooked. These agency costs as emphasised by Jensen and Meckling (1976) can be categorised into monitoring costs, bonding costs and residual losses. The most underlying issue in this theory is the need for managers to disclose information for shareholders to keep abreast with current circumstances.

Another standpoint to understand the relationship between environmental and financial performance is through the natural resource-based view lens. As pointed by Hart (1995), firms may improve their environmental performance through pollution prevention, product stewardship, sustainable development or the combination of all three. In other words, the investigation to determine whether pollution prevention, production stewardship or sustainable development can improve financial performance could be from the natural resource-based view theory perspective. Since this theory is an extension of the resource-based view, intangible resources and firm capabilities all play a crucial role in determining which of the three aspects of the natural resource-based view will be adopted by businesses. In this case, managers' competence in understanding the natural environment is vital to developing environmental strategies. However, whether they will use their skills well for corporate advantage or personal goals brings to light an interrelation between agency theory and natural resource-based view.

From the preceding sections where the theories have been reviewed, it is clear that more than one theory underlie the adoption of environmental practices and improvement of environmental performance. Besides, existing evidence suggests that no single theory is satisfactory enough to fully explain the rationale behind environmental management and performance (Toms, 2002). Also, identifying a positive or negative link between financial performance and environmental performance has been demonstrated by extant scholars to be explained by these theories. The theories are seen to interrelate as they are not too distinct and thus complement each other in establishing such a link (Healy and Palepu, 2001). Therefore, based on their interdependencies, the study adopts a multi-theoretical approach in investigating corporate environmental management and financial performance.

CHAPTER THREE

EMPIRICAL LITERATURE REVIEW

3.0 Introduction

This chapter aims to review the available literature on the Corporate Environmental Performance (CEP) and Corporate Financial Performance (CFP) association by identifying consistencies in research findings and gaps. This present study will help bridge the gaps as tailored towards the research objectives. Section 3.1 of the chapter will discuss the nature and scope of the environmental management and performance practices (EMPs) adopted by large UK firms with an emphasis on the critical environmental issues raised by DEFRA (2013). The rationale behind this is to determine and indicate the EMPS commonly employed by firms in the UK from a comprehensive multi-sectoral perspective (e.g., Montabon et al., 2007; Lucas, 2010). Section 3.2 will provide reviews on relevant extant literature that has investigated the relationship between environmental performance and firm financial performance under the classifications of DEFRA's key environmental issues (e.g., Jaggi and Freedman's, 1992; Hart and Ahuja, 1994; Konar and Cohen, 2001; Nakao et al., 2007; Teles et al., 2015). Section 3.3 examines the controlled variables which have been classified into corporate governance and firm characteristics that affect firms' financial performance (e.g., Harris, 1988; Min and Smyth, 2014; Al-Matari et al., 2012; Niresh and Thirunavukkarasu, 2014). Section 3.5 brings to bear the limitations in extant literature and the need for further research. Section 3.6 will finally conclude the whole chapter.

3.1 Corporate Environmental Management and Performance

Different definitions of environmental management and environmental performance have been given by researchers in existing literature (Albertini, 2013; Crammer, 1998; Klassen and Whybark, 1999). According to Albertini (2013), corporate environmental management is the embodiment of environmental management, environmental performance and environmental disclosure. Environmental management is further described by Crammer (1998) as the process of reducing firms' environmental impact on the natural environment by adopting organisational and technical activities.

Environmental performance, on the other hand, has been simplified by Klassen and Whybark (1999) as the output of environmental management thus the impacts of those activities firms engage in on the environment. Firms employ some policies, techniques and procedures with the primary objective of controlling and monitoring their operational impact on the natural environment (Montabon et al., 2007). Present literature has suggested that the recent popularity of such practices in operational research is as a result of the voluntary and international environmental standards such as ISO 14001 (Montabon et al. 2007; Sroufe, 2003). It is vital that to explore the nature of organisational impacts on the environment, the critical environmental issues firms should consider in decision-making are highlighted.

Because the current research is based in the UK, the environmental performance key indicators drafted by DEFRA (2013) is adopted in this study with the motive of pointing out the environmental management practices (EMPs) firms do engage in. There are six main indicators enlisted by DEFRA which this study has redefined as the "six (6) key environmental management practices (KEMPs)". It is necessary to point out that each key environmental management practice encompasses sub-issues which will be discussed later in other chapters of this study. The "6 KEMPs" and their association with businesses performance are discussed below.

3.1.1 Greenhouse Gas Emissions Management

Greenhouse Gas emissions are grouped into three main scopes namely Scope 1, Scope 2 and Scope 3 by the GHG Protocols Standard (2012). Scope 1 emissions are those direct emissions from sources owned and controlled by a company such as fuel combustion and fugitive emissions. Scope 2 emissions, on the other hand, are indirect emissions from purchased and consumed electricity. Scope 3 is also another class of indirect emissions from both upstream and downstream sources which are not controlled or owned by the company.

Firms' especially large ones are noted to emit a significantly tremendous amount of GHGs into the environment mainly from energy use in production activities, and therefore the need to reduce their emissions and prevent global warming (e.g., Bradford and Fraser, 2008; Bernstein et al., 2007) has become a global concern. The industrial combustion of fuel, for instance, was recorded in Japan to have accounted for 26.2% of the 2008 total GHG emissions (GHG Inventory Office of Japan, 2010). Borland and Paliwoda (2011) suggested in their findings that the usage of non-renewable resources like fossil fuels and natural resource increases GHG emissions. They emphasised the need to shift to use renewable resources and exploit fewer resources for lesser environmental impact. The industrial sector, for instance, uses more energy than any end-use sectors and currently consumes about 37% of the worlds' total delivered energy. Energy is consumed in the industrial sector by a diverse group of industries including manufacturing, agriculture, mining, and construction and for a wide range of activities (Abdelaziz et al., 2011). Existing evidence has indicated to governments and policymakers the potential of cost-effectiveness derived from a reduction in industrial energy use and also the likelihood of a reduction in GHG emissions (Tanaka, 2011).

Supply chains of businesses are also known to be part of the key sources of GHG emissions and other toxic wastes in the USA (Delmas and Nairn-Birch, 2011). For instance, 85% of the total carbon footprint of firms after a life cycle assessment was noted to have emanated from the supply chain sources and also responsible for two-thirds of all the toxic wastes in the primary economic sectors in the USA (e.g., Rosenblum et al., 2000). It has, therefore, become imperative to note that management of carbon emission efforts should cover the sub-sector activities that tend to contribute to GHG emission. For instance, in the UK, EMPs geared towards reducing GHG emissions are advocated to target vehicles, furnaces, purchased electricity, boilers, and heat, among others as suggested by DEFRA (2013).

Busch and Hoffmann (2007) suggested that the manner in which GHG emissions are managed could either provide extra business opportunities or increased a business risk which is a managerial choice to be made. In trying to find empirical evidence for the relationship between GHG emissions and firms' performance, two different schools of thoughts have polarised it. The first school of thought have argued out the win-win link while the second school of thought, the win-lose (Boiral et al., 2012). The second viewpoint seems to be popular in international debates of reducing GHG emissions as most firms are known to believe results in high costs that could undermine their business competitiveness. Nonetheless, Stubbs and Cocklin (2008) and Pulver (2007) have argued otherwise stating that GHG emission reduction rather improves firms' competitiveness that motivates many stakeholders. Existing literature, unlike international debate, is dominated by this win-win school of thoughts providing and presenting empirical evidence to support the logic behind it.

Ziegler et al. (2009) have emphasised that the difference in existing literature results could be as a result of the country under study and the related carbon regulations. For instance, in the UK, a report by DEFRA (2006) showed that the power generation sector and transport industries are the most significant contributors to GHG emissions emitting a total of 37% and 22% respectively. Consequently, some policies and stringent regulations are advanced which focus on large companies and industries to actively reduce their GHG emissions (Dunn, 2002). That is, the extent to which a business will engage in EMPs that will reduce GHG emissions will depend mostly on country-specific regulations. In other words, different carbon policies in the European Union and the United States, for instance, will have a different impact on firms regarding designing and engaging in EMPs yielding different results from these two different zones (e.g., Reid and Toffel, 2009; Ziegler et al., 2009).

3.1.2 Water Usage Management

Industries have been noted to be the substantial users of water compared to human consumption (Lambooy, 2011). Hence, there is the need to examine policies put in place by businesses to ensure that their water consumption is done efficiently and sustainably. It is essential for firms to note that their use of water might be closely linked to the efficient use of other resources such as energy, materials, chemicals and land.

Water efficiency in businesses can be attained by putting in place measures that will reduce the consumption both technically and by organisational regulations as emphasised by (Gil et al., 2001). According to Ruini et al. (2013), firms can reduce their water footprint by first decreasing consumption and pollution in their operations while engaging with suppliers to efficiently utilise water in the supply chain. Companies have been advised to adopt water-saving technologies like taps and showers flow limiters, lavatory cisterns with reduced flush options, low flow toilets while also creating awareness for stakeholders especially, staff and clients whose direct activities affect water consumption (e.g., Yusof and Jamaludin, 2013; Gossling et al., 2012; Molina-Azorin et al., 2009).

A study by Molina-Azorin et al. (2009) examined the relationship between environmental practices and firm performance in the Spanish industry after grouping them into proactive, basic and reactive cluster groups. They found water-saving practices to be adopted by all the respondents followed by energy saving measures across the groups. They indicated that an increase in such environmental commitments could lead to competitive advantage for the hotels that engage in them. In their recent study on Spanish hotels, Molina-Azorin et al. (2015) indicated explicitly how an improvement in environmental performance and quality would benefit the hotels while giving them a competitive advantage. They found that environmental performance increase will, in turn, reduce customer complaints and increase satisfaction, provide service faster, reduce service errors, and decrease emissions and pollution while reducing water and energy consumption.

Further, from a global perspective, Gössling et al. (2012) employed both the quantitative and qualitative measures in their research while focusing on the direct freshwater consumption in the tourism industry. They found that among the 56 countries they studied, the total water consumed by the tourism industry was insignificant as was less than 1% of the global water consumption compared to the other sectors of the economy. However, they suggested that no matter how insignificant the tourism industry contributes to water consumption, it is still relevant that they control and manage their consumption. They, therefore, recommended that installing water-saving technologies will save operational costs. Similarly, Barberan et al. (2013) empirically found that a hotel that invested 14,126 Euros in retrofitting equipment to improve water efficiency earned an average Net Present Value (NPV) of 140,000 Euros over the useful life of 12 years. They conducted a case study of a hotel in Spain and found that after the retrofitting, total water consumption was reduced by 21%, 17.6% reduction in cold water and 33.2% in hot water.

Also, a survey report by Carbon Disclosure Project (CDP) (2014) found evidence of improved financial performance of firms that invested in technologies and other organisational practices in reducing their water usage. For instance, Diageo Plc., a UK listed firm in 2014 reduced its water consumptions by 1 million cubic metres and saved approximately US$3.2 million after modifying its production processes. Nestle also provided staff training for the new coffee making technology which reduced their water usage per kg of coffee to 3-5 litres from 40 litres previously. It is relevant to note that EMPs that manage water usage in businesses will be different for firms mostly depending on their size and location but most importantly the cost and benefits of such investment (European Commission, 2007).

Businesses are presented with opportunities as well as challenges to meet the future's need and global markets and also to shape it (Lambooy, 2011). Ruggie (2008) emphasises that as industries consider the progress of their operations, they should also ensure that human rights and access to freshwater are not trampled upon. For instance, in 2003, Coca-Cola and its subsidiaries operating in India were accused of extracting groundwater causing severe water shortages in the local community which oust thousands of farmers out of their jobs. The company was also accused of illegally discharging its waste water (India Resource Centre, 2004). As the company faced court fines over the years, their sustainability review in 2006 indicated that 35% reduced the total water consumption from 1999 to that year. They also aimed for a net zero user of groundwater by the end of 2009 and rather support hundreds of rainwaters harvesting projects (Coca-Cola Company, 2006, 2008/2009). According to the European Commission (2007a/2009/2011a), an in-depth assessment will identify the principal sectoral water users, society and the environment and the possible gaps in implementing existing EU policy instruments. Their regular follow up assessments revealed that there is considerable scope to improve current water management practices, especially regarding water saving potential.

3.1.3 Waste Management

The 2008 Waste Framework Directive Article 3(1) defines waste as any form of object or substance which is either intended by the holder to be discarded or is supposed to be discarded. Government institutions, householders, product manufacturers and private businesses are involved in the waste management decision making to reduce the waste volume disposed of. They decide whether to divert waste materials through recycling rather than utter disposal and lastly decide on disposing of the waste which could not be diverted through landfilling and incineration.

Some studies have investigated waste reduction strategies and possible implications from implemented strategies in the environmental economics discipline (Hanley et al., 1995; Wickborn, 1996; Hernandez et al., 1996). Waste reduction has been defined by the Environmental Protection Agency in the USA as the avoidance of waste from the source, either by product redesigning or by changing consumption and waste generation from a societal pattern.

Effective waste reduction according to Jacobs et al. (2010), provide lots of benefits to both firms and their municipalities. Some researchers identified benefits include reducing pollution, lowering costs, improving businesses share prices and providing greater security for resources (e.g., King and Lenox, 2001; Jacobs et al., 2010). To get firms to reduce their waste generation, pressures from institutions, customers, and business markets have been assumed to give enough incentives for businesses to reduce waste and improve their performance (Gonzalez-Torre et al., 2010; French and LaForge, 2006). Also, market intervention (e.g., fines and increased disposal fees) of government regulations (e.g., disposal and packaging law) for instance, have been evidenced to motivate firms not to use the landfill waste disposal alternative (Ongondo et al., 2011 and Taylor et al., 2005). Despite these pressures, most firms still resort to illegal dumping, expensive offsite treatment through third-party contractors and landfill instead of being proactive to reduce waste from its source (Simpson, 2010; Gonzalez-Torre et al., 2012). As to why firms become reactive to these institutional pressures but not proactive in their measures to reduce waste, previous studies have not explored it extensively (Simpson, 2012). Simpson’s argument was supported by Bansal and Roth (2000) who stressed that firms only respond to institutional pressures when they understand how it could lead to their survival in business competition but not as a complicated alternative to waste removal. Hart (1995) also buttressed this point by stating that firms will rather invest in resources that produce a wide range of pressure responses options more than their competitors.

An increase in organisation's waste and disposal has been argued to represent operational cost as a sign of inefficiency (Hart and Ahuja, 1994; Porter, 1991). King and Lenox (2001) emphasised that waste minimisation and efficiency maximisation relevance promotes competitive advantage as a result of improved reputation from such practices. Sarkis and Cordeiro (2001) also pointed out that to enrich the "bottom-line" for firms, there is the need for recycling, remanufacturing and waste prevention to be included in EMPs. Their suggestion was in line with the waste hierarchy developed by Waste Framework Directive (1975) which starts with waste prevention, re-use, recycling, energy recovery and finally waste disposal.

Clearly, from this hierarchy, the most important is waste prevention which is difficult for businesses since it demands a complete redesigning of the manufacturing process to include green technologies (Sarkis and Cordeiro, 2001). However, the "Porter Hypothesis" suggests that simple prevention measures such as the installation of innovative end-of-pipe techniques could result in costs savings through efficiency and productivity. Supportively, Hart and Dowell (2011) found evidence of waste prevention measures leading to higher profits which is consistent with that of Hart (1995). As such, continuous improvement and innovative methods might not necessarily lead to a direct financial performance but can lead to competitive advantage from firm-specific capabilities development (Christmann, 2000; Hart, 1995).

It is, however, apparent that recycling is gaining much recognition in literature as organisations recognise it to be useful in managing their waste related problems (Singh et al., 2014). From the results of a field survey by Banerjee (2001), 92% of the respondents were found to engage in waste recycling, and 77% were found to use recycled materials. For instance, the usage of recycled materials is found by extant studies to lower material costs and less new for virgin materials (e.g., Shrivastava, 1995; Porter and Van der Linde, 1995; Banerjee, 1998; Doonan et al., 2005) thus averting adverse environmental impacts.

Waste reduction is beneficial to both environmental and financial performance of firms that develop such strategies as indicated according to King and Lenox (2001). On the other hand, reusing waste material or reducing waste generation can reduce the cost of raw materials for businesses (Doonan et al., 2005). Kitazawa and Sarkis (2000) in their study focused on two primary forms namely pollution-focused and cost-focused waste reduction. The pollution-focus waste reduction, for instance, tends to decrease the harmfulness in the production materials as well as the output to be taken to the landfill or for waste treatment.

The cost-focus waste reduction, on the other hand, is however directed at reducing raw materials and energy usage, inventory and quality defects (King and Lenox, 2001). Large companies in the USA, for example, have benefited financially and saved lots of money from reduction operational waste emissions. According to a study by Rooney (1993), Du Pont, a US company saved approximately $1 million through the implementation of waste reduction strategies in one year. In Britain also, it was estimated by the Environmental Agency that approximately £3 billion could be saved each year if manufacturing firms especially engage in waste reduction practices either with a little amount of investment or nothing at all (DEFRA, 2013). However, since large firms usually have high turnover, the savings are quickly calculated compared to that of small firms which mainly struggle for business survival with low turnover (Baylis et al., 1998). They further suggested that firms should invest in capital expenditure like advanced technology which will lead to clean production hence the possibility of saving costs.

3.1.4 Materials and Resource Usage Management

A recent advocacy by United Nations Environment Programme (UNEP) and IPSRM (2009) that businesses should strive to be more resource efficient and sustainable in their usage to give them competitive advantage has reinforced the earlier research by Hart (1995) which called for less usage of virgin materials. Materials and resource in this context have been categorised by DEFRA (2013) into minerals, fossil fuels, metals and biomass. Most of the activists for resource and material efficiency have argued from either the beginning-of-pipe concerns or the end-of-pipe concerns.

In their study, Skelton and Allwood (2013) pointed out that the Steel Industry, for instance, should focus more on the beginning-of-pipe concerns by reducing the amount of metal required and used to meet their services. Their main suggestion was that firms in the Steel Industry could adopt the lightweight design of their final products without compromising the quality so that less metal is inputted into the whole process. This recommendation of theirs can be extended to other industries as well but not only the Steel Industry. It is highly possible that businesses use few materials for packaging while ensuring that customers' hygiene, interest and safety are still of high standards.

Henningsson et al. (2004) also stressed that a decrease in materials usage and exploitation especially the virgin ones would reduce demand for energy required for t processing as most energy sources are from fossil fuels which is a pivotal contributor to GHG emissions. In the Netherlands, for instance, Worrell et al. (1995) revealed in their research that fertiliser usage could be reduced up to 44% should their application be more specific in quantity and applied at the required areas only. Other practices such as re-using product components and upgrading products have all been evidenced as material efficiency strategies which could lead to a reduction of costs for a given product or service (Skelton and Allwood, 2013). Some existing studies have confirmed the benefit derived from resource efficiency. Hall (1983) and Zipkin (1998) established in their research that efficiency on its own is a sign and indicator of "good" operations management. Womack et al. (1990) supportively argued that business operations become more stable and predictable thereby reducing the overall cost when such firms focus on resource efficiency.

From the end-of-pipe stance, Gemechu et al. (2013) pointed out that waste material from manufacturing processes for instance waste paper could be used to produce tissue paper without cutting down virgin pulp for that purpose. It has already been established by the Environmental Paper Network (2007) that the paper industry directly uses 40-42% of harvested wood, continuous harvesting of wood will cause much harm to the environment at large. Sometimes, most of the raw materials including wood are not used immediately and instead stocked for future use. Such overstocking could lead to waste, obsolesce or deterioration due to reasons including poor conditions of storage. It is therefore imperative for businesses to reduce their consumption of raw materials through system reassessment so that the exact quantity needed would be instead extracted. As a result, general costs will be reduced leading to savings for customers and businesses at large (Zipkin, 1998).

3.1.5 Biodiversity Management

Global biodiversity is declining at an increasing rate, and business activities have been identified to play a critical role in such loss. As a result, stakeholders have likewise increased pressure on firms to reduce the negative impacts of their activities (Houdet et al., 2009). According to a report by the Earthwatch Institute (2002), businesses have suffered from customer dissatisfaction, legal fines, increase in the cost of capital, among others when they perform poorly regarding their impact on biodiversity. The opposite of this case was also established in the same report. Firms' activities may have either direct or indirect impact (i.e., negative or positive) on biodiversity and ecosystem. Direct impacts are those that may affect water, land or air environments and the organisms occupying them, for instance, displacing water species as a result of water extraction for irrigation purposes.

Some businesses may not realise the impact of their activities on biodiversity due to the indirect nature of their impacts possibly through the operations of supply chains or the usage of their products by consumers. Though indirect impacts may be difficult to assess and managed, they could in some cases be more significant than issues from direct impact presenting major risks which could shake the core of business stronghold (DEFRA, 2013). Thus, ensuring that businesses do not continuously cause the loss of biodiversity, all firms should put in place measures to prevent such losses from occurring whether directly or indirectly. It is essential to point out that, long-term survival of businesses regarding exposure to risks (e.g., operational, reputational and regulatory risks) and competitive advantage cannot be analysed without a linkage of operational activities to biodiversity. This is because the loss of biodiversity will affect the supply of raw materials and resources which will thus affect firms' production at large leading to losses (Schandl et al., 2017).

The World Resources Institute (WRI) indicated that since many firms rely on some specific ecological services for their product line to survive economically, managing those ecological services well can either increase their profit or reduce it drastically (Winn and Pogutz, 2013). Hence, it is a significant responsibility of firms to ensure that the natural environment is preserved, protected, extracted conveniently. For instance, a study by Winn and Pogutz (2013) after investigating the impact of the four top Fortune 500 companies' activities on biodiversity discovered a number of measures enforced by those firms. They found measures such as restoring contaminated areas, protecting fisheries and freshwater bodies, and aiding suppliers in their supply chain to be sustainable in their practices were found to be engaged in by the studied companies.

According to Pielke et al. (2002), one of the principal sources of loss of biodiversity is land use change. Change in land use also leads to land degradation which in turn reduces biological life and soil biodiversity. As emphasised by Stocking (2003), the productivity of land is related to biological processes dependent on living organisms, and as such business should consider their impacts on these living organisms, so they can extract matured raw materials from a productive land. It is as a result of the urgency to enhance biodiversity that sustainable land use and forestry are being financed and as such, firms that deliberately engage in actions which will improve biodiversity can benefit from such financial schemes.

Existing literature has however argued that the conservation of biodiversity should not be left to the market alone since other problems may arise (Perrings et al., 2009). They indicated that the first issue to arise could be the failure of local market factors in dealing with public goods and the associated externalities with biodiversity while the second issue may be the global market failure. They thererfore, suggested that public institutions should be developed to ensure that the involved economic agents take full responsibility for their actions by implementing some tools and schemes. Some economic tools that have been tested so far by extant literature are subsidies, taxes, quotas, norms, licence, and tradable permits among others. These are implemented to ensure that businesses reduce their negative impacts and strive to execute some internal measures on their own (Houdet et al., 2009). If organisations understand the scope and extent of their impacts and manage them, they stand a high chance of discovering new market opportunities and business models and gain competitive advantage.

3.1.6 Air, Land and Water Emissions Management

Businesses processes, operations and products could lead to different forms of emissions which may occur at different stages of a product from production through the product's lifespan to the end of its use. There is diverse range of impacts of environmental emissions to the air, land and water. For instance, air pollution is known to have significant adverse health impacts on human life and the natural environment at large (Sahu and Dash, 2011).

Contaminants like acids among others may leach to water sources polluting local water supplies and forming concentrations in the soils which will be detrimental to the fauna and flora. Other contaminants like volatile organic compounds may disrupt aquatic habitat while different forms of organic waste discharges may also damage lives in lakes, rivers, marine, coastal waters and estuaries. All these emissions expose firms to reputational, litigational and regulatory risks if not managed adequately since they are seen as a form of waste through inefficient operations and poor process design (Hart and Ahuja 1996). There are also some potential costs associated with such emissions like accidents and spillages which will cause those firms to invest in cleaning up and restoring those sources.

In the Latin America, the Pan American Health Organisation (PAHO) in 2004 emphasised that recorded level of high water and air pollution could be attributed to the mining industry. The mining industry, for instance, is noted to be one of the highly polluting sectors and thus have a negative image attached to it (Kumah, 2006). The spillage of cyanide has been recorded from different countries (e.g., Caribbean, Ghana, Indonesia) to have polluted water sources including drinking water to the point of killing all living organisms in those rivers. Musee et al. (2007) investigated emissions and pollution in the wine production industry which is known to generate large quantities of waste, organic, inorganic and wastewater. They proposed some practices such as technological modifications, operational practice, input substitution and waste product recovery and re-use for firms to engage in to reduce their emissions

Solomon (2005) accentuated the need for firms to adopt environmental management systems (EMS) to help them in reducing their emissions. His study of the sugar mills discovered a range of activities that he believes other firms could adopt in their quest to reduce emissions and achieve environmental excellence. He suggested that firms in that industry and other related ones can engage in recycling condense and cooling water as well as installing efficient demister and entrainment separator to reduce emissions efficiently. From his analysis, firms stand a high chance of benefit from employing these actions but could not support it with any empirical evidence. In a nutshell, reducing emissions to land, air and water by businesses could be beneficial to their operations, productions and finances.

According to Ćirović et al. (2014), the critical elements in logistics processes seemed to contradict with the environmental protection requirements as transport is characterised as the crucial environmental pollutant. This assertion is supported by Wu and Dunn (1995) who stressed that transportation is the single most significant source of environmental pollution in the logistics organisation. Their argument was as a result of a survey carried out by Delaney (1991) who reported that transport accounts for more than 11% of US expenditure for services. A further study investigation stressed by McKinnon (2010) found freight emissions on an aggregate level to account for approximately 8% of the worldwide CO_2 emissions which are energy related. This is because most vehicles use fuels from petroleum products and emit poisonous substances into the air, most especially. Wu and Dunn (1995) therefore urged companies to make logistic decisions with the possibility of minimising the amount of transport emissions. They further suggested few measures to combat these issues by advocating for less use of road transport which includes using more of alternative fuels for their fleet and employing energy-efficient technologies.

Aronsson and Huge-Brodin (2006) empirically investigated how firms could contribute to environmental improvement through structural changes of their logistics system. They proposed a range of different measures to succeed in environmental as well as logistics performance which are to either introduce more energy-efficient technology or to reorganise the logistics procedure altogether. On the contrary, McKinnon (1995) argued strappingly that introducing new technology on its own to stop environmental impacts was not enough. Cooper et al. (1994) suggested that the only way to structurally reduce the emissions caused by one company is to decentralise warehousing and use fewer and larger vehicles.

Another motivation has been evidenced to be cost savings on the part of businesses. For instance, a recent survey by PwC/APICS (2014) received a response from 162 businesses out of which one third recorded annual sales in excess of $1 billion as a realised value from sustainable supply chain activities in the form of cost savings than targeting environmental performance.

3.2 The Relationship between CEP and CFP

Extant literature has investigated the relationship between corporate environmental performance (CEP) and corporate financial performance (CFP) from a different perspective, usually from the linear and non-linear point of arguments (e.g., Misani and Pogutz, 2015; Wagner, 2001; Jaggi and Freedman, 1992). This section will review existing literature on this subject matter while classifying them under the '6 KEMPs'. However, only four out of the six key environmental management practices have received a greater attention by extant literature. As a result, these four-main common environmental issues according to existing literature are separated from the other environmental issues. This classification aims to bring to light the environmental management practices that existing researchers have placed much emphasis on in their studies and the ones that have received less attention. It will also show the gaps in the literature and why this study is necessary to fill the gaps.

3.2.1 GHG Management and Financial Performance

Studies (e.g., Delmas and Nairn-Birch, 2011; Iwata and Okada, 2011; Hatakeda et al., 2012; Misani and Pogutz, 2015) have examined the relationship between GHG performance and corporate financial performance. Some of the researchers used GHG emissions as the measurement proxy while others also used GHG performance proxies such as reduction in fuel combustion and electricity usage. In terms of GHG performance, some benefits can be accrued to industrial energy efficiency.

One eminent benefit with supportive empirical result is the cost savings that come along with energy efficiency. For instance, Lung et al. (2003) pointed out that a 3-day steam and process heating assessments conducted in 2006 at 200 industrial facilities by the United States Department of Energy led to a total of US$485 million dollars in annual energy savings. In Europe, Saidur et al. (2009) also empirically emphasised that switching to energy-efficient motor–driven systems can save up to 202 billion kWh in electricity use which is equivalent to a reduction of $10 billion per year in operating costs for industries. Cost motivation was found by Chai and Baudelaire (2015) to have the highest motivational impact on energy efficiency outcomes. They used data from an industry survey conducted by the Energy Studies Institute in Singapore and out of 143 valid responses received, 84% reported to spend 10% of their total operating cost on energy.

Likewise, Delmas and Nairn-Birch (2011) used a longitudinal database to empirically analyse the impact of GHG emissions on corporate financial performance from 2004-2008 with a sample size of 1100 US firms. They used ROA as their accounting-based measure and found a positive impact on ROA and an increased carbon emission. In other words, their study suggested that when firms reduce their GHG emissions, they get penalised from the ROA as an accounting-based perspective. Their result contradicts and challenges the feasibility of voluntary carbon reductions as a policy instrument in addressing climate change issues effectively.

Iwata and Okada (2011) similarly used a five year (2004-2008) unbalanced panel data of 268 Japanese manufacturing firms to examine the CEP and CFP relationship in both the short and the long-term. GHG emission which was one of the environmental management variables they employed in their study was found to have a positive impact on financial performance in the long run but not in the short run. They concluded that the differential impact of GHG emissions in the two-time periods could be because of a stockholder; financial agencies and investors value firms' performance in the long run but not keen in the short run.

A year later, Hatakeda et al. (2012) also examined the relationship between GHG emissions and firms' profitability in Japan with the focus on manufacturing industry by sampling from both the Tokyo Stock Exchange and the Osaka Stock Exchange. They focused their empirical analyses on the adoption of ISO 1400, market competition, uncertainty, financial flexibility and share ownership structure as the factors. According to them, firms with low firm-specific uncertainty, high financial flexibility and a high proportion of large shareholders tend to have a non-negative net benefit to mitigate the positive relationship between GHG emissions and profitability. They argued that adopting ISO 14001 does not necessarily guarantee or provide enough incentive for reducing GHG emissions though it is an indicator of environmental proactiveness. Their conclusion is consistent with that of Barnett and Salomon (2012) who could not establish symmetry in the relationship. They emphasised that although environmental protection activities can reduce GHG emissions and increase firms' value from a long-term perspective, business executives and directors could inhibit these environmental management activities to suit their private desires.

A recent study by Misani and Pogutz (2015) examined the relationship between process and outcome dimensions of environmental performance and Tobin's q. They hypothesised a non-linear relationship while studying a sample of 127 global firms operating in carbon-intensive industries (i.e., materials, energy, industrial and utilities) from 2007 to 2013 using an unbalanced panel data. According to their results, low or high carbon performances were not found to have improved financial performance but an average carbon performance, on the other hand, yielded the highest financial performance. They also found that through improved stakeholder management, environmental processes moderated the relationship by reinforcing firms' financial performance. Comparing Tobin's q result with that of Return on Equity (ROE), ROA and ROS, they found a sharp contrast between firms from other countries, the UK and US. They also found a negative U-shape like the other researchers such as Barnett and Salomon (2012), Hatakeda et al. (2012), Wagner et al., (2001:2002). Their empirical results suggest that a limit to the extent carbon performance could improve financial performance after which marginal benefits (i.e., internal efficiency, improved reputation and legitimacy) derived from further emissions reduction fail to offset the related marginal costs. Tatsuo (2010) in a similar study on Japanese firms, on the other hand, found an inverted U-shape between CO_2 emissions and economic performance of the sampled manufacturing firms.

From European perspective on the GHG and CFP relationship, Moneva and Ortas (2012) used partial least squares modelling to explore the influence of corporate environmental management on financial performance. Their results indicated that firms with better and improved environmental performance tend to have better financial performance. They noted that firms need to reduce their GHG emissions as their financial performance improves so that it is not just a one-sided flow of influence.

These results are contradictory due to differences such as different countries of study and the variation in carbon regulations (Ziegler et al., 2009; DEFRA, 2013; Dunn, 2002).

3.2.2 Waste Management and Financial Performance

In consonance with Sarkis et al. (2010), there is empirical evidence that waste reduction is explicitly influenced by choice to invest in resources that are waste reduction related. They found that waste reduction related resources were slightly significant to drive pollution-focused waste reduction as compared to cost-focused waste reduction. This is because cost-focused is a likely way of exhibiting competitiveness. In the early 2000s, Kind and Lenox (2001) empirically found evidence that green business practices gave firms' competitive advantage by assisting in their overall pollution prevention performance goal. Especially, where firms reduce waste at source, they benefited financially, lowered total emission and improved their reputation for standing out in the market. Waste reduction benefits firms that develop strategies in pursuit of that according to King and Lenox (2002). Some of these identified benefits include reducing pollution, lowering costs, improving businesses share prices and providing greater security for resources. In order to get firms to reduce their waste generation, lots of pressures from institutions, customers, business markets have been assumed to give enough incentives for businesses to reduce waste and improve their performance (Gonzalez-Torre et al., 2010; French and LaForge, 2006). Market intervention (e.g., fines and increased disposal fees) of government regulations (e.g., disposal and packaging law) for instance have been evidenced to motivate firms not to use the landfill waste disposal alternative (Ongondo et al., 2011 and Taylor et al., 2005).

In the same vein, Iwata and Okada (2011) used waste emissions as one of the environmental issues that they examined in their study of 268 Japanese manufacturing firms over five years from 2004 to 2008. They found that waste emissions do not have a significant effect on financial performance. They also found that the partial effect of waste emissions on firms' financial performance decreases and their growth rate improves. They suggested that such results for waste emissions could be because stakeholders do not place much value on the management of waste which in according to them was not expected.

Likewise, Fujii et al. (2013) explored the same relationship and found a significant inverted U-shaped relationship between environmental performance and ROA. They also found the same relationship as found by Iwata and Okada (2011) exist between environmental efficiency and capital turnover after using both linear and quadratic functions from 2006 to 2008 in determining their results. This result according to them is due to the possibility of decreasing the investment required for abating pollution thus investments saving yields a positive relationship. On the other hand, excess investment in abating pollution could be as a result of a decrease in capital productivity leading to a negative relationship after reaching the turning point.

3.2.3 Materials/Resource Management and Financial Performance

After carrying out an event study, Gupta and Goldar (2005) found that environmentally unfriendly businesses were penalised on the Stock market with the announcement of poor environmental performance. They investigate the influence of environmental ratings of auto, chloralkali firms and pulp and paper on stock prices. Their result indicated up to 30% abnormal returns in the events of weak environmental performance announcements. To further understand how the stock market reacts to natural resource performance, Qi et al. (2014) moderated for resource slack and industrial munificence in exploring the relationship between environmental and financial performance in China. They sampled 39 firms that accounted for the environmental pollution (including both clean and dirty) in the country with data collected from 1990-2010. The corporate environmental performance was found to significantly influence financial performance by moderating for slack resources but not industrial munificence. According to them, slack resources reemphasises the problem of resource scarcity and allocation for environmental performance. It also aids in building a foundation for promoting firms' environmental innovation activities through investments (Sirmon et al., 2007).

Hart and Ahuja (1994) also found a positive relationship between environmental and financial performance. They used accounting-based measures in their analysis covering a two-year period for 127 firms sampled. They selected firms from manufacturing, production and mining firms with the tendency of high emissions. According to their results, return on assets and return on sales were enhanced significantly after a year of considerable emission reduction by firms which continued into the second year and started declining in the third year. Similarly, return on equity reported a positive relationship with environmental performance in the second year only before reducing in the third year. They noted that future gains of ROE were significant for 52 "high polluting" firms running through year one to the third year. Their result is a clear indication that environmental variables affect accounting data and measures differently.

3.2.4 Air, Land and Water Emissions and Financial Performance

Recently emissions to air, land and water has attracted media and researchers' attention due to the increasingly high rise of air pollution in the UK especially. As such, companies that use natural resources, for instance, in their activities are likely to have the greatest negative impact on land, air and water.

Xu et al. (2012) explored the response of the Stock market to environmental violation events in China. Their results showed that firms linked to river pollution experienced a negative Stock market reaction in the event windows after a month of media announcement date. However, they argued that the price paid regarding market value be less compare to other countries like South Korea, Canada, USA, and Argentina among others and therefore called for stricter regulations and penalty fines.

Jaggi and Freedman (1992) studied thirteen pulp and paper companies using market and economic performance measures as indicators and found a significant negative relationship between environmental and financial performance in the short-term. Two years later, Hart and Ahuja (1994) investigated 127 firms from S & P 500 manufacturing, mining and production industries and found that environmental performance such as emissions reduction and pollution prevention initiatives improves businesses financial performance. These financial benefits were however only seen after two years of implemented those environmental initiatives.

In the same vein, Cohen et al. (1995) found that companies with low pollution levels earned greater Stock returns than those of higher pollution level. They studied S&P 500 companies in the USA, segregated them into 85 different industries and placed them under two significant categories of "high pollution" and "low pollution" portfolios. Their result indicated that more than 80% of the low pollution firms outperformed the high pollution ones after comparing three different time frames of 1987-1991, 1990, and 1991. They argued that such an underperformance by some of the companies may be due to environmental litigations and advised managers to manage such environmental issues and announcements properly. In the same year, Hamilton (1995) in their study found that negative news of firms' Toxic Release Inventory (TRI) emissions levels incurred ensuing Stock declines. The study also found significantly negative on-average abnormal returns on the release date. The author also estimated an average loss of $4.1 million in companies' market value that received coverage on the release data.

Chang et al. (2015) in his recent work investigated whether firms' financial performance is affected by propensity disclosure and environmental performance using an unbalanced panel data from 2008-2012 in China. He sampled firms from heavy polluting industries including sixteen firms from the Steel Industry, 23 from the thermal electric industry, 20 from the chemical-petrochemical industry, 19 from the non-ferrous metal industry, 24 from the pharmaceutical industry, 14 from the coal-oil-mining industry, 12 from the textile-leather industry and 14 from the building material industry. They found a positive relationship between Tobin's Q and environmental propensity disclosure whereas a negative relationship was established with environmental performance. They emphasised that their results are helpful for environmental regulators to evaluate the implementing effect of voluntary environmental policy and for firms' managers to increase market expectation and improve financial performance.

Lorraine et al. (2004) also examined the relationship between good or bad environmental performance publicity affects the share prices of companies in the UK selecting companies from 1995 to August 2000. They used the conventional event studies approach to analyse 32 media events over 21 days assessing share returns from 10 days before such announcement is made to 10 days after the news. Their results indicated that the Stock market reacted to such fine-related news a week after the media announcement was made as the weight of the share price response is a function of the imposed fine.

Another similar event study was conducted by Gupta and Goldar (2005) using a sample of 31 companies in the large pulp and paper, 29 from auto, and 25 from chloralkali industries to explore the impact of environmental ratings on firms' stock prices. They found that environmentally unfriendly firms get penalised by the Stock market in the events of such announcements. Thus, unfavorable abnormal returns of about 30% were found for firms with weak environmental performance. They emphasised that their results, unlike earlier studies, were not driven by disparate "events" but rather a consistent and comprehensive green rating over a period.

Using a cross-sectional analysis to study the link between improved perceived future financial performance and strong environmental management, Klassen and McLaughlin (1996) employed stock prices as a market-based measure (MBM). They found a significant positive return for strong environmental management as indicated by environmental performance awards whereas significant negative returns were measured for weak environmental management as indicated by environmental crises. They sampled 96 publicly traded firms from 1985-1991 and showed in their results that the average market valuation of the firm rose by approximately \$80.5 million following the award announcement. They emphasised that the figure represents the market's perception of the net present value of future profits and cash flows related to high environmental performance.

On the other hand, Konar and Cohen (2001), investigated the extent to which the Stock-market places value on firms' environmental reputation in the S&P 500 in the United States. They decomposed a firm's market value into intangible and tangible assets emphasising that firms with worse environmental performance tend to have lower intangible asset value. They found that their sampled firms experience a reduction of \$380 million market value due to environmental concerns raised. It was concluded that toxic chemicals emitted legally have a significant impact on publicly traded companies' intangible asset value as businesses market value could increase by \$34 million in the event of a 10% reduction in toxic chemical emissions. Their result agrees with that of Hamilton (1995) who found in 1989 on the first day of the Toxic Release Inventory (TRI) that affected firms' experience significantly negative abnormal returns which were approximated around \$4.1 million. Konar and Cohen (2001) eliminated "non-polluting" industries which included most companies in the Service Sector and focused on firms in the manufacturing sector making their results one-sided.

To get rid of the biases of extant literature as only a few examined this relationship in the Service Sector, Lucas and Wilson (2008) specifically analysed the CEM and CFP relationship solely in the service industry. They used a cross-sectional sample of 1,228 service firms making use of both univariate and multivariate analysis. It was that the Service Sector might not be heavy pollutants compared to manufacturing and construction but recognise the opportunities for competitive advantage enhancement through proactive EMPs. They found significant evidence that it pays to companies in the service industry to have "clean-running facilities" and to have those facilities run in a cleaner Service Sector. Schendler (2001) supportively argued that environmental practices are equally relevant in the service industry as it could be a means of improving employee satisfaction, enhancing competitiveness, reducing costs and improving customer loyalty.

3.2.5 Environmental Management and Financial Performance

Considering the relevance of environmental management itself and not just the performance, it is no doubt that researchers have placed much relevance on the different aspects of it. Lo et al. (2012) investigated the impact of environmental management system adoption on firms' financial performance in the United States. They sampled 61 publicly listed firms which were ISO 14000 certified in the textile industry. A profitable improvement was found during the ISO 14000 implementation stage until at least a year after the certification was obtained. In a nutshell, ROA was enhanced up to 2.9% for certified firms whereas ROS was enhanced up to 3.3% for over three years that ISO 14000 was implemented. Certified firms were found to earn up to US$31.05 million extra profits more than competitors who were not certified. Their results support that of Melnyk et al. (2003) who also employed a cross-sectional study and ascertain same results.

Saeidi et al. (2015) examined the relationship between corporate social responsibility and financial performance by moderating for customer satisfaction, reputation and competitive advantage. They focused on 205 manufacturing and consumer product firms in Iran and employed accounting-based measures for corporate financial performance. They found that CSR and financial performance is an entirely facilitated relationship with reputation and competitive advantage. In other words, the relationship they found was not a direct one as CSR was seen to only enhance corporate financial performance through improving customer satisfaction, promoting firm's reputation while enhancing competitive advantage. They, however, noted that their study was biased towards the service industry which makes the findings limited to those industries sampled from.

Further, Vinayagamoorthi et al. (2015) in their recent study attempted to investigate the effect of firms' profitability on their environmental performance. Using correlation, descriptive statistics and regression analysis, they employed accounting-based measures as their financial performance proxies to be analysed on energy intensity (environmental performance proxy). They used a sample size of 191 companies listed on the Bombay Stock Exchange (BSE) with data from 1st April 2004 to 31st March 2014. They found a positive relationship between ROS and environmental performance whereas a negative relationship was recorded for the other variables. This implies that an increase in ROA, ROE and ROCE lead to a decrease in the energy intensity level. Sahu and Narayanan (2011) and Goldar (2010) stressed that other factors were dominant determinants of energy-intensive such as firm size, firm age, advertising intensity, R&D intensity and export intensity hence, the need to control them and examine the direct impact on financial performance.

Using a cross-sectional analysis to study the link between improved perceived future financial performance and strong environmental management, Klassen and McLaughlin (1996) found some interesting results. They found a significant positive return for strong environmental management as indicated by environmental performance awards whereas significant negative returns were measured for weak environmental management as indicated by environmental crises. They sampled 96 publicly traded firms from 1985-1991 and showed in their results that the average market valuation of the firm rose by approximately $80.5 million following the award announcement. They emphasised that the figure represents the market's perception of the net present value of future profits and cash flows related to high environmental performance.

3.3 Controlled Variables

Apart from corporate environmental management variables, other variables have been found by researchers to influence the corporate financial performance of firms. This study intends to control for some variables that have been argued to have a significant influence on firms' financial performance. The subsection is divided further into corporate governance (i.e., board size, CEO duality and board diversity) and firm characteristics (i.e., firm size, leverage, capital intensity and gearing ratio).

3.3.1 Corporate Governance

Min and Smyth (2014) simplified the definition of corporate governance (CG) as a general term which refers to designed institutions meant to monitor managements' actions with the view of mitigating related adverse effects of agency risks. In other words, corporate governance is the way things are governed and controlled in a corporate environment.

In order to justify the relevance of including corporate governance as control variables, the question of whether corporate governance influences financial performance needs to be evaluated. Earlier works of Jarrell and Poulsen (1987) and Malatesta and Walking (1988) emphasised that adopting charter amendments and using poison pills have an influence on firm stock prices. In other words, the more restrictive corporate governance structures, the less accountable shareholders feel managers are which affects the overall stock performances. From the agency theory perspective, managers are incentivised to undertake projects that will maximise shareholders wealth. However, when managers focus on their personal interests, agency problem arises causing shareholders to withdraw their investments. As such, it is imperative to consider characteristics of corporate governance that have high tendency of influencing the financial performance of firms. Existing studies (e.g., Dalton et al., 1998; Cornett et al., 2008) have pointed out some of the main corporate governance elements that need to be explored in instances like this. For the purpose of this study and following recommendations by academics (e.g., Coles et al., 2008; Guest, 2009), this section will examine board size, CEO duality and board gender diversity as control variables.

3.3.1.1 Board Size

Board size simply refers to the number of directors on a corporate board (Levrau and Van den Berghe, 2007) and has been found to vary from one country to another and from one company to another. For instance, a small board size is recorded for most European countries (the Switzerland, United Kingdom and Netherlands) while countries such as Spain, Italy, Belgium, Germany and France had a much more substantial board size. In other words, there is no specific size for the board as argued by Conger and Lawler (2009) that a board has no ideal size and the size should be driven by the effectiveness of the board as a team.

There is inconclusive result on the board size-firm performance relationship. For instance, Guest (2009) examined this relationship on 2746 UK listed firms from 1981-2002 and found a significant adverse impact of board size on profitability (i.e., using Tobin’s Q and share returns). This negative link is consistent with the perception that agency problems and communication issues get severe as the size of board increases. A critical argument by Jensen (1993) is that CEOs can control a corporate board quickly when there are more than seven to eight directors on such a board as the directors are less likely to be effective in their roles. He also emphasised that decision-making process becomes slower with the increase in a board size as the cost of such communication issues outweighs the possible benefits to be derived from putting more directors on board.

Coles et al. (2008) on the other hand found a positive impact of board size on firm value for larger firms. Their finding corroborates Pearce and Zahra (1992) and Dalton et al. (1998) arguments that such a positive relationship could be due to the view that a larger size board delivers quality decisions since directors are from diverse backgrounds. Thus, bringing on board directors diverse expertise, intellect and knowledge improve the horizon and extent of issues discussed which is less likely to be found on a smaller board (Golden and Zajac, 2001). Other studies, on the other hand, found a U-shape relationship and pointed out that optimal board size could exist midway with the positive relationship being followed by a negative link.

3.3.1.2 Chief Executive Officer (CEO) Duality

The evidence of the CEO duality and firm performance relationship is inconclusive in the existing literature (Dalton et al., 1998; Kang and Zardkoohi, 2005). Some findings do support the separation of CEO role and that of the chairperson (Chen et al., 2005; Rechner and Dalton, 1991) while others suggest that the two roles should be combined (Brickley et al., 1997; Coles et al., 2001). Some other studies did not discover any significant relationship between the leadership structure of a board and firm performance (Dalton et al., 1998; Dulewicz and Herbert, 2004).

US corporations, for instance, are predominantly (i.e., approximately 70%) known to have CEOs play the dual role of Chairpersons during the board of directors meeting (Rhoades et al., 2001) while only 10% of the publicly listed firms in the UK allows the combination of these roles (Kang and Zardkoohi, 2005). Agency theorists argue that CEOs roles should be separated from that of the chairperson for productive monitoring and delivering of service (Jensen, 1993). According to Rhoades et al. (2001), CEO duality reduces board independence and enhances CEO entrenchment. CEOs' primary responsibility is to execute companies' policies while efficiently running the business. The chairperson, on the other hand, is responsible for monitoring and evaluating the activities of directors while ensuring that the board is appropriately run. Stewardship theorists, however, assumes that allowing a CEO to play the role of chairperson would make managers act in the best interest of owners by being stewards while contributing substantially to the unity of the firm.

Consistent with the agency theory, Weisbach (1988) pointed out that when CEOs are made to handle both roles, they only gain enough power to seek for their interests than that of the shareholders. His main suggestion was that firm performance would be affected negatively due to the personal interests of the CEOs. Similarly, Cornett et al. (2008) found empirical evidence that lagged CEO duality and firm performance was negatively related to after studying 100 listed companies on the S & P index. A previous study by Daily and Dalton (1993) also found a negative relationship between duality and firm performance of 114 publicly listed US firms in the transportation, retail and manufacturing sectors.

From the stewardship perspective, Brickley et al. (1997) asserted that because CEOs have a broader knowledge of the business and know how to run a company, they would be able to make timely and optimal decisions that would somewhat improve corporate performance. Krause et al. (2014) studied 1500 listed firms on the S & P and found non-duality to have an adverse effect on firm performance. Similarly, Guillet et al. (2013) discovered that US restaurants performed better under the management of CEO with a dual responsibility.

Drawing from the analysis of the two schools of thoughts above, it appears that CEO duality and non-duality would be beneficial to businesses performance depending on some moderating circumstances. A study by Lam and Lee (2008) examined the relationship between CEO duality and firm performance by using family control as moderating factor in Hong Kong public companies. They discovered that agency theory and stewardship theories are not adequate to explain why duality and performance relationship should be negative or positive. They found empirical evidence which indicates that CEO duality is positively related to the accounting-based financial performance measures in the non-family-controlled circumstances. However, in the full sample where no family controls were made, they found a negative and insignificant relationship between duality and accounting performance. Their empirical evidence suggests that the relationship is negatively moderated by the existence of family control fact and positively moderated by non-family-controlled factors. Likewise, Rutledge et al. (2016) recently investigated the effect of CEO duality on firm performance. They analysed data from 100 firms from 2010-2014 and found empirical evidence that there is a negative relationship between CEO duality and firm performance.

Duru et al. (2016) explored the relationship between CEO duality and firm performance and found convincing evidence that duality has statistically significant negative impacts on firm performance. Their findings are consistent with arguments advanced by agency theorists and other management scholars who assert that duality reduce firm performance, but in the presence of board vigilance, it could be beneficial. Thus, the impact of the board on firm performance depends on abilities and skills of board members as well as incentives. Arguments from efficiency and contingency perspectives (Falaye and Oloyede, 2017) highlight that with adequate representation of board independence, CEO duality would be managed properly to mitigate costs and yield profitable results.

Another call for non-duality structure is from Tang (2016) who emphasised that the relationship between duality and firm performance are affected by two main internal governing forces (i.e., top management executives and blockholding outside directors). He found the existence of a negative relationship between CEO duality and performance but included that blockholding outside directors could monitor CEOs successfully when they have to carry out such dual responsibility.

3.3.1.3 Board Gender Diversity

Board gender diversity has attracted many researchers (Gul et al., 2011) recently to investigate the possible impact of gender diversity on overall firm performance. The results, however, have been inconclusive as some researchers find positive, negative and no relationships at all.

Perryman et al. (2016) investigated the effect of gender diversity on firm performance by studying 2564 firms from the Compustat and ExecuComp databases. They found that board gender diversity had a positive and significant relationship with firm financial performance. Adams and Ferreira (2009), on the other hand, found mixed results when they explored the relationship between board gender diversity and financial performance. Their mixed results stemmed from the difference between weak and strong governance. The positive impact was found to be as a result of weak governance in those firms while firms with stronger governance recorded a positive relationship between board gender diversity and firm performance. Another argument in favour of board diversity is from the research by Smith et al. (2006) who found a positive relationship between diversity and performance. They argued that a diversified board could help to enhance the corporate image of companies which may lead to improved firm performance.

From the European perspective, Christiansen et al. (2016) examined 2 million companies in the Europe regarding the association between gender diversity and financial performance. They found empirical evidence of a positive link between ROA and women in senior positions in sectors such as the high-tech and service sectors. They emphasised that increasing the female representatives on board would boost overall business performance across the European belt. In contrast, Bohren and Strom (2010) conducted a study in Sweden and found that a negative association between gender diversity and financial performance. Their main argument was that activists of gender diversity should either back up their reasons with some related financial benefits or reduce the rate at which they vouch for an increase in female board representatives.

Other studies by Pelled et al. (1999) and Li and Hambrick (2005) have all pointed out some underlying reasons why board gender diversity should not be encouraged in developing a corporate board structure. They have argued that a complex diversity may result in team conflicts which would impede the speed decision making. They also opined that focusing on diversity may lead to unintended tokenism which might result in the hiring of people based on reasons other than expertise. For instance, after studying the impact of the mandatory gender quotas on Norwegian corporate boards, Ahern and Dittmar (2012) pointed out that 40% of the female board representatives were less experienced to contribute to strategic decision making which leads to a negative impact on performance.

Despite the above positions, Conyon and He (2017) used quantile regression to study 3000 US firms while investigating the link between boardroom gender diversity and firm performance. Their results indicated that presence of women on corporate boards had a positive influence on firm performance. According to them, the effect of gender diversity is not homogenous as pointed out by previous studies. The quantile results suggest that such diversity on the board plays a significant role in improving the performance of high-performing firms relative to low-performing companies. They further argued that women's unique perspective and life experiences are essential moderating factors that led to positively impact their presence to have on overall corporate performance. Supportively, Adams and Funk (2012) stressed that female and male directors differ regarding their attitude to risks, core values, perspectives and backgrounds, thus, gender diversity could be linked with cognitive diversity.

However, when de Cabo et al. (2011) studied the same relationship using 612 European banks, they could not find a clear association between gender diversity and performance. They did discover that low risks banks had more females on their boards than those with high risks. Another study by Marinova et al. (2016) revealed that there is no significant relationship between board diversity and firm performance. Their research focused on 186 listed firms from Netherlands and Denmark where they discovered that 40% of the overall sampled firms had at least one female director. To reasonably understand the relevance of board gender diversity, it seems appropriate to control for its impact on the CEP and CFP relationship.

3.3.2 Company Characteristics

3.3.2.1 Firm Size

The size of a firm according to Niresh and Thirunavukkarasu (2014) can be described as the ability a firm possesses or the amount and production variety capacity or service varieties to its customers. Large firms are known to be more diversified, less likely to go bankrupt and also more efficient. According to the traditional neoclassical view of the firm, the size of a firm is a primary factor in determining the firms' profitability due to the concept of economies of scale

(Majumdar, 1997; Dogan, 2013). Firm size and profitability has been a debatable subject in literature over the decades and started gaining grounds in the 1960s. There have been contrasting results in the literature regarding the relationship between firm size and performance. While some studies support a positive relationship (e.g., Hall and Weiss, 1967; Majumdar, 1997; Doğan, 2013), others found evidence of negative relationship (e.g., Shepherd, 1972; Vintila and Duca, 2013) and others could not establish any relationship (e.g., Whittington, 1980; Khatap et al., 2011).

Niresh and Thirunavukkarasu (2014) explored the effect of firm size on the profitability of listed manufacturing companies in Sri Lanka. They selected a sample of 15 firms with data from 2008 to 2012 using total assets and total sales as indicators of firm size. After employing ROA and Net profit as the indicators of firm profitability, they found a weak positive relationship between firm size and profitability of the quote manufacturing firms. According to their findings, the separation of ownership from management could have shifted managers' concentration from profit maximisation to managerial utility maximisation. Also, they suggested that used technology, adamant organisation structure and a change in tactical logic of firms may have also caused such weak correlation. Similarly, Vintila and Duca (2013) found a significant negative relationship between the size of firm and profitability of firms in Romania. They used the ordinary least squares method and a pooled regression analysis and found a significant negative relationship between total sales and ROE likewise total assets and ROE.

On the contrary, Doğan (2013) found a significantly positive relationship between firm size and profitability after he investigated this relationship on 200 companies listed on the Istanbul Stock Exchange from 2008-2011. He used total assets, the total number of employees and total sales of the firm size indicators while ROA was employed as a proxy for financial performance. An intriguing finding from this study was that as the size of the listed companies expands, their corporate profitability also started improving which is in contrast to the other studies. They proposed that economies of scale could be the cause of this finding as large firms are known to be productive than small firms.

A puzzling mixed result was found by Becker-Blease et al. (2010) that 47 industries out of the total sample experienced an increased profitability at a decreasing rate and eventually declined. They examined the firm size and profitability relationship within 109 SIC manufacturing industries in the USA. They also discovered that there was no significant relationship at all between firm size and profitability in 52 industries within the studied sample. According to them, the measures of the size of the firm could be driven by the theories of the firm a study suggests. Theories such as technological theories of a firm, organisational theories and institutional theories are classifications that could implicitly predict such a relationship between firm size and financial performance. However, they also found that profitability continued to increase in 11 industries as firms' size expanded. This implies that the relationship is industry specific and could either be significantly positive or negative based on the industry investigated. They concluded from their results that large firms earn excess returns while small firms failed to earn to cover the cost of capital. In other words, firm size is likely to react differently when accounting returns and market returns are studied.

The above-discussed evidence buttress the need to control for firm size in the current study. Even though firm size may be a control variable, any possible way of distinguishing between the firm categories in the sample study would not be overlooked. For instance, if at any point, the researcher realises that the sampled firms could be grouped into relatively small and large, such distinction would be made.

3.3.2.2 Capital Intensity

A firm can be said to be capital-intensive when it requires enormous amounts of financial resources in producing its products and services (Sen and Farzin, 2000). Capital intensity is measured as the ratio of a total fixed asset or total assets to sales/labour inputs (Chang and Singh, 1999). For instance, when the ratio of the required capital to the labour of a firm tends to show high fixed assets levels in those organisations, the capital intensity can readily be determined (Lee and Xiao, 2011). Some researchers have argued that capital intensity could be related to firms' efficiency when the utilisation of corporate assets used in producing goods and services are examined (Sen and Farzin, 2000). There are two main perspectives considered when analysing capital intensity on firms. One school of thought argues that higher capital-intensive firms anticipate riskiness as a result of high level of fixed costs which do not vary with changes in sales level (Shapiro and Titman, 1986). The other school of thought, on the other hand, argues that capital intensity can help firms reduce their risks and enhance performance (e.g., Barton, 1988; Lubatkin and Chatterjee, 1994; Reitenga, 2000). The rationale behind this argument is that capital-intensive firms enjoy cost savings from a commitment of capital to tangible fixed assets.

Many empirical findings have supported both arguments in extant literature though majority of them reinforces the standpoint by the latter school of thought. For instance, Harris (1988) found capital intensity to have a positive impact on firm performance by using the operating margin ratio as a measurement. Lubatkin and Chatterjee (1994) on the other hand found an adverse effect of capital intensity on unsystematic risk. Most existing studies found a linear relationship as they ignored other forms of relationship such as the curvilinear and cubic links. The few that explored the non-linear relationship found some intriguing results. Lee and Xiao (2011) conducted a pooled regression analysis in examining the relationship between capital intensity and firm value of the US hospitality industry from 1990-2008 on 281 sampled firms. They found a U-shaped relationship for both hotels and industries but indicated interesting differences in the decades. For instance, the U-shape was only present in the 2000s analysis but not in the 1990s. According to their results, an increase in capital intensity in hotels will decrease firms' performance to a level and eventually increase. On the contrary, restaurants demonstrated an insignificant relation for capital intensity which instead depicts a different relationship but not curvilinear.

Another study by Lee et al. (2011) explored the effects of capital intensity on firm performance from the United States Restaurant industry. They proposed a non-directional hypothesis and found an adverse effect of capital intensity on Tobin's Q (i.e., financial performance). Their findings suggest that analysts and investors considered restaurant firms' capital intensity as an evaluation tool for determining the investment portfolio. According to them, when businesses become more capital-intensive, firm's risks increase as a result of the fluctuations in operational profitability. In a nutshell, a supportive argument to that of Lubatkin and Chatterjee (1994) could be made that higher risks from high capital intensity will lead to higher costs of capital which can decrease the value performance of businesses or firms.

3.3.2.3 Financial Leverage

According to Murphy (1968), financial leverage is the long-term debt ratio to total long-term capital ratio. As such, the higher the dependence of a firm on creditors for long-term capital, the higher the leverage involved. Horne and Wachowicz (2007) also described financial leverage as the incurring fixed costs of financing by a firm. Due to the relevance of leverage to businesses, many researchers have carried out various studies to understand better how it relates to firm performance. Those studies that investigated such relationship yielded contrasting results. According to Iqbal et al. (2014), the contradictory results could be as a result of the different control variables and the independent variables employed.

From a negatively related empirical viewpoint, Iqbal et al. (2014), investigated this relationship in the Pakistan Cement Industry on 21 sampled listed firms from 2007-2012. They employed ROA, ROE and ROCE as their financial performance proxies while controlling for firm size. After running Pearson correlation and regression analysis, they found a strong negative relationship between the profitability of firm and leverage. Their results imply that as leverage increases, firm profitability decreases and vice versa. Their results were consistent with that of Cai and Zhang (2010) who found that an increase in leverage increases the debt obligations of a firm more than the increase in the firm’s value of assets leading to an inefficient investment decision.

Vithessonthi and Tongurai (2015) also found similar negative results from their full sample of 159,375 firms in Thailand during the financial crisis period from 2007-2009. Their study separated the sampled firms into domestically oriented and internationally oriented and found a negative relationship to be evident in the domestic firms but a positive link in the international firms. They argued that such results could be due to the resource-based view (e.g., Wernerfelt, 1984; Barney, 1991; Chiung-Hui et al., 2007) and international business perspectives (see e.g., Zander, 1999; Ganotakis and Love, 2012) which provide the idea with those international and domestic firms comparatively exhibit different pattern in this relationship. This, according to them is because international firms are more likely to acquire a better set of investment opportunities.

From a developing country perspective, Ojo (2012) explored the effect of financial leverage on corporate financial performance in Nigeria. He used panel data from 1993 to 2005 utilising the Vector Auto Regressive (VAR) model employing net assets per share and earnings per share as financial performance indicators while debt-equity ratio represented leverage. A negative relationship was found for earnings per share while a positive one was found for net assets per share. He argued that the mixed result found in the study could be as a result of the inadequate proxies available in Nigeria unlike that of a developed country. Rehman (2013) also found mixed results after conducting the same study on the 35 listed companies in the Pakistan sugar industries. He employed ROA, ROE, and EPS after tax, net profit margin and sales growth as his financial performance variables and carried out a descriptive and correlation analysis of the data. He found a positive relationship between leverage and ROA and sales growth while a negative relationship was found for ROE, EPS after tax and net profit margin. This study was however limited by its focus on only one Industrial sector. Evidently, financial leverage is relevant in the current study, and firm financial performance is examined.

3.3.2.4 Gearing Ratio

Gearing ratio can be described as a financial ratio that compares borrowed funds to shareholders equity. Gearing demonstrates the degree to which companies activities are funded by shareholders and creditors. Companies use a mixture of debt and equity in suitable proportions to maximise their overall market value (Abor, 2005). Gearing is an essential feature of capital structure which has been regarded as a measure of leverage for business.

Based on the tenets of Jensen and Meckling's (1976) agency theory, directors and managers of highly geared companies are supposed to disclose all related information regarding their borrowings and source of funds to minimise the agency costs. It is also an essential factor to consider when modelling strategic firm behaviour. According to Stulz (1990), highly geared firms are at higher risk of being unable to pay their interest and debt than less geared firms. Nonetheless, shareholders tend to benefit from high gearing if the end of period profit exceeds the borrowings. That being said, it is risky to assume that profits will exceed borrowings. Consequently, investors would be less attracted to firms with high gearing ratios due to the uncertain risks involved. On the other hand, low geared firms have enough motivation to increase their output to exert pressure on the price of products to decrease. By so doing, firms with high gearing ratios tend to struggle to meet up with profits due to a decrease in prices of goods that may likely affect their revenue.

Rajan and Zingales (1995) for instance found a positive relationship between gearing and sales of UK companies. Though their findings are quite fascinating, yet it emphasised the point that highly geared firms could boost their profits through an increase in sales due to the adequate funds there were able to access. Bevan and Danbolt (2001) found a significant negative relationship between gearing and market to book value. Haddock-Fraser and Fraser (2008) pointed out that most companies appreciate loan financing because of their anticipation of a higher return. Despite the differing results found by researchers as discussed above, it is no doubt that gearing plays a significant role in assessing a company's performance and therefore it is inclusion in the present study could be justified.

3.4 Summary of Extant Literature

Table 1 below summarises the outcomes of studies on CEM and CFP by previous researchers relevant to this study. The table is divided into five (5) columns with the details of author (s) name and publication year, the country of research, the sample size used in the study, the methods employed, the variables used for the research and the key findings respectively.

Table 1: Summary of Environmental and Financial Performance Studies

Author (S) / Year/ Country	**Sample size**	**Main method(s)**	**Variables Confirmed**	**Variables not Confirmed**
Trumpp and Guenther (2017) International	2361	One-way clustered OLS	Carbon performance Waste performance Leverage Cash flow Growth	Research and Development Firm size Capital Intensity
Lie et al. (2017)	62 FTSE 100 firms	Panel Regression analysis	Carbon emissions Carbon disclosure Capital expenditure	Leverage Market to book Profit margin
Busch and Lewandowski (2016)	32 studies	Meta-Analysis	Carbon performance ROA Tobin’s Q	Absolute carbon emissions
Misani and Pogutz (2015)	127	Unbalanced panel data analysis	Carbon performance Intensity	Carbon emissions

Global study including US and UK			Research and Development corporate governance size	
Vinayagamoorthi et al. (2015) India	191 listed companies	Descriptive statistics regression analysis	Energy intensity	size
Saeidi et al. (2015) Iran	205 firms	Regression Analysis Structural Equation Modelling (SEM)	Corporate social responsibility Competitive advantage Customer satisfaction	Reputation
Gallego-Alvarez et al. (2014) 21 countries	89 publicly listed companies	Panel data analysis	GHG emissions ROA Size, growth, company sector and legal system	Return on Equity
Fujii et al. (2013) Japan	Samples A and B A, 758 B, 2498	Regression analysis	CO2 emissions Environmental efficiency R&D, investment, employee numbers	Capital turnover/productivity
Hatakeda et al. (2012)	426 publicly listed firms	Descriptive statistics, Regression analysis	Uncertainty Financial flexibility	ISO 14001 Degree of market competition

Japan			Share ownership Reduction of pollution emissions, Size, Tobin's q, industry dummies	
Lioui and Sharma (2012) International	3100 publicly listed firms	Regression analysis, Random and fixed effects	Hazardous Regulatory problems Ozone depletion chemicals Substantial emissions Clean energy Pollution prevention recycling R&D, leverage	Agricultural chemicals Recycling
Lo et al. (2012) USA	56 publicly listed firms	Event studies	EMS adoption firm size	-
Barnett and Salomon (2012) Several countries	1214 firms	Ordinary Least Squares (OLS) Linear autoregressive dynamics	Net KLD score Size Debt ratio	Advertising intensity R&D
Xu et al. (2012) China	57 firms	Event study Multivariate analysis	Environmental pollution news ownership	Local government Size

				leverage
Iwata and Okada (2011) Japan	268 listed firms	Industry specific fixed model	GHG emissions Size R&D leverage	Waste emissions Growth Advertisement
Delmas and Nairn-Birch (2011) USA	1100 firms	Panel data analysis, fixed and random effect models	GHG emissions Firm Size, Growth Water Abstraction KLD concerns	Disclosure Capital Intensity
Saleh et al. (2011) Malaysia	200 publicly listed firms	Fixed and random effect model	Environmental dimension Earnings per share Size Leverage Total assets turnover	Corporate social responsibility (employee relation and community involvement)
Busch and Hoffmann (2011) Europe, Japan and North America	2500	Regression analysis ANOVA	Carbon Intensity Carbon management firm size	Risk
Uotila et al. (2009)	279 manufacturing	Generalised method of moments (GMM),	Explorative orientation Exploitation orientation	Size

USA	firms	Content analysis	R&D intensity	
Brammer and Millington (2008) UK	537 firms, All share index	Firm-level fixed model	Corporate social responsibility R&D Size Advertising Labour Intensity	Leverage
Lucas and Wilson (2008) USA	1228 service firms	Univariate and multivariate regression analysis	Pollution prevention Recycling Alternative fuels Beneficial products and services Environmental communications Industry, leverage	Industry risk Employees Smokestack service
Ziegler et al. (2007) Europe	368 firms	Time series regression, asset pricing models	Environmental performance Social performance	Relative sustainability performance
Nakao et al. (2007) Japan	278 listed firms	Multi-linear regression analysis Granger causality test	Pollution risk, resource recycling and global warming measures Advertising expense R&D expense	Leverage Debt ratio
Murray et al. (2006) UK	100	Cross-Sectional longitudinal analysis	Environmental disclosure Firm size	-

Clemens (2006) USA	76 SMEs	Field survey Regression Analysis	Green economic incentives Green performance	Firm size Effectiveness of current standards
Gupta and Goldar (2005) India	85 firms	Event study	Environmental pollution announcements	-
Lorraine et al. (2004) UK	32 news	A cross-sectional analysis, conventional event study approach	Environmental pollution news Company size	R&D
Konar and Cohen (2001) USA	321 publicly listed firms	Ordinary Least Squares (OLS)	TRI emissions, environmental related litigation R&D, market share Sales Growth	Advertisement expenditure
King and Lenox (2001) USA	652	Event studies	Relative Emissions Capital intensity Growth R&D Environmental regulation	Industry emissions Leverage Firm size Permits
Russo and Fouts (1997) USA	243	Regression analysis	Environmental ratings Industry concentration, Firm growth, Firm size and advertising intensity	Capital intensity

Feldman et al. (1997) USA	330 listed firms	Regression analysis	adoption of EMS toxic emission reduction Leverage	R&D
Hart and Ahuja (1994) USA	127 listed firms	Regression analysis	Pollution prevention Emissions reduction Capital intensity Leverage	Advertising intensity R&D

3.5. Limitations of Existing Research and Need for Further Research

Despite the several studies in corporate environmental management and financial performance, it is evident from the above-reviewed literature that there are a number of limitations which calls for further investigation and research.

First, extant literature has focused on answering the question “does it pay to be green” and yielded contradictory results with some reasons identified as the difference in geographical locations, methodology, sample size, control variables, time variables among others (Moneva et al., 2006). Some researchers found a positive relationship (e.g., Hart and Ahuja, 1994; Gupta and Goldar, 2005; Iwata and Okada, 2011) while others found a negative link (e.g., Jaggi and Freedman, 1992; Rassier and Earnhart, 2011; Horváthová, 2012). Some studies, on the other hand, could not establish a conclusive relationship between them (e.g., Cohen et al., 1995; Earnhart and Lizal, 2007; Hatakeda et al., 2012). Consequently, recent scholars have reformulated the research question into “how does it pay to be green” and “when does green pays” to focus more on the conditions that could drive the CEM-CFP relationship (Misani and Pogutz, 2015; Ambec and Lanoie, 2008). Most of these studies have been carried out in the USA and some few European countries including the UK. This study will contribute to the on-going debate on the relationship between corporate environmental management and corporate financial performance in the UK by providing new evidence from a multi-sectoral perspective. Since this study is investigating the CEM-CFP link from a multi-dimensional perspective, the results from a sectoral lens will give a better view for government agencies to provide interventions, policy adjustments and specific derogations to companies with similar interest and business perspectives.

Second, the nature and scope of EMPs have not been analysed comprehensively (Montabon et al., 2007). EMPs according to Lucas (2009) is the umbrella term for a wide range of activities from ranging from the internal efforts by firms to assess, plan and implement environmental strategies (e.g., Sroufe et al., 2002), the different sets of procedures advanced to design processes and products efficiently to the environmental performance reports issued to stakeholders (e.g., Melnyk et al., 2003). Businesses, as emphasised by Montabon et al. (2007) may adopt EMPs based on their activities and environmental consciousness. According to them, EMPs can be proactive, reactive, accommodative and defensive in nature and may be seen as strategic, tactical or operational approaches to environmental sustainability depending on the manner and the period in which firms utilise them.

Whether firms adopt EMPs by reacting to environmental regulations or perhaps responding to stakeholder pressures, there is a general advocacy by governments and environmental agencies for them to be proactive for competitive advantage (Marshall et al., 2005; Buysse and Verbeke, 2003). Existing literature so far has not indicated which industrial sectors are noted to be strategic, tactical and operational in their decision to adopt EMPS; it is prudent for a further study from a multi-sectoral viewpoint to present practices commonly adopted by these industries. There have been calls for academic research to examine these practices comprehensively and distinguish them across industrial sectors rather than targeting some sectors (Ngniatedema et al., 2014; Montabon et al., 2007). This study intends to contribute to bridging this gap by examining these practices reported by FTSE All Share firms from corporate responsibility reports and categorise them under the various sectors to aid policy design.

Further, some EMPs have been explored by extant studies such as Teles et al. (2015) who recently studied large Brazilian corporations and found evidence that environmental practices such as reducing natural resource consumption and improving waste treatment were the most popular among the studied firms. Other practices such as recycling and reusing of materials (Jones, 2010), pollution prevention through environmental technologies (Lai and Wong, 2012), Eco-design of products and processes (Rondinelli and Berry, 2000) and achieving ISO 14001 and Eco-Management and Audit Scheme (EMAS) Certifications (Disterheft et al., 2012) were also discovered to be common among large firms. Montabon et al. (2007) for instance, adopted the content analysis approach to sampling a comprehensive list of EMPs that firms disclosed in their corporate environmental reports. No studies so far in the UK have considered EMPs from the outlined vital environmental issues raised by DEFRA (2013) in the compulsory guidelines for listed firms to follow in their environmental reports. Thus, this study intends to use these critical EMPs as a benchmark in investigating the scope of the practices the FTSE All-Share listed firms.

Also, extant research carried out different statistical tests to examine how each financial performance indicator impacts on the EMPs (e.g., Misani and Pogutz, 2015; Wang et al., 2013; Nakao et al., 2007). However, the reversal investigation of how each EMP react to CFP has received less attention in literature relatively. Fewer studies have examined the impact of GHG emissions and waste on financial performance (e.g., Delmas and Nairn-Birch, 2011; Hatakeda et al., 2012). However, no extensive study has analysed a range of environmental practices and their impact on financial performance yet (Lioui and Sharma, 2012). In order to understand how stakeholders and interested parties react to different environmental issues, Misani and Pogutz (2015) have argued the need to explore the impact of each EMP on CFP comprehensively for strategic decisions as managers will be advised on the green practice that maximises financial performance. Identifying the indicators negatively affected by EMPs and those positively affected will advise policymakers on the necessary strategies to be advanced to keep businesses running effectively and efficiently. More so, understanding which EMP has a significant impact whether negative or positive on financial performance will enable managers detect the most relevant environmental issue to their stakeholders and interested parties in their various industrial sectors and design policies accordingly.

Also, the majority of studies made provision for some accounting measure of financial performance while just one or two market-based measure of financial performance were utilised (e.g., Misani and Pogutz, 2015; de Burgos –Jimenez at al., 2012; Iwata and Okada, 2011). For instance, Misani and Pogutz (2015) ran an unbalanced panel data analysis of listed firms registered on the Carbon Disclosure Project (CDP) and used Tobin’s Q, ROE, ROS and ROA as their financial performance indicators in their test for a curvilinear relationship. They found an inversed U-shaped relationship between Tobin’s Q and environmental management, but no discernible impact was found for ROE, ROA and ROS. This result according to them is because of the uniqueness of Tobin’s Q as a market-based indicator that captures investors’ expected gains in the future unlike the accounting based financial indicators employed. Iwata and Okada (2011) also established evidence that GHG emission reduction does not affect ROS in the short run but rather in the long run while on the other hand, GHG emission had a negative relationship with Tobin’s Q in both short and long run using a 5-year unbalanced panel data. The difference in results for the financial performance indicators (i.e., accounting-based and market-based) have raised calls for a multi-dimensional approach to differentiate between them and establish construct distinction (Endrikat et al., 2015).

Finally, researchers such as Konar and Cohen (2001), Nakao et al. (2007) and Teles et al. (2015) argued that the investigation of causality direction CEM-CFP link is relevant to understanding their relationship in-depth instead of relying solely on correlation. Hart and Ahuja (1996), for instance, argued that there could be a virtuous circle of causality in the CEM-CFP relationship but not necessarily a linear (positive or negative) one because of the integration of instrumental stakeholder theory and natural resource-based view (NRBV). In order to draw a causal inference, Endrikat et al. (2014) emphasised the need to measure both EMPs and financial performance with a time lag to distinguish between short and long-run causality. Nonetheless, the majority of the extant studies (e.g., Flammer, 2012; Teles et al., 2015) investigated this relationship mostly in the long run but not the in short run. Such findings may not give a general inference of the causality direction since it only accounted for long-term impacts thereby partially indicating when it pays to be green. This study intends to provide evidence for the causality directions of EMPs and financial performance indicators (i.e., accounting-based and the market-based indicators) of the FTSE All-Share companies. Since no studies so far in the UK have explored this multi-dimensional causal relationship, it is imperative to get a new perspective in that regards which may lead to policy adjustments.

3.6 Conclusion

This chapter has provided an adequate review of the literature covering the various environmental management practices particularly as outlined by DEFRA for firms to follow in their environmental reports since this study's main focus on listed firms on FTSE. In doing so, empirical evidence to support why those practices (i.e., GHG emissions management, water usage management, waste management, materials and resource usage management, biodiversity management and air, land and water management). The emphasis of the chapter was clearly on identifying the relationship between corporate environmental management and corporate financial performance in different countries from the linear and non-linear point of view. This review has helped to identify gaps in the extant literature which calls for the current study to investigate. Control variables like corporate governance (i.e., Board size, CEO duality, gender diversity) and firm characteristics (i.e., firm size, financial leverage, capital intensity, gearing) are employed in this study to ensure that the relationship between CEM and CFP is not biased. Having looked at the relationship between both quantitative and qualitative selected studies, none of the studies so far in the UK has considered the multi-sectoral analysis from the short and long-term perspective. Also, the focus of the study unlike existing researchers has been a range of EMPs and their impact on corporate financial performance but not just one or two environmental issues as emphasised by Misani and Pogutz (2015). This study moves away from the excessive reliance on literature on correlation and probes further to establish inference of causal direction.

CHAPTER FOUR

THE NATURE OF CORPORATE ENVIRONMENTAL PERFORMANCE

4.0 Introduction

This chapter aims to expound the importance and the nature of corporate environmental performance (CEP) by highlighting the reasons behind the much emphasis placed on it at the global level. The chapter begins with the general overview of the evolutional background of environmental management and performance. In the previous chapters, it has been demonstrated that environmental management is perceived by researchers and interested stakeholders to be a current topic for management discourse. Thus, it is undeniable that companies do play a huge role in improving environmental performance. This chapter also covers the underlying arguments in support of adopting environmental management practices (EMS). The relevance of developing company’s specific EMS is well noted in this chapter as well. Further, the benefits of environmental performance reporting as outlined by DEFRA are acknowledged in the current chapter. The chapter concludes by looking at the environmental legislation in the UK as most of those laws and regulations on environmental performance were developed from the European Union (EU) directives.

Throughout this chapter, the emphasis is made on the fact that environmental performance is indeed a topical issue not only this time but also some decades ago and would still be until companies and national leaders take a stern position on how to manage it (Albertini, 2013). This is because of the on-going debate on whether companies would benefit financially if they improve their environmental performance and also whether the economic stance of countries would be boosted when they take measures to enhance national environmental performance. In addition to corporate environmental reporting being recognised as a signal to stakeholders on firms’ transparency and accountability, measuring the performance also helps firms to manage their environmental performance (Deloitte, 2001). As a result, stakeholders may not merely overlook the transparency and accountability of companies’ due to their environmental reporting (Chithambo, 2013) but also go the extra mile to look for audit evidence that shows the extent of credibility of the reported environmental performance. In this respect, measuring and reporting such performance tends to be a pivotal feature of environmental performance assessments so far as managing and improving the performance is the focus.

4.1 Historical Evolution of Environmental Management

According to Colby (1991), environmental related problems had been on the increasing side before the 1990s in both scope and scale and still increasing to date. Issues such as pollution, deforestation, usage of water, soil erosion and other forms of resource degradation, depletion including climate change and the ozone layer were all on the considerably higher side in those times. Also, the world's population kept expanding extremely right from the 1990s. During that period, about 40% consumption of the terrestrial primary production was attributed to humankind activities. Further to this occurrence, a conference that was held in Stockholm in 1972 on the Human environment brought about many developmental changes regarding society's perception on how to manage the relationship between man-made activities and nature. Such changes in the different time regimes could be referred to as the evolution of the environmental development paradigms.

International organisations also formulated the development stages through which environmental management had gone through from a corporate viewpoint. These development stages were organised by the United Nations Environment Programme (UNEP), International Federation of Consulting Engineers (FIDIC) and the International Chamber of Commerce in 1996. They outlined the timelines in a chronological manner starting from 1964 as the era of environmental awareness for companies; 1970, the end of the pipe approach era; 1975, the era of process-integrated approach; 1980, environmental coordinators era; 1985, the era of environmental management (i.e., EMS and Auditing); 1990, the EMS standards (i.e., BS 7750 and ISO 14001) period; 2000, the era of EMAS and reporting of certification; and from the year 2000 till date has been the sustainability era by companies. These development stages are all inculgated in the eras described by Colby (1991).

This section will, therefore, discuss the four main eras presented by Colby (1991) as they encompass all the development stages outlined by the international bodies and also include the broader view of development economics.

4.1.1 Frontier Economics

The term frontier economics was first used by Kenneth Boulding (1966) to describe how various economies utilised their natural resources until the late 1960s. During the frontier economics era, natural physical resources (i.e., energy, raw materials, soil, air and water) were thought to be infinite in supply for human consumption. However, the by-products and end-result of consuming these resources led to various forms of pollution. This caused a vicious cycle where nature provides resources to the economy and the economy, on the other hand, exploits those environmental resources based on the perception that no matter the natural resources used and wasted, nature would regenerate them. After some years, the neoclassical economists (see Daly, 1989) started a different argument that resources were scarce in supply and therefore suggestions on how to allocate those resources should be the focus. Around the same period when neoclassical economics was centred on the allocation of resources, Marxist economics also pointed out the need to focus on the distribution of those natural resources. The arguments in support of managing the biophysical environment were not given much attention but somewhat deemed to be irrelevant.

After following the frontier economics standpoint for a while, resources started depleting, and that brought about the need to measure the natural resources in order not to endanger the quality of human life and distraught the functionality of the ecosystem. This knowledge created a paradox that natural resource value is only recognised when the resources are scarce. The paradox was linked to the exchange theory of value and led to the discussion of efficiency as a relevant topic when discussing the use of natural resources. Some developing nations in those days emulated this approach of frontier economics towards the environment in ways they presumed was helpful in boosting their economy and conserving resources. Though this was not the best decision at that time, it sure was helpful in the conservation of natural resources to some extent. As framed by Colby (1991), it was a minor evil with some justifications during the early stages of industrial development and rapid increase in population growth. Economists in this paradigm believed that after ensuring a stable economic development, any damage to the natural environment could be effortlessly repaired (Colby, 1991).

4.1.2 Deep Ecology

A complete opposite attitude to the frontier economics emerged in the 1970s and was termed by researchers as deep ecology (Devall and Sessions, 1985). It started off as a political movement and therefore was not accepted well by the general public. The concept of deep ecology according to Colby (1991) is different from the science of ecology. It thus, however, acknowledges the scientific reasoning with a non-anthropocentric perspective of the relationship between human activities and nature. The emphasis of deep ecology is on the ethical, social and spiritual aspects that are synthesised together to help understand the relationship between natural resources and human activities (Nash, 1989). Though it is not a consistent philosophy, some advocates consider it to promote diversity and flexibility with regards to the means through which natural resources are used.

Deep ecology also eclectically draws on several schools of thoughts including the wilderness preservationism, transcendentalism in the 19th century, religions, participatory democracy and other social equality characteristics. To the deep ecology economists, the scientific aspects could be merged with their indigenous management. To them, engaging in technological activities would rather incur more costs and problems than improve overall environmental performance. Notwithstanding the negative attitude towards technological input to regulate the relationship between man-made activities and the natural environment, having a sense of deep ecology should not be overlooked either. Thus, applying this philosophy resulted in radical changes in the environmental, economic, legal and social systems (Colby, 1991).

4.1.3 Environmental Protection

After the weakening of the frontier economics in the 1960s and the short reign of deep ecology school of thought, researchers and social stakeholders started recognising the problems associated with increased pollution levels. As a result, it became germane to realise the trade-off between frontier economics and deep ecology or compromise. There was an emerging perception of a nexus between ecology and economic growth. In some industrial dominated countries, they institutionalised the need to have an environmental impact statement to provide an assessment of the costs and benefits of developmental activities. However, this was perceived to be an anti-development strategy due to negative influence environmental politics had recorded in the past. The environmental protection approach was seen to be defensive because it placed less emphasis on improving both economic development and ecological resilience but instead focused on protection. During this era, this approach was termed as the “end-of-pipe”, “business as usual” and sometimes the “treatment plant approach” (see Colby, 1991). Regarding economic analysis, the neoclassical model was still in use, and the natural environment was legalised as an economic externality. For optimal pollution levels to be determined, the focus was meant to be on the impact of pollution on the ecosystem and its resilience rather than the short-term economic acceptability of a level of pollution. At that point, it became necessary to introduce technological solutions that could avert environmental related problems.

In addition to technological solutions, environmental protection agencies and ministries were created and allocated responsibilities which included setting up pollution limits and cleaning up after those limits were exceeded. They were, however, not responsible for organising and planning activities to create awareness of non-pollution and therefore was not liable for facilitating ecological functions. At some point, such developmental activities were benign ecologically and barely recognised. Nonetheless, the impact of pollution on environmental quality and human health was the concern of all industrialists and not only the industrial middle class. Thus, environmental protection was a step closer to ensuring that the environment is safe for both human life and industries.

4.1.4 Resource Management

In an attempt to improve the concept of environmental protection and close the loopholes in merely protecting the environment, further discussions were made by interested stakeholders and governments (Colby, 1991). According to Colby’s analysis, reports from the Brundtland Commission, the world watch Institute state of the world and the World Resources Institute resources brought about the theme of resource management. Resource management involves a fair theoretical extension of the neoclassical economics and a significant change in the management practice. The main idea behind resource management was to incorporate all capital and resources which ranges from biophysical, infrastructural, human, productivity and policies and to manage them for improved economic performance. In order not to impede economic growth and expansion, resource management should have stretched to the interdependence of resources and not focusing on some known vital resources alone. Also, some resource managers also thought that stabilising population levels and reducing per capita consumption in developing countries and industrial nations were relevant for achieving sustainability. Also, resource management needs to cover a lot more than managing natural resources by including the quality of those resources consumed either by humankind or companies.

The paradox is that the poor in the society tend to place less priority on environmental quality and yet they are those who are harmed extensively by environmental degradation compared to the rich. The concept of resource management is analysed differently by managers in developed and developing countries whether it is more of resource depletion or pollution. It is getting quite difficult for the change in paradigm from business as usual to resource management to be grasped wholly due to its related costs. On the other hand, it is easier to naturally fall into the conventional polarised language of frontier economics and deep ecology discourse than continuing with the management concept. According to Pezzey (1989), the primary goal of development is imperative for economic growth, but sustainability was not accorded the necessary attention due and was rather seen as a constraint to green growth.

4.1.5 Eco-development and Environmental Management

Since the resource management era faced some backlash from stakeholders and environmentalists, it became pertinent for the researchers and policymakers to delve into eco-development and environmental management schools of thoughts. Just as resource management was linked to economic development, environmental management was equally noted to have a significant trade-off with economic growth. To find the best of the two worlds (Ignacy Sachs, 1984), eco-development restructures the relationship between society and natural environment by reorganising activities of human to be in synergy with ecosystem services as opposed to the simple symbiosis of back-to-nature. One can say that the use of different terms such as growth, development, management or protection as an explicit connotation signifies the reorientation of the integration of environmental, social, economic and ecological concerns. The concept of eco-development expands the boundaries of resource management framework to a more sustainable concept. Its prime focus is to shift from polluter pays to pollution prevention where sustainability is given considerable attention, and ecological principles are aligned for the same purpose.

Also, eco-development did stride towards maintaining sustainable levels and economic welfare simultaneously (Daly, 1977). This required long-term management of adaptability, uncertainty and resilience to mitigate the unexpected occurrence of ecological thresholds. Under eco-development, tradable emissions permits are not highly encouraged because of the rights they give to companies to pollute and even trade pollution limits. In perspective, a significant attitudinal change the modern society needed was to give up the “business as usual” notion and understand that every corporate and human-made activity had an impact on the environment indirectly or directly. Such restructuring would enable companies to develop new comparative advantages to help make them adaptable and more competitive in the long run. Some arguments held a notion that great benefits could be obtained from economic and social angles should environmental management approaches be fully integrated (Miller, 1985).

4.2 Environmental Management and Environmental Management System

According to Cramer (1998), environmental management involves the exploration of the various technical and organisational activities which are aimed at decreasing the impact of businesses operational activities on the environment. Environmental management is the last aspect that has been added to the sustainability model. Diverse methods and tools have been developed to aid companies in minimising their environmental impact (Cramer, 1998). Some of these tools companies used to improve their performance include strategic environmental assessment, environmental flow assessment, life cycle assessments, environmental impact analysis and standardised environmental management system (EMS). Some companies, on the other hand, have collaborated with suppliers and third parties to develop the same environmental objectives and plan to guide their operational activities. It has been established that firms engage in environmental management actions due to several reasons which include regulation and legislation (Holland and

Foo, 2003). Some firms are satisfied when they manage to acquire an EMS and ISO certification, most especially the ISO 14001 certificate which is the greatest and most impactful (Bernado et al., 2009).

An EMS can simply be defined as the non-stop cycle which starts from planning environmental policies, implementing, reviewing the processes to improving actions that have been taken to meet all environmental requirements and targets. According to ISO14001, EMS can also be defined as a part of the overall management system that includes planning activities, organisational structures, procedures, processes, and responsibilities, implementation of policies and the reviewing and maintaining of policies (European Committee for Standardisation, 1996). In short, EMS manages the environmental impacts of organisation activities that lead to a continuous improvement in environmental management as the outcome.

Both public and private sector organisations are faced with the challenge of responding to ISO 14001 EMS standards. This is because sometimes stakeholders including customers, governments, communities, employees, society interest groups may request for ISO or EMAS certificates in order to ensure that the environment is not harmed but managed properly as firms carry out their activities. Despite the relevance of obtaining an ISO 14001 or EMAS certificate and developing EMS, the associated efforts and costs make it quite unbearable for companies to do so sometimes (Bernardo et al., 2009).

It is worth noting that ISO 14001 and EMAS certification only provide guidelines on how to develop an organisation's EMS but not to define the contents to be included. The company decides on the important aspects and issues that need to be in the EMS and how to organise them. If the organisation decides to focus on the specific operational practices outlined in the EMS then the associated operating costs and environmental would be reduced. Most companies are subjected to national and international environmental regulations without being aware and consequently end up operating in the blind. Since all companies irrespective of size and sector affiliation do have an impact on the environment to some extent whether it is the production of emissions or waste or other activities, unawareness of such regulations may not be used as an excuse. Of course, there are some variations and exemptions to environmental regulations, but a company is better off developing an EMS to help it avoid unnecessary regulatory non-compliance costs.

Though EMS development may be costly, it could also be regarded as an investment, and therefore the benefits may outweigh the costs. Developing an EMS can help businesses to improve their environmental performance and achieve environmental targets while meeting stakeholder expectations (Feldman et al., 1997). Other benefits of EMS may include managing liabilities and identifying risks related to environmental compliance and avoiding damages.

There are two prime goals of EMS that are preventing pollution and complying with environmental regulations (Waste and Resource Action Programme, 2015). Also, the National Sanitation Foundation, for instance, listed some numerous and yet non-exhaustive benefits of EMS. These include improved environmental performance, pollution prevention, and conservation of resources, enhanced compliance, increased efficiency, attract new customers, enhanced employee morale, competitive advantage, enhanced stakeholder image, fewer liabilities among others.

4.3 Environmental Performance

Environmental performance can be put in simple words as the output of environmental management regarding the actual effect a firm's activities have on the natural environment (Albertini, 2013; Klassen and Whybark, 1999). Thus, such effect could be positive (e.g., emission reduction through the planting of trees) or negative (e.g., toxic emissions) depending on the particular business activity. Businesses tend to make good environmental sense when they improve their environmental performance. However, uncertainties and risks related to environmental activities do impact the general performance of all businesses to some extent that could affect their consumer behaviour and investment decisions. Environmental performance can also be affected by energy and natural resource management in order to avoid business risks that could endanger the future of the company.

Companies that are well placed in the society are those that manage; measure and communicate their environmental performance (DEFRA, 2013). Those companies already know how to reduce their costs through process improvement and complying with all regulatory requirements that meet stakeholders' expectations. In the UK for instance, all listed companies are required by law to report their GHG environmental performance which has also incited them to report on other environmental issues. In addition to GHG emissions, other environmental aspects that need to be managed properly are waste, water, emissions to air, land and water, biodiversity and materials and resource efficiency. Managing and reporting environmental performance comes along with some major benefits recognised by DEFRA (2013).

First, reporting and improving environmental performance according to DEFRA (2009; 2013) could lead to cost savings and productivity gains. Through a reduction in resource use and improved resource management, companies can save operational costs and increase their efficiency. They can also save costs through various means such as less raw material usage, waste reduction, and a decrease in water consumption, less packaging or green packaging, among others. Any of the practices mentioned can help to reduce levies and taxes and other associated compliance costs significantly. For instance, British manufacturing firms were estimated by the Environment Agency to be able to save approximately 2-3 billion pounds which are equivalent to 7% of profits when best environmental practices are adopted to minimise waste (DEFRA, 2013).

Also, better environmental performance can lead to the improved business image before customers and suppliers. Such improved company image heightens customers' confidence in the business and its products. Thus, even new customers who are environmentally conscious would be attracted to patronise products and services. Orlitzky and Swanson (2012) emphasised that engaging in EP leads to reputational benefits. In respect of suppliers, improving environmental performance and reporting incite the impression of great environmental concern. Due to the recent environmental regulations, most suppliers are attracted to companies that comply with regulations and work harder to avoid convictions. Suppliers are assured to the greater extent that businesses that have better environmental performance can be trustworthy in creating a long-term business partnership. Frooman (1999) asserted that maintenance of good stakeholder relationship such as the one with suppliers could reward firms to secure resources that are valuable for competitive advantage.

Also, the recent interest of financial investors and brokers in knowing the sustainability plans of businesses they deal with is on the upsurge. Thus, managing environmental performance and reporting it provides a better indication to investors that such a company is taking all necessary steps to reduce associated risks and develop opportunities. Over 200 financial institutions and the UNEP Finance Initiative (UNEP FI) worked together to establish and promote the relationship among financial performance, environment and sustainability (DEFRA, 2013).

Furthermore, when environmental impacts are well managed, it brings about new ideas that are innovative and helps to achieve the set environmental targets. Product innovation could be attained through process redesigning, green packaging, raw material content among others. This will help secure existing customers and attract new markets while safeguarding the existing ones. Surroca et al. (2010) and Hull and Rothenberg (2008) emphasised that environmental performance provides the opportunity for businesses to be innovative in utilising intangible resources for capable managers to combine and yield competitive advantage. Research and development into green production processes are likely to lead to innovations that generate revenue and minimises costs (Porter & van der Linde, 1995).

Also, high-calibre employees are attracted to companies that manage, improve and report their environmental performance. Employees that are concerned about the natural environment are motivated to work for firms that do not have an adverse operational effect on the environment because of their values. According to a survey by Environics' Global Campus Monitor (2003), three out of five people would want to work with a company who share similar environmental values with them. Greening and Turban (2000) and Turban and Greening (1997) highlighted that improved environmental performance helps attract and retain outstanding employees while serving as a guard against possible future damages and risks (Godfrey et al., 2009). Further, establishing environmental performance practices has been found to help increase employee involvement in organisational activities, encourage goal congruence and increases motivation which leads to enhanced productivity (Becchetti et al., 2008).

Finally, exposure to environmental related fines is a considerable risk that needs to be averted by companies through proper management of environmental impacts. A business in the right environmental performance standing tends to have a better relationship with regulators and get trained to ensure that its operating licence is maintained. Thus, the business is confident of staying out of regulatory fines and levies due to its improved environmental performance.

4.4 Environmental Legislation and Regulation in the UK

There is a wider range of legislation available to help tackle environmental issues in both developing and developed economies. The control of environmental damage is the central focus of the UK national environmental law. In the UK for instance, the environmental legislation is driven largely by the EU directives covering the business cycle and applies the principle of extended producer responsibility in all aspects as defined by the OECD in 1999. Regarding environmental legislation, its history spans from the 1860s where it was found relevant to develop controls on air pollutions at industrial sites. Several regulations were developed and led to the Environmental Protection Act in 1990. This Act is very vital in the UK as it draws from regulatory structures and requirements to protect the environment. The enactment of this Act caused the companies to rise to protect the environment and avoid getting fined for damaging the environment. The companies started acting under the environmental permitting regime (EPR) which combines the pollution prevention and control (PPC) and waste management licensing and industrial emissions regimes, water, waste, contaminated land, conservation of nature, wildlife and habitats and environmental impact assessments (EIA).

The EIA aims to encourage businesses to internalise the environmental costs associated with product full life cycle. This will ensure that businesses that have negative impact on the environment do not pass the costs on to other parties in the product lifecycle as externalities but rather as internal cost to be reflected in their own income statements. In order to assess and regulate environmental planning, the environmental impact assessment directive and the strategic environmental assessment (SEA) directive became the two significant directives. They were both transposed into a UK law by the regulations of the environmental assessment of plans and programmes. The goal was to provide a greater protection level of the environment and to aid the integration of environmental considerations to promote sustainable development through preparation and programme adoption. However, these directives are for large projects in the local communities and therefore require both private and public-sector entities as well as local authorities to ensure that all proposed projects are assessed environmentally before implemented. These directives reflect the best projects and if followed well can help businesses achieve long-term financial benefits and good stakeholder relations.

Since legislation has to be regulated and enforced, the environmental agency (EA) is the principal regulator of the environmental legislation in the UK by the regulatory enforcement and Sanctions Act 2008 and Environmental Protection Act 1990. DEFRA is the UK's department assigned the responsibility of developing policies and regulating environmental, food and rural issues. There have been some specific environmental regulations and policies that eventually became legalised such as the Climate Change Act (CCA) 2008. The CCA 2008 is set to reduce GHG emissions by 34% by 2020 and 80% by 2050 against 1990 levels. These targets are higher than the EU, and the Kyoto Protocol set due to UK's higher ambition of curbing climate change impact. Though other environmental aspects are regulated, GHG emissions are currently regulated on a larger scale. For instance, in 2002, the UK introduced the emissions trading scheme to help facilitate corporate compliance with the climate change objectives in the country (Bailey, 2007). In a whole, the UK climate policy encompasses three main policy instruments namely: climate change levy (CCL) 2001, climate change agreements (CCA) 2001 and the UK Emissions Trading Scheme (UKETS) 2002. Other environmentally targeted legislation includes the Energy Performance Certificates (EPCs) and Display Energy Certificates (DECs), Carbon Reduction Commitment (CRC) energy efficiency scheme, site waste management plans, flood risk assessments and BREEAM (Building research establishment environmental assessment method).

One foremost feature of EA is the integrated pollution control (IPC) which aims to minimise environmental impact through the introduction of best practical environmental options (BPEAO) and best available techniques not exceeding excessive cost (BATNEO). Investing in various environmental practices has no doubt led to increasing corporate expenditure while avoiding environmental fines at the same time. Recently, there are industrial led initiatives such as the ISO 14000 series which mandates companies to pay greater attention to environmentally related issues so far as achieving international quality is the corporate focus. According to a study by Holland and Foo (2003), the UK produces more separate sustainability reports than the firms in the US. However, they believed that the increase in environmental performance disclosure in the UK is driven by management and reporting initiatives and not the increased legislation due to the proactive response given to voluntary disclosures. Nonetheless, legal obligations remain as one of the greatest drivers for compliance with environmental policies as highlighted by Deegan and Rankin (1999).

Aside from the issue of legal fines and possible management initiative to comply with environmental legislation, studies (e.g., Atkins et al. 2007) have shown that SMEs are less aware of environmental issues and tend to have a low level of compliance. Over half of the SMEs' managers indicated that they had little knowledge of environmental legislation and how to implement them according to a study by Wilson et al. (2012). This may not be the case for only SMEs but also large listed firms considering the frequency with which some of them are fined continuously. Thus, the issue of awareness needs to be taken seriously by regulators for companies to go all out for improved environmental performance. It is no doubt that environmental legislation leads to the achievement of the desired environmental protection levels. In fact, a study by Ormazabal and Sarriegi (2014) on the evolution of environmental management in companies confirmed that fulfilling environmental legislation is the first evolutional stage of businesses before training, systemisation, economic, eco-innovation and lastly, leading a green company to become a priority.

4.5 Summary and Conclusion

The chapter discussed some developments that make up the concept of environmental management. It began by highlighting the five main eras of the environmental management evolution from the early 1960s. The frontier economics was the first era discussed in the section. It was emphasised that in this era, no concerns were made for sustainable consumption and exploration of natural resources which led to massive increase in pollution. The next era that was discussed is the deep ecology regime where the preservatism idea started sprouting through political movements. The environmental protection followed the deep ecology era where the ‘end of pipe’ or ‘business as usual’ approach became the order. Companies started getting more concerned about protecting the natural resources and human life from exploitation and poor health issues. When it was later realised that environmental protection did not encourage management of resources, the resource management era was birthed. Resource management incorporated capital and natural resources in the quest to improve economic performance. The last regime which is currently in use now is the eco-development and environmental management. During this era, sustainability was embedded into the measures to promote environmental management and economic welfare. Also, an environmental management system which comprises of environmental assessment, environmental flow assessment, life cycle assessments, environmental impact analysis and standardised EMS was related to recent development in environmental management. The section further presented some issues in environmental performance and discussions of some key environmental legislation (e.g., CCA, CCL) and regulations (e.g., EPR, PPC) in the UK.

CHAPTER FIVE

RESEARCH METHODOLOGY

5.0 Introduction

As defined by Silverman (1998*)*, a research methodology *"is a general approach to studying a research topic that establishes how to go about studying any phenomenon and how the research should be designed".* Saunders (2011) also developed a term for research methodology known as "research onion" to describe the various stages that need to be considered when formulating an effective research methodology. The five main layers of the "research onion" are the research philosophy, approaches for the research, strategies to be adopted, time horizons and the data collection methods involved.

This chapter presents the framework of the proposed methodology and the design the researcher employed in achieving the research objectives outlined in the preceding chapters. The sections are organised as follows: Section 5.1 describes the research paradigm and philosophies underpinning this research. Section 5.2 provides details of data sources and description of all the variables employed. Section 5.3 discusses the statistics and analysis adopted to achieve each research objective. The diagnostic diagnostic checks and tests to validate the model adopted for this study are also presented in this section. Finally, Section 5.4 summarises the whole chapter.

5.1 Research Philosophy

According to Bryman (2012), a research philosophy refers to the fundamental set of beliefs that underlies the nature of the reality under study. Saunders (2011) also noted that the investigation philosophy represents the knowledge development and the nature of such knowledge. Having a philosophical research position helps the researcher justify the assumptions made for a particular research (Flick, 2011). It is vital to appreciate the extensive range of different philosophical assumptions; however, there are two major ones used by the social science and management researchers. These, according to Burrell and Morgan (1979) are the ontology (i.e. realism versus nominalism) and epistemology (i.e. positivism versus post-positivism or anti-positivism). These two philosophies have been pointed out by Furlong and Marsh (2007) to be analogous to a ‘skin’ but not a ‘sweater’. From their perspective, a researcher can only present a good defence against critiques from other viewpoints only when that researcher understands his/her ontological and epistemological positions. These philosophical perspectives could be discussed in relation to any of the four paradigms (i.e., positivism, interpretivism, critical orientation and poststructuralism) mapped by Lather (2006).

5.1.1 Positivist Paradigm

Positivism is a philosophical ideology that was initially argued by Auguste Comte to be the best means of obtaining and revealing the truth about reality through scientific knowledge (Kaboub, 2008). Thus, through logical analysis, real events can be observed as they happen in orderly and interconnected manner. Such scientific theory could only be validated when the knowledge claims are consistent with the information obtained by using senses. In order to grasp the underlying assumptions of positivist researchers, the subsequent paragraphs probe further into ontology and epistemology viewpoints.

5.1.2 Ontology

Ontology addresses what social reality consists of in the context of human nature. Two different positions identified by extant researchers (e.g., Burrell and Morgan, 1979; Saunders, 2011) in respect of ontology are realism and nominalism. Holden and Lynch (2004) revealed the different forms of arguments underlying both realism and nominalism. Realism according to his emphasis, argues that the social world has to be real with physical structures in place while the nominalism considers the social world to be a product of labels and constructs to provide basic reality structure. With this in mind, a research based on nominalism requires precise identification of objectives to aid the establishment of a real structure.

With regards to research paradigm under ontology, the positivistic approach (i.e. scientific in nature) and the interpretivist approach are the two most important assumptions. Positivism emphasises that social reality is objective in nature and since it is external to the researcher, it should be regarded as only one reality (Collis and

Hussey, 2009). Based on this stress, positivists argue that not only is scientific, generalisable and objective research possible but also the only meaningful and valid approach. Thus, to obtain a valid knowledge, positivists mostly rely on quantitative methods such as experiments, surveys and statistical analysis (Eriksson and Kovalainen, 2008). Another relevant point to note about positivism is to follow a structured methodology to enable replication and also carry out statistical analysis from quantifiable observations. The interpretivism, on the other hand, believes that the social reality is subjective but not objective and thus each has his or her sense of realities because it is socially constructed (Collis and Hussey, 2009). Thus, interpretivism argues that there are more realities in the social world. This assumption thus suggests that living in a social world and thus affected by 'reality' social constructions implies no observer can be 'objective'.

5.1.2 Epistemology

Blaike (1993) describes epistemology generally as a theory of knowledge which is primarily concerned with what constitutes and does not constitute adequate knowledge in social reality. Supportively, Bell and Bryman (2007) emphasised the identification of knowledge to be within the context of appropriate in a particular discipline. Two principal positions under epistemology are the positivism and anti-positivism according to Burrell and Morgan (1979). Positivism applies natural science methods to the study of social science, and as a result, the research tends to test theories and how to advance those theories. The researcher from the positivist viewpoint is independent mostly of the object of study, and thus the discovered findings are often through measurements and observations (Krauss, 2005). Anti-positivism, in contrast, highlights the relevance of the researcher in appreciating the differences between social actors and humans but not placing the whole emphasis on the generation of results (Bell and Bryman, 2007; Saunders, 2011).

Interpretivists under the epistemological concept argue that the social world is far complicated to be comprehended within the context of a set of rules leading to generalisations. As humans play key roles in the social world, it is prudent to accept that they will interpret their social roles on the meaning they give to their roles. This, therefore, implies that interpretivism is sure of multiple realities of the social world as Lincoln and Denzin (2003) stressed in their work. From this standpoint, knowledge comprehension largely depends on an individual's interpretation of the realities they faced and based on their experiences making it more inductive in nature (Hatch and Cunliffe, 2006). The generalisation concept does not apply from this perspective as the emphasis is on the feelings and emotions of people; hence this is often related to qualitative research (Easterby-Smith et al., 2008; Saunders, 2011).

Given that this research is concerned with the study of the relationship between environmental management and financial performance, the positivism paradigm is the underlying applicable philosophy. Positivism is most suitable because the research is covers the mainstream and critical accounting research exhibiting the characteristics of quantitative methodology. For the current study, the researcher will be detached from the participants of the study in order to remain neutral by distinguishing between personal experience and science. Thus, the researcher will maintain an objective stance and explain the findings from logical and rational outlook.

Further, positivism will be employed in testing the established hypotheses in the current study and supporting with existing theories that have been empirically acknowledged. Thus, despite the generalisation of the theory in literature, a hypothetico-deduction would be made to apply theories to sampled firms under study.

To sum it up, the current thesis, which is a positivist research will first seek to identify effects of the independent variable on the dependent in order to explain the phenomena before testing the theories. It will also use the observed tangible or empirical evidence as the basis for knowledge building. Highly structured and standardised scientific method will be adopted by the researcher to ensure objective investigation. The ensuing sections provide an exposition of the research methodology and designs in this study.

5.2. Sample and Data Description

The study makes use of companies' annual reports and sustainability reports over the period of 7 years from 2009 to 2015 by using FTSE All-Share index of 634 firms is as the population for this study. The FTSE All-Share is the combination of the largest 100 companies (FTSE 100) by market capitalisation, the next largest 250 companies in the mid-range market capitalisation (FTSE 250) and the next largest companies with small market capitalisation (FTSE SmallCap). Thus, the population is made up of listed firms of varied sizes but predominantly, large listed firms. In the UK, large listed firms are encouraged to report on their overall environmental performance where Greenhouse Gas (GHG) emissions' reporting is mandatory (DEFRA, 2013). FTSE All Share is used in this study as the population due to lack of access to environmental performance data. The researcher recognised the fact that even large listed firms in the UK were recently obliged to report their GHG emissions alone leaving the other environmental aspects as an option.

This study includes firms from all sectors as listed on the FTSE without any biases to some specific sectors. However, to support existing literature that emphasised the need to analyse financial firms separately from non-financial firms, this study shows results from sample size inclusive and exclusive of financial companies (see Chithambo and Tauringana, 2014). The sampled firms are grouped into sectors following the Industrial Classification Benchmark (ICB) structure to aid in the sectoral analysis that the researcher aims to undertake in this thesis.

Also, the researcher's choice of the studied period from 2009 to 2015 is to capture all the relevant environmental performance related issues disclosed by these listed firms which are related to this study. According to Brammer and Pavelin (2006), though most large companies voluntarily disclosed their environmental practices and issues before 2004, 2009, however, seems to be the year from where most environmental data may be available for public consumption and analysis. Also, since DEFRA released the voluntary disclosure guidelines for environmental performance in 2009 and compulsory GHG emissions reporting guidelines in 2013, it is judicious to spread the study to cover both periods while including some year lags for better analysis. A UK based sample is to help further track the progress and contribution of firms in achieving a green economy considering the motivations put in place by the UK government.

The study adopts two basic sample selection criteria to deliver results for a balanced panel data analysis. First, firms with missing financial data (probably as a result of insufficient data or mergers and acquisitions) needed for this study are eliminated. Also, companies with no environmental performance data from 2009 to

2015 are not included. In a nutshell, only firms on the FTSE All Share index with all relevant data required for this research from 1st January 2009 to 31st December 2015 will be sampled from all sectors to help achieve the research aims from a multi-sectoral perspective. These two criteria are necessary to allow for sectoral comparison while avoiding the problem multicollinearity among variables and providing more degree of freedom (Gujarati, 2003). The Table 1 below shows the industries and the number of firms on FTSE All Share index under each sector, their percentage of the total population, net market capitalisation in Great British Pounds (GBP) (millions) and the weight in percentage.

Table 2: Summary of FTSE All-Share Companies by ICB

		FTSE All-Share		**FTSE 350**		**FTSE SmallCap**	
ICB Code	**ICB Industry**	**No.**	**Net MCap (GBPm)**	**No.**	**Net MCap (GBPm)**	**No.**	**Net MCap (GBPm)**
0001	Oil & Gas	17	276,072	10	273,751	7	2,320
1000	Basic Materials	28	162,099	22	161,093	6	1,006
2000	Industrials	112	252,287	66	238,016	46	14,270
3000	Consumer Gds.	38	360,064	29	357,415	9	2,650
4000	Health Care	21	217,070	15	215,822	6	1,248
5000	Consumer Serv.	94	263,745	67	257,074	27	6,671
6000	Telecom	6	87,894	5	87,433	1	461
7000	Utilities	7	82,471	7	82,471	-	-
8000	Financials	294	595,654	122	545,472	172	50,182
9000	Technology	17	19,648	7	15,622	10	4,026
Total		**634**	**2,317,004**	**350**	**2,234,169**	**284**	**82,835**

Source: LSE, FTSE All Share constituents on March 2017

5.2.1 Data and Sources

This study uses secondary data sources to collect financial accounting and environmental management/performance data needed for analysis. For instance, all financial and accounting related data were sourced from companies' Annual Reports and DataStream databases (Jeanjean and Stolowy, 2008). Environmental management and performance variables were collected from ASSET4 (Environment, Social and Corporate Governance) ESG (Kocmanova and Simberova, 2012) and sustainability reports (Mudd, 2007). ASSET4 became the most substantial database for collecting even the financial performance data where annual reports for some periods could not be accessed online. The coverage of this database is extensive and inclusive of firms listed on major Stock exchanges around the globe.

5.2.2 Dependent Variable

The current study examines firm financial performance as a multi-dimensional construct dependent variable used to assess firms' financial stance (e.g., Hoopes et al., 2003; Richard et al., 2009; Barney, 2002). Thus, financial performance is measured using accounting-based and market-based measures. Gentry and Shen (2010) argues that such distinction is necessary as they represent different dimensions of the financial performance of firms and thus combining them becomes inappropriate.

Researchers have conceptualised Accounting-based measures (ABMs) as the most popular in management literature (Barney, 1997). Cynics have suggested that accounting-based measures are popular due to the easily accessible and available data, especially for publicly traded firms. Other schools of thoughts have contended that the accounting measures and numbers are pertinent because of their usefulness in delivering acumens into economic rates of return since managers utilise them in the strategic decision-making processes. Watts and Zimmerman (1990) criticised in their study that ABMs are biased towards short-term performances and vulnerable to the manipulation of managers while undervaluing intangible assets. Theoretically, as bolstered by Gentry and Shen (2010), ABMs reflect historical information which makes it possible in assessing a firm's short-term performance.

Despite the criticisms for and against the use of only Accounting-based measures, most researchers have used some proxies in their studies. Examples of some ABMs used by researchers are Return on Assets (ROA), Return on Equity (ROE), Return on Sales (ROS), Profit margin and cash flows among others. Hart and Ahuja (1994), for instance, used ROA, ROE and ROS in analysing the relationship between environmental and financial performance for a two-year period for 127 firms sampled. Likewise, Delmas and Nairn-Birch (2011) used ROA as their accounting-based measure in determining the impact of GHG emissions on corporate financial performance for US firms. Horváthová (2012) also investigated the inter-temporal effect of environmental performance on financial performance using firm-level data from the Czech Republic and utilised ROA and ROE as her proxies for financial performance. Recently, Saeidi et al. (2015) employed ROA, ROE, ROS, ROI and net profit margin when examining the relationship between corporate social responsibility and financial performance in Iran. In the same year, Vinayagamoorthi et al. (2015) also investigated the effect of firms' profitability on environmental performance and utilised ROA, ROS, ROE and ROCE as their financial performance indicators. From these studies, it is evident that corporate financial performance cannot be completely analysed without considering the accounting performance.

Hence, this study adopts ROE, ROA and ROS as the accounting-based financial performance proxies. These three proxies have been argued by extant literature to possess appropriate distributional properties (e.g., Saeidi et al., 2015). According to Mukherjee and Padgett (2006), ROA and ROE can be used by investors to determine the growth potential of companies. They are also known to enable the evaluation of resource management regarding profits or losses associated with utilisation of resources at management's disposal as underlined by Cohen et al. (1997). Using these three proxies (Al-Tuwaijiri et al., 2004) will help overcome the deficiency of size effect when a different measure of net profit and income is used as the accounting-based measure.

On the flip side, it is imperative to note that management researchers have emphatically pointed out the relevance of employing market-based measures (MBMs) in determining financial performance and the need to combine both MBMs and ABMs (Hitt, 1994; Rowe and Morrow, 1999). In fact, MBMs have been argued to be more accurate in assessing firms' financial performance than ABMs because they measure the present value of incomes future streams, unlike ABMs which focus on past firms' performances (Seth, 1990; Delmas and Nairn-Birch, 2011).

Empirical studies have employed several market measures such as Tobin's Q ratio (Weir et al., 2002; Hiraki et al., 2003; Kiel and Nicholson, 2003), dividend yield (Gompers et al., 2003), market-to-book value ratio (Black et al., 2006), return on stocks (Mitton, 2002), among others. Cohen et al. (1995) used stock returns and risk-adjusted stock returns as their financial performance proxies in determining the effect of pollution on market value. Hamilton (1995) similarly used stock returns in exploring the impact of Toxic Release Inventory (TRI) on firms' market value. In investigating the link between firms' financial performance and corporate social performance in the UK, Brammer et al. (2008) used stock returns as the proxy for financial performance. Misani and Pogutz (2015), Delmas and Nairn-Birch (2011) and Lioui and Sharma (2012) all adopted Tobin's Q as their market-based financial performance measure for their respective investigations. Gupta and Goldar (2005) used stock prices as their financial performance proxy in examining the impact of environmental rating of large pulp and paper, colour alkali and auto firms in India.

In addition to the ABM proxies, the study adopts Stock prices, market-to-book value ratio and Tobin's Q as market-based financial performance measures. These MBMs are argued not to be subject to the control of management as they reflect shareholders interest in the performance of the company and thus decide the fate of the firms and managers which are beyond management's control (Grossman & Hoskisson, 1998). The basic argument in literature and theory is that MBMs are more accurate to determine firms' financial performance than that of accounting-based measures (Seth, 1990).) For instance Seth (1990) argued that MBMs focus on the present value of future streams of companies' income. According to him, MBMs are most appropriate for long-term investigation as they reflect the market's overall estimates of the potential to create shareholders' value.

5.2.3 Independent Variable

A number of different environmental management practices and performance measures have been used by extant researchers in investigating the relationship between environmental and financial performance. From the review of environmental management literature especially of the studies that focused on large listed companies; this study adopts five (5) environmental performance variables.

As stressed in the literature review chapter, there are six main environmental issues raised by DEFRA (2006: 2009: 2013). However, these five (5) main variables have been emphasised by previous researchers to be key measurement proxies for environmental management and performance. They are: (1) GHG Emissions, which comprised of gases such as carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride (e.g., Wang et al., 2014). (2) Water usage performance is the score for water efficiency measures installed to reduce consumption (e.g., Klassen and Whybark, 1999). (3) Energy Efficiency is also computed as the amount of energy saved due to the installation of efficient equipment for such a purpose (e.g., Klassen and Whybark, 1999). (4) Waste Produced is the amount of total waste emitted into land and water (e.g., Iwata and Okada, 2011) and (5) Materials and Resource used are the quantity reported by the sampled firms (e.g., Worrell et al., 1995).

For analysis and comparison and to advice policy and decision makers, these environmental management/performance proxies have been categorised into environmental operational performance (EOP) and environmental management performance (EMP) as claimed by Trumpp et al. (2015) to cover the multidimensionality of corporate environmental performance. According to Trumpp et al. (2015), EMPs could be grouped into five main factors which are environmental policies, environmental processes, environmental objectives, organisational structure and environmental monitoring. Considering the available data, this study likewise divided environmental management performance into five (5) sub-groups which are environmental monitoring score, objective score, process score, policy score and management system. EOP, on the other hand, consist of Greenhouse Gas (GHG) Emissions (i.e., scope1 and scope 2), Waste usage performance and resource usage reduction performance. Categorising corporate environmental performance measures helps bring to light the different impact corporate activities could have on the environment at large. In other words, it is likely that some businesses may perform better while using some specific EMP but not necessarily be operationally beneficial regarding the impact on the environment as would have been expected (Bansal and Clelland, 2004). Thus, using different measures of environmental performance could give a better conclusion than focusing on only a specific measure (Trumpp et al., 2015).

Table 3 below shows the summary of all the variables used in the regression models.

Table 3: Variables and Measurements

Variable	Acronym	Measurement
Dependent Variables - Financial Performance (i.e., Accounting-based and Market-based)		
Return on Assets	ROA	Earnings before interest and tax (EBIT) divided by total assets (TA) at the end of the financial year
Return on Equity	ROE	Net Profit after tax divided by total shareholders' equity
Return on Sales	ROS	Net Profit divided by Total Sales Revenue
Tobin's Q	TQ	Firms' market value divided by replacement value of firms' assets
Stock Prices	SP	Final stock prices quoted over a period
Market-to-book value Ratio	M2B	The ratio of firms' total market value divided by firms' total asset value of the financial year
Independent Variables (Environmental Management)		
Environmental Operational Performance (EOP)		
GHG Scope 1	Scope1	The log of direct emissions tonnes from fuel combustion, company vehicles and fugitive emissions
GHG Scope 2	Scope2	The log of indirect emissions tonnes from purchased/imported electricity, heat and steam
Resource Reduction Score	RRS	The performance score of resource use reduction (percentage)
Water Usage Score	WUS	The performance score of water usage reduction
Environmental Score	ES	Total Environmental performance score of companies (percentage)

Environmental Management Performance (EMP)		
Total Environmental Monitoring Score (TEM)		
Monitoring Energy Efficiency	MEE	The existence of environmental monitoring for energy efficiency measures (1 for yes and 0 for no)
Monitoring Resource Efficiency	MRE	The existence of environmental monitoring for resource efficiency measures (1 for yes and 0 for no)
Monitoring Water Efficiency	MWE	The existence of environmental monitoring for water efficiency measures (1 for yes and 0 for no)
Total Environmental Objectives Score (TEO)		
Resource Efficiency Objective	REO	The existence of environmental objectives for resource efficiency measures (1 for yes and 0 for no)
Energy Efficiency Objective	EEO	The existence of environmental objectives for energy efficiency measures (1 for yes and 0 for no)
Water Efficiency Objective	WEO	The existence of environmental objectives for water efficiency measures (1 for yes and 0 for no)
Total Environmental Policies Score (TEP)		
Resource Efficiency Policy	REP	The existence of environmental policies for resource efficiency measures (1 for yes and 0 for no)
Energy Efficiency Policy	EEP	The existence of environmental policies for energy efficiency measures (1 for yes and 0 for no)
Water Efficiency Policy	WEP	The existence of environmental policies for water efficiency measures (1 for yes and 0 for no)
Total Environmental Processes Score (TEPR)		
Resource Efficiency Processes	REPR	The existence of environmental processes for resource efficiency measures (1 for yes and 0 for no)
Energy Efficiency Processes	EEPR	The existence of environmental processes for energy efficiency measures (1 for yes and 0 for no)
Water Efficiency Processes	WEPR	The existence of environmental processes for water efficiency measures (1 for yes and 0 for no)
Total Environmental Management System Score (TEMS)		

ISO 14001 Certified	ISO	ISO14000 certification with coding 1 for a certificate and none.
Environmental Team	ET	Existence of environmental team in the company with coding 1 for yes and 0 for no
Environmental Training	ETR	Environmental training for employees with coding 1 for yes and 0 for no
Control Variables (Corporate Governance and Firm Characteristics)		
Board Size	BS	The total number of executive and non-executive members serving on the board of a company
Board Diversity	BD	The proportion of female directors on the board
CEO duality	CD	The number of directors in executive position in the firm
Firm Size	FS	The natural logarithm of companies' total assets.
Capital intensity	CI	The total assets divided by total sales of the company
Financial Leverage	LL	The ratio of long term debt divided by long term capital
Gearing Ratio	GR	The total companies' debt plus bank overdraft divided by shareholders' equity
CSR Committee	CSR	The presence of corporate social responsibility committee in the firm (1 for yes and 0 for no)

Source: Author's Construction

5.2.4 Control Variables

This study like most of the existing academic scholarships has included variables that are likely to influence the profitability and performance of firms in the econometric models. Per the empirical findings and arguments in literature, seven (7) variables are held as control variables that have a significant impact on firms' overall performance. Employing those variables, also help to ascertain their relevance on the observed relationship between environmental management and financial performance in a comparative test of inclusion.

This study has classified the control variables into corporate governance and firm characteristics. Regarding the corporate governance variables, the researcher employed board size, CEO duality and gender diversity in the analysis. For instance, Guest (2009) found board size to have a significant adverse impact on firms' profitability in the UK while Coles et al. (2008) found that in larger companies, board size tends to have a positive influence on firms' value. Thus, indicating the relevance of the size of corporate boards in evaluating firm performance. Reinforcing the need to include CEO duality, Tang (2016) discovered a substantial adverse impact of dual CEO role on firm performance. On the contrary, Falaye and Oloyede (2017) found a positive influence but confirmed that such influence is significant to overall firm performance. Despite the mixed results, it is evident that CEO duality could affect corporate performance either positively or adversely and therefore its inclusion in the model as a control variable is justified. The other relevant variable controlled in this study, board gender diversity, has recently become the focus of most researchers (Konadu, 2017; Adams and Ferraira, 2009; Conyon and He, 2017. For example, authors Adams and Ferreira (2009) and Conyon and He (2017) found compelling evidence of female directors on corporate decision making and firm performance in general. While the latter found a positive relationship in US corporations, the former discovered mixed significant results.

From firm characteristics viewpoint, the size of the firm has been described as firm's abilities and possessions which signify the capacity of production of goods and services to customers. Firm size is noted in existing literature to have a significant impact on firms' profitability and thus the need to control for it in this study is imperative (e.g., Doğan, 2013; Mukherjee and Padget, 2005). Capital intensity, which is another control variable is defined by Chang and Singh (1999) as the ratio of total assets to sales and labour inputs. Lee and Xiao (2011) for instance found a U-shaped relationship between capital intensity and value of the firm in the hospitality industry in the USA. Financial leverage has been revealed to have mixed results in existing studies due to the anticipated two-pronged effect as pointed out by Mukherjee and Padget (2005). However, such contradictory results unveiled the significance of financial leverage. For instance, Iqbal et al. (2014) from their investigation in the Pakistan Cement Industry found a strong negative association between firms' profitability and financial leverage. The final variable considered in the current study is the gearing ratio. Though some scholars could argue that gearing and financial leverage should not be combined because of high collinearity that might exist, the current study argues differently. In this thesis, the measurements for gearing and financial leverage are different and since gearing contains the elements of companies' debt and shareholders' equity, its essentiality cannot be overemphasised.

5.3 Data Analysis Methods

This section aims to briefly describe the analytical methods employed in the study. According to Zikmund (1994), specifying the data analysis methods and procedures adopted by a particular study are vital to the research design which aids in answering the research questions. The process begins with gathering raw data from different sources which in this study are all secondary. This is then followed by the processing of the raw data into meaningful information with the use of the appropriate analytical tools and methods to inform the right decision-making (Davis, 1996). As accentuated by Zikmund (2003), to arrive at the appropriate findings, it is pertinent to find the right analytical method in answering specific research questions. Hence, different methods are adopted by the researcher in achieving the three (3) primary research objectives which are:

1. To investigate the impact of CEP (i.e., environmental operational performance (EOP) and environmental management performance (EMP)) on corporate financial performance (CFP) in the various sectors from 2009 to 2015.

2. To examine the non-linear relationship between environmental operational performance and corporate financial performance in the carbon and non-carbon intensive sectors.
3. To explore the mediational effect of environmental operational performance on the relationship between environmental management performance and corporate financial performance.

The study, therefore, adopts the use of descriptive statistics, bivariate data analysis, multivariate data analysis and the Sobel-Goodman mediation test in the quest to answer the above questions.

5.3.1 Descriptive Statistics

The first step in achieving the stated objectives above is to explore the descriptive statistics to help analyse the data from a preliminary viewpoint. According to Fisher and Marshall (2009), descriptive statistics are the statistical procedures used in organising and describing the characteristics of the sampled data. These statistics help to describe the measures of central tendency (i.e., mode, median and mean), the measures of variability (i.e., standard deviation, variances, minimum and maximum values) of the data presented and the measures of relative position (i.e., standard scores and percentile ranks).

5.3.2 Bivariate Analysis

Bivariate analysis is described as the investigation of a relationship between two variables or parameters namely $\boldsymbol{x}$ and $\boldsymbol{y}$. Variable $\boldsymbol{x}$ is mostly identified as the independent variable while $\boldsymbol{y}$ as the dependent variable. The study employs Pearson's correlation in summarising the magnitude of the linear relationship and also by regression analysis equation. According to Ghauri and Gronhaug (2005), Pearson's correlations coefficient ranges between -1 and +1 and the sign represents the direction of the relationship either negative or positive. It is important to note that the farther the coefficient away from 0, the more perfect or stronger the relationship between the independent and the dependent is. In other words, a coefficient close to -1 indicates a stronger negative relationship and a coefficient close to +1 signifies a stronger positive relationship while a correlation coefficient of zero indicates a non-related relationship. Below is the formula for Pearson's correlation:

$$r = \frac{\sum_{i=1}^{n}(X_i - \bar{X})(Y_i - \bar{Y})}{\sqrt{\sum_{i=1}^{n}(X_i - \bar{X})^2}\sqrt{\sum_{i=1}^{n}(Y_i - \bar{Y})}^2}$$

Where X and Y stand for the sample means of X and Y respectively. If there is an established association between X and Y, it may or may not be because X influences Y or the vice versa. The study also adopts the correlation matrix to test for multicollinearity through the inclusion and exclusion of variables in the models.

5.3.3 Multivariate Analysis

The observation and examination of more than one variable at a time is simplified as a multivariate analysis. In essence, this form of analysis aims to describe and aid the understanding of the relationship between arbitrary numbers of statistical variables where the other independent variables explain one or more dependent variables.

Regression analysis is one of the multivariate techniques. Multivariate analysis is adopted in this study because of the multi-dimensional nature of the dependable variable (i.e., firms' financial performance). Since financial profitability can be divided into market-based and accounting-based performance, the use of multivariate analysis is to help understand the variability of each indicator given the same independent variables. It is worth noting that multivariate analysis is concerned with both inferential and descriptive statistics. Descriptive statistics have already been explained in preceding paragraphs. Thus, this section will concentrate more on the inferential aspect of multivariate analysis.

5.3.3.1 Panel Data (Econometric Analysis)

Panel data are often a form of longitudinal data consisting of cross-sectional dimension with the subscript of ***i*** as an indicative sign and the time series dimension with a subscript of ***t*** which involves repeated observations on the same variables. There are different types of panel data and some include cohort surveys, panel surveys, non-temporal survey panels, non-survey panels among others. The use of panel data analysis has become increasingly popular in the econometric analysis as a result of some advantages that have been outlined by extant literature (Hsiao, 2003). First of all, it is known to provide much accurate inference which increases the efficiency of the econometric estimates as a panel with *T=1* or *N=1*. It usually contains more degrees of freedom and sampling variability than cross-sectional data (Baltagi, 2005). It also provides greater capacity for capturing the complexity of behaviour than a single cross-section or time series data as well as controlling for omitted variables. In other words, panel data allows a researcher to control the effects of missing and unobserved variables from the explanatory variables (Hsiao, 2003). It further helps simplify the computational and statistical inferences regarding non-stationary time series data by invoking the central limit theorem to show asymptotical normality of the limited distribution of the cross-sectional units (e.g., Binder et al., 2005).

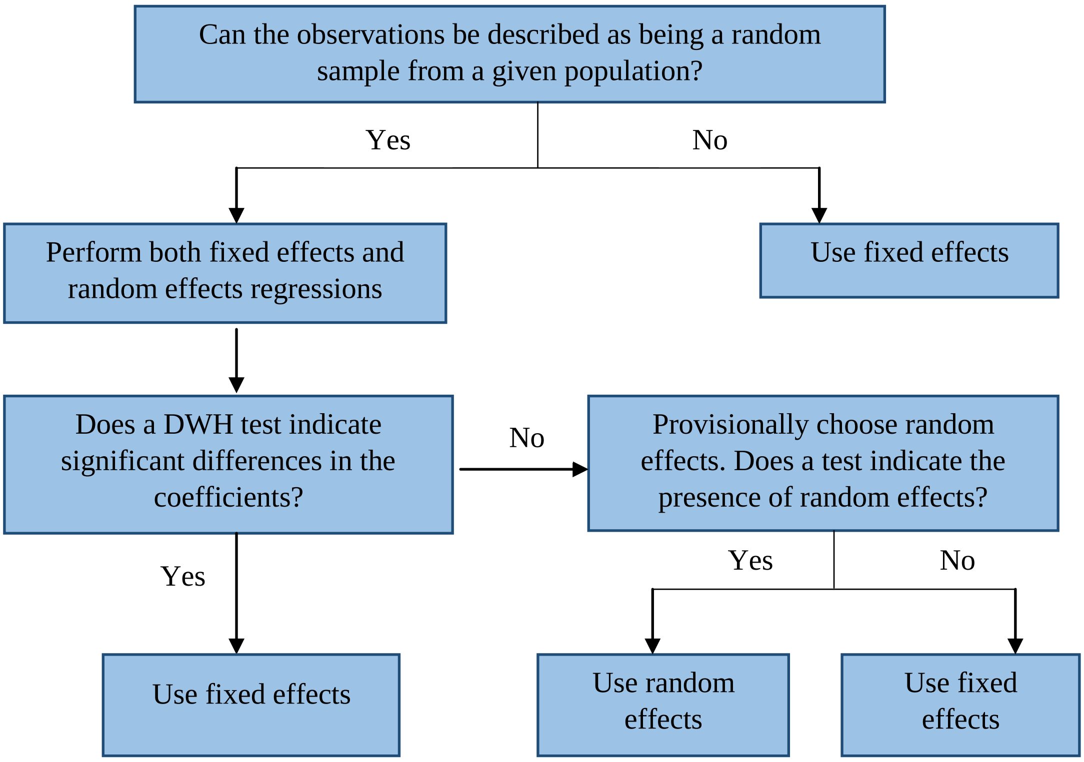
Despite the outlined advantages of employing panel data analysis, there are some few limitations to its usage. First, data collection, design and management could become problematic due to the time series and cross-sectional dimensions of the data. Second, there is a possibility of measurement errors leading to distortions and tendency to exhibit bias as a result of sample selection attrition and problems (e.g., Wooldridge, 1995). Nonetheless, the power of panel data to isolate specific effects of treatments, actions, policies among others is emphasised to depend mainly on the compatibility of the statistical tools assumption with the data generating process (Hsiao, 2003).

A linear panel data regression model is given as follows:

$$Y_{it} = \alpha + x'_{it}\beta + \mu_i + \lambda_i + \varepsilon_{it} \quad i = 1 \ldots, N \; and \; t = 1 \ldots, T$$

Where i denotes the cross-section dimension (e.g., industries, countries, regions, etc.) and t denotes the time series dimension (e.g., years, months, quarters, etc.). x_{it} is a vector of observations K explanatory variables, β is a k vector of unknown coefficients, μ_i is the unobserved individual specific effect, λ_i is an unobserved time specific effect and ε_{it} is the zero mean random disturbance. From the model above, a panel data equation can be estimated using a one way $(\varepsilon_{it} = \mu_i + \varepsilon_{it})$ or two way errors($\varepsilon_{it} = \mu_i + \lambda_i + \varepsilon_{it}$). Unbalanced panel data analysis is employed in this study as it presents non-equal unit observations in each time period. In order to proceed with this analysis and arrive at the panel data model, it is pertinent to identify whether the cross-section effects of each individual unit are constant, fixed or random. The choice of the model will however be concluded after the application of the statistical tests. Thus, all the models will be estimated and discussed in subsequent paragraphs and the necessary tests applied to them before the appropriate model is chosen. The figure below indicates the circumstances under which a particular panel regression model should be adopted. Details of the processes involved are given in the subsequent sections of this chapter.

Figure 3: Panel Data Regression Effect Decision Tree



Source: Dougherty 2007

5.3.3.1.1 Pooled OLS Regression

This is where no distinction is made between time series and cross-section and put all the data together. Pooled OLS regression provides efficient and consistent estimates of the homogenous slope and intercept. The Pooled OLS estimator can be obtained by stacking the data over the period (t) and cross-section (i) into a single long regression model with observations of N and T using ordinary least squares. The pooled model can be simply written as follows:

$$y_{it} = \alpha + x_{it}^{'}\beta + u_{it}$$

If Cov $[u_{it,}x_{it}] = 0$, then $N \rightarrow \infty$ or $T \rightarrow \infty$ is appropriate for consistency.

The correct specification of the above model where the regressors and error term are uncorrelated makes it easier for estimation using Pooled OLS. If the panel model is the Fixed Effect (FE) model, then the Pooled OLS estimator cannot be used since it leads to an inconsistent estimation of β.

Though it is more straightforward to run and simple and quick to analyse, it is, however, subject to some errors. Mainly, as the unit specific effects are assumed to be the same under Pooled OLS, the results become mostly unrealistic and restrictive. Also, the issue of serial correlation within the units and heteroskedasticity across panels have been argued by Baum (2006) as some of the errors that could arise from the process. As this study considers unbalanced panel data and the tendency of encountering heteroskedasticity and correlation is to be avoided, Pooled OLS regression is not considered for this research. However, only Fixed Effect (FE) and Random Effect (RE) models will be tested for to choose the appropriate model.

5.3.3.1.2 Fixed Effects (FE) Model

Per the concept of FE models, there is the assumption that for all sampled firms, the slope coefficients are constant throughout but there are variations in the intercepts. It also assumes that there is a correlation between the individual specific effects and the independent variable thus no need to consider that the effects of the error term (ε_{it}) are independent.

The FE model is estimated as follows:

$$y_{\boldsymbol{it}} = x_{it}^{'}\beta + \alpha_i + \gamma_t + u_{it}$$

It is known to control for unobserved heterogeneity when heterogeneity is indicated to be constant over the period under study.

Each $\mu_i or\ \mu_i + \gamma_t$is treated as an unknown parameter yet to be estimated in an FE model. The residuals u_{it} are also i.i.d (i.e., independent and identically distributed):

$$cov(u_{it}, u_{it'}) = 0, \forall t' \neq t \text{ and } cov(u_{it}, u_{jt}) = 0, \forall j \neq i.$$

Baltagi (2005) emphasised that when the focus of a study is on a specific set of units (e.g., firms, regions, countries), then the FE model is an appropriate specification. Despite the use of FE model, there are some noted shortcomings. For instance, the FE estimator is unable to estimate the effect of time-invariant variables (e.g., price, interest rates) of any sort thus wiping out all of them as the deviation from the mean value keeps transforming. Also, there is the possibility of multicollinearity arising among the regressors. Further, there is an enormous loss of a degree of freedom because the FE models estimate individual dummies **(N-1)** and time dummies **(T-1).**

5.3.3.1.3 Random Effects (RE) model

Unlike the FE models, the RE models assume that the unobservable effects may be stochastic with a normal distribution. It also assumes that the independent variables are not correlated with the individual specific effects, and thus Balestra and Nerlove (1966) generalised least squares (GLS) estimator can be used for the analysis. RE model is estimated as follows:

$$y_{\boldsymbol{it}} = x_{it}^{'}\beta + \alpha + \gamma_t + e_i + u_{it}$$

Under this model, each intercept is considered as the outcome of a random deviation from the mean intercept. The intercept here is assumed to be free from any error related to any particular observation as it is drawn from distribution for each unit. The RE model also assumes strict exogeneity where $E(e_{it}|\boldsymbol{X}) = 0, E(u_i|\boldsymbol{X}) = 0 \Rightarrow E(\varepsilon_{it}|\boldsymbol{X}) = 0.$

There is more degree of freedom with the use of RE model because there is the estimation of the parameters that can describe the intercept distribution. Also, the RE model is mostly preferred because it can estimate coefficients of explanatory variables that are constant over the period. Further, the use of GLS estimator which is a weighted average tool enables the extraction of information from two variations either within a group or between groups. Despite the benefits outlined above, Hsiao (2003) emphasised one major disadvantage to be the need to assume the patterns of correlation present in the effects and explanatory variables.

5.3.3.1.4 Econometric Model Analysis

Based on the above reasons for adopting a panel data analysis, the model below is adopted to investigate the relationship between environmental management and financial performance. The general multivariate regression estimation is:

$$FP_{it} = \beta_0 + \beta_1 EOP_{it} + \beta_2 EMP_{it} + \beta_3 BD_{it} + \beta_4 BS_{it} + \beta_5 FS_{it} + \beta_6 CD_{it} + \beta_7 CI_{it} + \beta_8 FL_{it} + \beta_9 GR_{it} + \mu_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

Where $_i$ is the firm; $_t$ is the period; **βo** is the Constant; **EOP** represents all the environmental operational variables including **GHG**, **water usage** performance and **resource reduction** performance; **EMP** represents all the environmental management performance including **environmental policies, processes, monitoring, management system and objectives**; **BD** is the female gender board diversity; **BS** is the board size; **CD** is the CEO duality; the **FS** is the firm size; **CI** is the capital intensity; F**L** is the leverage; **GR** is the gearing ratio; $\boldsymbol{\mu_i}$ is the unobservable individual effects (heterogeneity) which is different but specific to each firm; $\boldsymbol{\lambda_t}$ is the parameters of time dummy variables, and $\boldsymbol{\varepsilon_{it}}$ is the standard error term.

5.3.3.1.5 Hausman Test

The Durbin-Wu-Hausman (DWH) test popularly called the Hausman Test is the most commonly used test to determine whether the fixed or random effect model should be adopted in a particular panel data analysis. It, first of all, has to test for correlation between the explanatory variable and the unobserved heterogeneity of each unit of the model. The Hausman Test can be estimated as follows:

$$H = (\beta FE - \beta RE)' [var(\beta FE) - var(\beta RE)]^{-1} (\beta FE - \beta RE) \sim X^2_k$$

Where k is the dimension of the slope vector β

Thus H_0: cov (η_i; x_{it}) = 0

H_1: cov (η_i; x_{it}) ≠ 0

The Hausman Test basically does the following:

a. It, first of all, assumes that under the null hypothesis (H_0), both the FE and RE are consistent. The null hypothesis is rejected when the fixed effects dummy variables are very close to zero. Thus, making RE more efficient and therefore to be run.
b. Both specifications are further run.
c. Afterwards, a test statistic of a sophisticated linear algebra is computed which has to produce decreasing standard errors and increasing absolute values of the FE dummy variables.
d. The null hypothesis is rejected if the test statistics is very large implying the inconsistencies with RE and call for FE to be run.

If no correlation is found, the RE (between groups) GLS estimator can be used for the estimations. In other words, Random Effects become unbiased when the unobserved heterogeneity and the independent variables are not correlated becoming more efficient as it does not involve irrelevant variables. However, Random Effects can become biased as the correlations between the independent variables and the unobserved heterogeneity become stronger causing fixed effects to become preferable. In case a correlation is found, then FE (within group) estimator can be used to obtain the consistent estimation of the intercepts. When T or N is small, fixed effects cause complications for both cross-sections and time periods.

5.3.4.1.6 Reverse Causality and Endogeneity

Before moving a step further to run sensitivity tests, it is relevant to discuss the potential impact of corporate financial performance on corporate environmental performance. This is also termed as the reverse causality which highlights the assumption that environmental performance influences financial performance and the reverse relationship of financial performance also having an impact on environmental performance. Naturally, one could easily perceive that firms with better financial performance might engage in activities that improve their environmental performance. Should this assumption be valid, it will defy the conceptual framework of this study thus making the model suffer from endogeneity. Despite the plausibility of such a reverse causality relationship, there are no rigorous empirical and theoretical roots in literature (Ramanathan, 2016).

First, Freeman et al. (2010) in their stakeholder theory analysis pointed out that environmental management practices are adopted due to pressures from stakeholders. The different categories of stakeholders have been identified in the literature to influence environmental management (e.g., Delmas and Toffel, 2008). However, there is the argument that financial performance per se does not cause firms to improve their environmental performance but rather top management's influences. That is, when the top managers and directors of a firm are supportive or motivated enough to support a particular environmental management practice; it is then that a decision could be made to work towards it (Labelle et al., 2015). Furthermore, research (Wisner et al., 2006) has shown that there is little exploration so far to understand how firms concludes on investing in a particular practice that translated into improved environmental performance. A study by Bansal and Roth (2000) of 53 UK and Japan firms highlighted that the main motivations that have led to recent improvement in corporate environmental performance are legitimacy issues, competitiveness and ecologically related concerns.

So far, no study has emphatically found evidence that firms with better financial performance engage heavily in activities and practices that improve their environmental performance (Ramanathan, 2016). Hence, the researcher does not consider the case of reverse causality or endogeneity problems in the current study.

5.3.4.1.7 Sensitivity Analysis

Pannell (2013) describes sensitivity analysis (SA) as the investigation of the probable errors and changes and their respective impacts on the final results from a model. It covers the various techniques available to test for the presence of errors, accuracy and validity of a model. Some of these tests employed in this study are discussed below.

Dealing with Outliers

Outliers are known to alter and cause severe biases in parameter estimations. The Box plot procedure will be adopted in this study for detecting outliers in the panel data to enable a clean-up in the sample. The most common and widespread ways to address the problem of outliers are winsorisation or truncation and trimming of data (see, e.g., Durnev and Kim, 2005; Black et al., 2006; Chhaochharia and Grinstein, 2007). Winsorisation of data alters extreme observations that occur which tends to improve the efficiency of estimations. Trimming of data is the removal of data in the sample due to the observation of a more extensive variation.

For this study, both approaches could be used since an unbalanced panel data is employed for this research. It is logically prudent to remove data from the unbalanced panel as an elimination of one observation will not affect the other sections and periods. The process of winsorisation involves altering the original data by basically imposing a lower and upper bound on the influential outliers' observations by setting them equal to a specified distribution percentile from the study (Beyer, 2013). In the finance literature, some researchers (e.g., Kieschnick et al., 2006; Ntim, 2009; Chen and Mahajan, 2010) have adopted the winsorisation method as a key process. The regression results on the winsorised data will be discussed later in the interpretation section.

Test for Heteroskedasticity and Serial Correlation

The general assumption that the error variance of a model is constant (i.e., homoscedasticity) has been argued to not always apply in economic modelling

(Pindyck and Rubinfeld, 1998). For instance, as the data employed in this study comprises a vast range of variables (X), there is the likelihood of the error variance being non-constant (i.e., heteroskedasticity) and the tendency of serial correlations in the panel study.

To correct the problem of heteroskedasticity, *the Breusch-Pagan/Godfrey Test* is adopted in this study. This test models the error variance while checking for the linear form of heteroskedasticity. It tests the model's null hypothesis (H_0: $\alpha=0$) and the alternative hypothesis ($H_{0:}$ $\alpha\neq0$). Since heteroskedasticity can be as the result of measurement error, the non-existence of constant variance after the test indicates heteroscedastic and vice versa. Another method that has been advocated by extant researchers, e.g., Padachi (2006) to cater for the issue of heteroscedasticity is to apply *the Robust Standard Error*. Adopting this in the research might control for both serial correlation and heteroskedasticity in the panel data.

The Wooldridge Test of serial correlation has become increasingly attractive as the underlying assumptions are few and easy to implement (Drukker, 2003). An error term is said to be serially correlated when the error terms of different cross sections from different time periods observations are correlated. There could be a first-order serial correlation and the positive serial correlations which affect the efficiency of the estimators. The presence of serial correlation in a panel data model causes the final results to be inefficient to an extent as the standard errors are biased. The robustness of the Wooldridge Test is mainly because it covers both fixed and Random Effects models in one way under any general condition.

The current study, however, uses the panel corrected standard errors (PCSE) in dealing with panel heteroskedasticity. The decision to use PCSE was arrived at by inferring from the study by Moundigbaye et al. (2016) who used Monte Carlo experiments to produce new evidence on the performance of a wide range of panel data estimators. They focused on estimators that were readily available in statistical software packages such as Stata and Eviews and for which the number of cross-sectional units (N) and time periods (T) are small to moderate in size. Two estimators were identified which are an FGLS estimator that weights on heteroskedasticity and Parks estimator PCSE. Their findings indicate that PCSE is the most efficient depending on whether T/N is less than or greater than 1.50. It was also found that PCSE estimator is best for hypothesis testing. Thus, though applied researchers widely use the traditional OLS with cluster-robust standard errors, Moundigbaye et al. (2016) found that it performs relatively poorly on both efficiency and inference grounds for the small to moderately-sized panel datasets studied.

5.3.4 Non-Linearity Test

Non-linearity assumes that the dependent variables interact with itself before influencing the independent variables. The non-linear model can be defined as:

$$E(Y_i) = \alpha + \beta X_i^2 \quad (2)$$

Where Y is, the dependent variable and X is the independent variable with a squared term to signal non-linear relationship. Testing for non-linearity is highly encouraged by researchers such as Barnett and Salomon (2012) who found a U-shaped relationship between CFP and corporate social performance (CSP). Because this test is primarily investigating a non-linear relationship, the relationship can thus be U-shaped or inverted U-shaped depending on the variables explored. To test for any U-shape, the study first of all test to see whether there are values that decreases at low interval values and increases at high values within the interval. The test of U-shape relationship includes a quadratic term in the model as shown below:

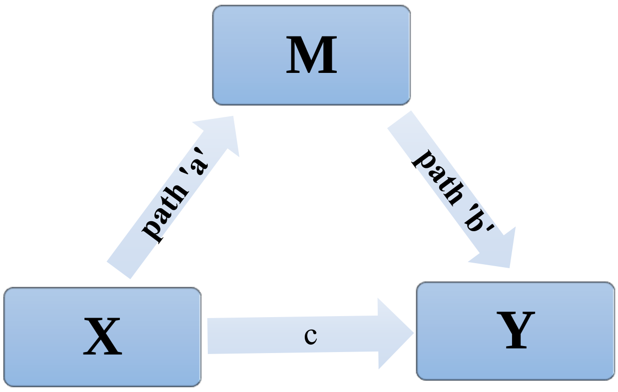
$$y_{it} = \alpha + \beta x_{it} + \gamma \mathrm{f}(x_{it}) + \xi' z_{it} + \varepsilon_{it}, i = 1, \ldots, n. (3)$$

x is the explanatory variable (i.e., corporate financial performance measures), y is the variable to be explained (i.e., environmental performance variables), ε is the error term, and z is the vector of control variables. The function f gives equation (3) a curvature, and a U-shape or inverted U-shape may be found depending on the parameters γ and β (Lind and Mehlum, 2010). It has been argued by Lind and Mehlum (2010) that using the quadratic term alone to determine non-linear relationship may lead to an erroneous conclusion because the quadratic and linear term may be highly correlated. As a result, the study tests whether the additional variance of the introduction of the quadratic term introduction is significant or not.

5.3.5 Mediation Test

A mediated model is one which has an independent variable, a dependent variable and a mediator. In other words, both the independent variable and the mediator do affect the dependent variable. According to Baron and Kenny (1986), a mediational model can also be referred to as a causal model. That is, the mediator is presumed to have a causal effect on the dependent variable and not vice versa. The diagram below shows a mediated model with the directional arrows indicating how the relationship should among the variables be.

Figure 4: Mediation Paths (Baron and Kenny, 1986)



Source: Adapted from Barron and Kenny (1986)

For testing mediation, the study uses Baron and Kenny (1986) 4 steps on the panel regression model specified above. First and foremost, the result should show the independent variable (X) is related to the dependent variable (Y). Finding such relationship leads to identifying that there is a direct effect (i.e., path c). Secondly, the independent variable (X) should be correlated with mediator variable (M). In this step, the mediator variable is treated as the independent variable to estimate path a. Step three involves a test that shows that the mediator variable (M) affects the dependent variable and that estimate path b. The independent variable has to be controlled in order to establish that the mediator variable affects the dependent variable. The final step is to establish that the mediator variable (M) completely mediates the relationship between independent and dependent variable. If all the steps are met, then a complete mediation can be concluded. However, when the first three steps are satisfied excluding the fourth, then there is an indication of a partial mediation.

The mathematical equations of the tests are:

$$Y = i_1 + cX + e_1 \qquad (4)$$

$$Y = i_2 + c^{'}X + bM + e_2 \qquad (5)$$

$$M = i_3 + aX + e_3 \qquad (6)$$

Where Y is the dependent variable CFP (i.e., market-based and accounting-based measures), X is the independent variable EMP (i.e., environmental policies, processes, monitoring, objectives and management systems), M is the mediation variable EOP (i.e., GHG emissions, water use and resource use performance). For the fourth step, when M is in the model, the effect of X on Y should be reduced. We further use the Sobel-Goodman Test (Sobel, 1982) which is a popular test used in academic literature (see Ramanathan, 2016).

5.4 Conclusion

This chapter provides a detailed discussion on the methodology adopted for this research. It presents a thorough presentation and discussion of the various procedures that the study adopts in answering the research questions listed above. The FTSE All-Share Index of 634 listed firms was used as the population of the study the recent March 2017 factsheet from 2009 to 2015. The underlying reason behind the researcher’s choice of this period is to capture the performance under the voluntary environmental disclosures and a foretaste of the compulsory environmental disclosures from 2013 to 2015. Such decision was motivated by the reasoning of Brammer and Pavelin (2006) who in their study pointed out that some large listed firms started disclosing their environmental practices and performance before 2004, but most of them got involved in disclosing such environmental information from 2004. Also, DEFRA after realising that large firms were disclosing their environmental information came out in 2006 with initial guidelines and voluntary reporting guidelines in 2009. In 2013, DEFRA issued a mandatory environmental disclosure for large listed firms to oblige with which started a new phase of corporate environmental performance. With this evolution of environmental reporting, the researcher reckoned the need to capture the voluntary era and the mandatory era in order to evaluate the environmental performance under those circumstances.

The environmental practices and management data and information will be sourced from the ASSET4 ESG database and sustainability reports while the financial data will be Annual Reports and DataStream database. The remaining section of the chapter described and defined the dependent variables, the independent variables and the control variables regarding measurements. Also, there is a thorough discussion of the panel data quantitative analysis employed in the study with emphasis on all the various tests relevant to arriving at the appropriate model. The mediation test and all the necessary steps required in arriving at a mediation have also been explained thoroughly in this chapter. For robustness of the model, all the diagnostic tests employed in this study have also been explained as well as the determination of the “goodness of fit” of the model selection.

CHAPTER SIX

HYPOTHESES DEVELOPMENT

6.0 Introduction

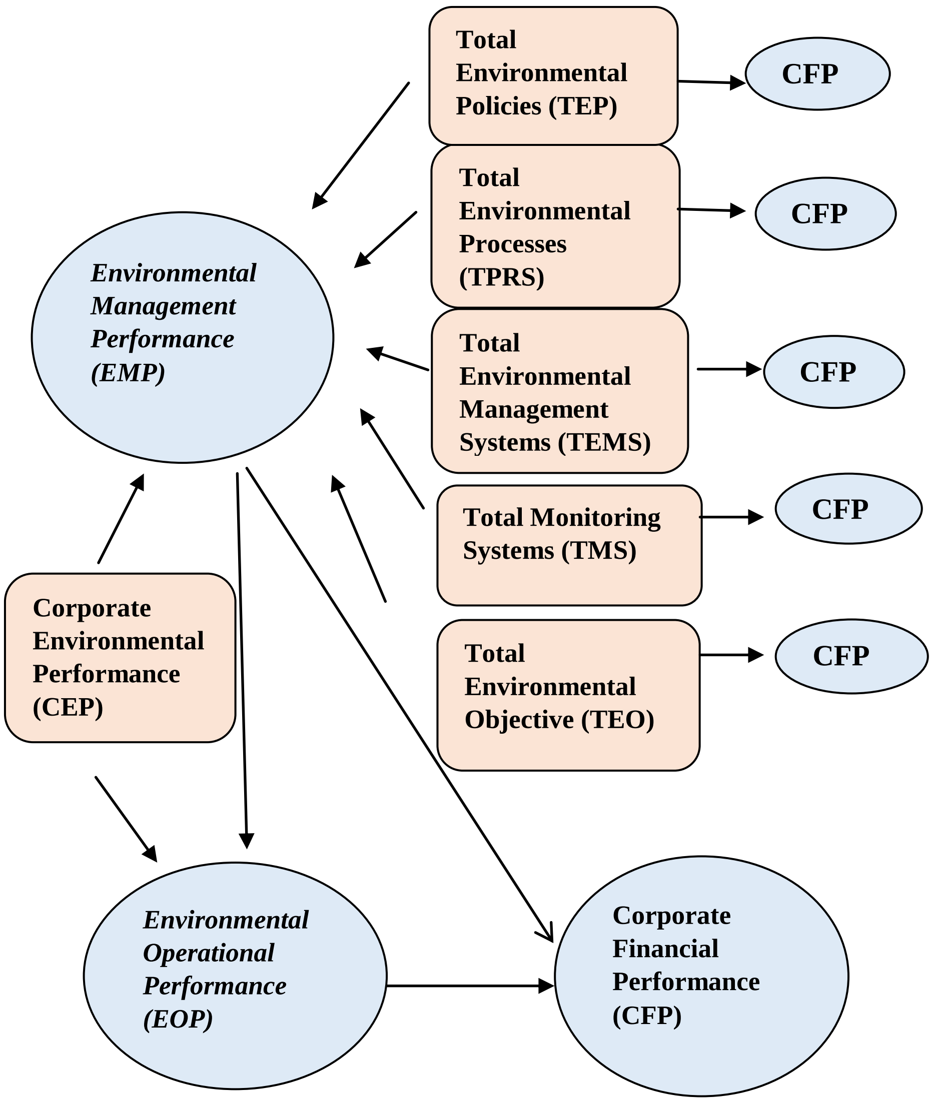
This chapter explains the hypotheses set out in the research and the rationale behind them based on the empirical and theoretical literature discussions in the preceding chapters. According to Creswell (1994), hypotheses are formal statements presenting the expected relationship between dependent and independent variables. Hypotheses are developed and suggested by observations and pre-conceived knowledge which have not been proven empirically yet but could be explained from a theoretical perspective.

The purpose of this chapter is to present the reduced form of the research problem in different hypotheses before testing and verification. The organisation of the chapter is as follows: Section 6.1 will briefly discuss the multidimensionality of corporate environmental performance (CEP) construct and the variables under each construct. Sections 6.2 and 6.3 examine the control variables, which are grouped into corporate governance and firm characteristics respectively. The chapter ends with a summary in Section 6.4.

6.1 Corporate Environmental Performance: Multi-Dimensional Construct

Researchers (e.g., Trumpp et al., 2015; Albertini, 2013) have made diverse attempts to define environmental performance but all specific definitions are futile in gaining wide acceptance. As a result, some researchers argued that the inconclusiveness of a widely accepted definition of CEP could be attributed to the various measurement and scopes one perceives it to cover. For instance, Xie and Hayase (2007) developed a measurement model for third-party comparison across sectors by drawing from ISO 14031 performance evaluation viewpoints. Their findings provide a strong backbone to view CEP as a multi-dimensional construct, which could be conceptualised differently across the dimensions a researcher intends to investigate. To buttress this concept, Trumpp et al. (2015) made a compelling attempt at defining CEP and developing a different measurement model, which yielded a positive evidence to reinforce the multidimensionality of CEP. This study aligns with the prepositions made by Trumpp et al. (2015) and thus utilise the definition of CEP by ISO 14031. CEP can be defined as the results seen when environmental aspects of an organisation are managed. According to ISO 14031 (2013), CEP indicators can be grouped into two namely: management performance and operational performance.

Figure 5: The Hypothesised Relationship between CEP and CFP



Source: Author's Construction

The management performance indicators used in this study as shown in Figure 4 above include environmental processes, policies, monitoring, objectives and management systems whereas the operational performance covers all outcomes of environmental aspects on the natural environment (e.g., GHG emissions, resource use, water withdrawal, waste produced, among others). The subsequent sections will cover in detail the multi-dimensional indicators adopted in this study.

6.1.1 Environmental Operational Performance

6.1.1.1 Scope 1 Greenhouse Gas Emissions

Scope 1 emissions or direct emission are those from sources controlled or owned by the reporting company such as production of electricity, fugitive emissions, manufacturing process emissions and company vehicle emissions among others. Energy and carbon-intensive firms mostly record scope 1 emissions more than those in other sectors due to the fervency of their operational activities and processes (Qian and Xing, 2016; Delmas and Nairn-Birch, 2011). Qian and Xing (2016) for instance, studied the relationship between scope 1 emissions and corporate financial performance in Chinese companies but found that there was no significant relationship between them. Lopez et al (2009) further emphasised that energy consumption is one major contributor to GHG emissions especially in the transportation sector where gasoline and diesel are used to fuel vehicles. These gasoline and diesel are sourced from fossil fuels through combustion processes. In the energy and manufacturing industries, for instance, fossil fuel combustion is one of the top emission sources where carbon dioxides are emitted in large quantities (Onut and Soner, 2006). According to Jaber (2002), scope 1 emissions mostly depend on the industrial activities. For instance, in the Jordanian cement factory, scope 1 emissions were noted to be from the calcination of limestone aside the direct burning of fossil fuel (Jaber, 2002). His study acknowledged the effect of old boilers and furnaces on GHG emissions levels and suggested that though fossil fuel combustion may not drastically have reduced, it is imperative that equipment used are efficient. However, it is no doubt that replacing old equipment with new and efficient ones comes at a cost to companies and therefore such investment decisions might not easily made without incentives or assurance of improved financial performance.

Investigating how financial performance reacts to scope 1 emissions, Delmas and Nairn-Birch (2011) found a positive relationship between ROA and emissions. Their findings suggest that the more scope 1 emissions released, the higher the return on assets. Such increase in ROA could stem from a possible increase in sales revenue and net income at large probably because the companies investigated might be engaging in counter activities that still yield higher revenues. Since the increase in emissions could result in other costs such as fines and taxes, the possibility of firms to keep their emissions levels and increase production without investing in efficient processes is undistinguishable. Nonetheless, one can argue that when emissions levels do not reach a point where legal fines are attracted; there are either no or fewer incentives for firms to reduce emissions so far as production levels are improving and sales made. Qian and Xing (2016) found evidence to support the assertion that though carbon-intensive firms are environmentally sensitive, they do not get paid off financially when emissions are reduced. Thus, considering the financial performance from the market-based and accounting-based perspective could help in delineating the specific impacts and incentives these carbon and energy-intensive firms would appreciate. Drawing from extant literature, the significant effect of scope 1 emissions on financial performance is questionable, and market-based measures such as stock prices should be thoroughly assessed in cases where emissions increase. This study, therefore, posits the following hypotheses:

> *H1a: There is a negative relationship between scope 1 emissions and market-based financial performance*
>
> *H1b: There is a positive relationship between scope 1 emissions and accounting-based financial performance*

6.1.1.2 Scope 2 Greenhouse Gas Emissions

Majority of businesses all over the world do purchase electricity, heat or steam at some point in their operation probably with the exception of those companies who directly produce their own form of energy for consumption. The GHG emissions that are released through the consumption of purchased and imported. A couple of studies (e.g., Lung et al., 2005; Tanaka, 2011; Caijas and Piazolo, 2013) have investigated the extent to which scope 2 emissions are related to firms' financial performances. Of course, it makes logical sense for an individual to quickly say that consuming less kWh of electricity would lead to minimal electricity costs. However, the focus of the current argument is not necessarily profits or costs but rather firm financial performance which is comprehensive and extensive than mere operational costs.

Tanaka (2011) for instance, found significant empirical evidence that indicates the extent to which reducing energy consumption is imperative for corporate costs savings. The author found that the use of energy-saving electrical appliances would consume fewer kilowatt-hours (kWh) of electricity, thereby, causing a reduction in electricity bills. Since energy consumption is a major source of scope 2 GHG emissions, one can say that reducing energy use would contribute to improving environmental performance and saving costs. Apart from an imminent reduction in cost as seen in the case of electricity above, other environmental management activities like investing in technical and technological equipment have been argued to yield financial benefits in the long-term (Phylipsen et al., 1997).

Most companies, apart from those involved in direct manufacturing and production, emit more scope 2 emissions from the use of purchased electricity and heating. The hotel sector, for example, experience higher increase in electricity consumption due to the kind of services they provide and therefore are mostly motivated to install energy-efficient equipment. In Jordan for example, Ali et al. (2008) pointed out that the main problem hotels in the country face are the high consumption of electricity caused by heating, ventilation, air conditioning and lighting. To buttress this point, Phylipsen et al. (1997) argued that indeed structural differences in sectors, most could account for the consumption and carbon emission levels whether in energy-intensive industries or not.

Industries as a sector under the ICB are known to consume more energy than the other sectors. For energy consumption to be managed and reduced in such a sector, investing in energy-saving technologies cannot be overlooked due to its cost-effectiveness and tendency to result in the reduction of energy consumption. Caijas and Piazolo (2013) for instance investigated the effect of energy consumption in German companies on their respective financial performances. Their findings provided evidence that energy-efficient buildings were performing better financially with approximately 31.5% increase more than inefficient buildings. Also, their regression results showed that a one percent decrease in energy consumption improves the total return of buildings by 0.015%. Between 1995 and 2001, a study of

41 completed industrial system energy efficiency improvement projects was completed in the United States and targeted an average 22% reduction in energy us (Lung et al. 2005). In aggregate, these projects cost US$16.8 million and saved US$7.4 million and 106 million kWh, recovering the cost of implementation in slightly more than 2 years. A more recent series of 3-day steam and process heating assessments conducted in 2006 at 200 industrial facilities by the United States Department of Energy identified a total of US$ 485 million dollars in annual energy savings and 55 petajoules (PJ) of annual natural gas savings, which, if implemented, would reduce the United States annual carbon dioxide emissions by 3.3 million tonnes. Six months after their assessments, 71 plants reported almost US$140 million worth of energy savings recommendations either completed, underway or planned (Lung et al. 2005). In Europe, switching to energy-efficient motor-driven systems can save up to 202 billion kWh in electricity use, equivalent to a reduction of $10 billion per year in operating costs for industry (Saidur et al. 2009). These empirical evidences indicate the strong connection between energy consumption and electricity use and firms' financial performance. As a result, the study posits that:

H_2: There is a significant negative relationship between energy consumption and financial performance, ceteris paribus.

6.1.1.3 Water Usage

Water is a common natural resource that all businesses use both in large quantities and small quantities and has no substitute, thus, a vital resource that need to be used sustainably. Despite the purpose of consuming water, the continuous consumption without replacement in any form has called for discussions on various platforms as experts envisage the shortage of water appears to be in the near future (Strandberg and Robinson, 2009). Aside from the possible shortage of water and the need to businesses to use it efficiently, its implication on corporate finances is a key topic in academic scholarship. Studies that investigated water usage and financial performance focused mostly on the tourism industry where consumption of water is argued to be very high.

Gossling et al. (2012), for instance, investigated the use of direct freshwater in the tourism industry on firm performance. Their findings demonstrate that businesses in the sector that had installed some form of water saving technology saved lots of their operational costs in both the short and long run. This may imply that through monitoring tourists water consumption may be difficult, such saving technologies helped in cutting down the consumption and thus paying fewer water bills. In addition to saving costs, these businesses will also meet expectations of their stakeholders as their brand value improves and threats of legitimacy are avoided (Dulipovici, 2001).

Similarly, a case study by Barberan et al. (2013) a hotel in Spain discovered that an average of 140,000 Euros of Net Present Value (NPV) was saved over 12 years of useful life after investing 14,126 Euros in retrofitting for improved water efficiency. Not only did the NPV improve, but also total water consumption was reduced by 21% after the retrofitting. Their results were attributed to the effectiveness of the water saving technology used and the retrofitting done. Garay and Font (2012) found that that water reduction, which is an aspect of eco-saving, is positively related to firms' financial performance in the SMEs they studied.

Having gained the popularity as one of the main environmental management practices due to its cost benefits, water efficiency or management has also been asserted as a non-necessary factor of a significant improvement in financial performance without the right policies and measures (Nyirenda et al., 2013). Thus, there is the need for policies to be examined to ensure their water is consumed sustainably and efficiently. It is important for firms to note that their use of water is closely linked to the efficient use of other resources such as energy, materials, chemicals and land. Also, considering the findings of Nyirenda et al. (2013) where no relationship was found between water usage and financial performance in South African mining firms, other related issues to ensure water efficiency would have to be analysed critically from technical and organisational regulatory viewpoints (Alvarez-Gil et al., 2001). Studies by Yusof and Jamaludin (2013), Gossling et al. (2012), Molina-Azorin et al. (2009) have emphasised the necessity for firms to focus more on water saving technologies in their quests to improve water efficiency. According to them, all stakeholders, most especially internal stakeholders should be made aware of companies' measures and means to reduce consumption and the specific departments and outfits that consume more water. This would help firms to prioritise departmental water need and usage while ensuring that financial performance is significantly improved with the reduction of water use. In view of these evidences, the researcher hypothesises that:

H3: There is a significant negative relationship between water consumption and financial performance.

6.1.1.4 Material /Resource Use Reduction

Efficient use of material resources is another key environmental management issue due to the problem of scarcity. It is an indisputable fact that manufacturing and production companies require materials, mostly raw ones to develop a product. However, there is the call for efficiency in using these material resources to ensure sustainability and cost-effectiveness (Berry and Randinelli, 1998). In the case where businesses fail to manage their resources well, they might end up facing challenges in corporate expansion, attracting customers, sustaining existing customers and improving their financial positions. To confirm this point, a survey by KPMG in 2012 recorded that 96% of their respondents indicated the relevance of the impact of material resources on their business performance.

Skelton and Allwood (2013) recommended that firms in the Steel Industry, for example, should prioritise the reduction of the amount of metal required and used in meeting the product demands. Their main suggestion was for firms in that Industry to adopt the lightweight design of their final products without compromising the quality so that less metal is inputted into the whole process of manufacturing. This recommendation of theirs could be extended to other industries as well but not only the Steel Industry. It is highly possible that businesses could use few materials for packaging while ensuring that the high standards of customers' hygiene, interest and safety are not compromised.

Additionally, Capkun et al. (2009) found a positive relationship between raw material efficiency and improved financial performance. In furtherance to reducing material resource use for sustainability and cost-effectiveness, it also helps reduce waste generation. For instance, less usage of packing material would contribute to material resource efficiency and less wastage. They further suggested that firms should invest in capital expenditure like advanced technology, which will lead to clean production and enlighten the path to possible cost savings. The following hypothesis is therefore proposed:

H4: There is a significant positive relationship between resource use reduction and corporate financial performance.

6.1.2 Environmental Management Performance

6.1.2.1 Environmental Monitoring

Environmental monitoring refers to review procedures and corrective actions that could ensure continuous improvements of environmental operational performance (Darnall and Edwards, 2006; Melnyk et al., 2003). For companies to effectively certify that all the environmental management practices outlined to be followed in the company are adhered to there is the need for supervisors and managers to monitor periodic performance. There is a high tendency that employees would rather follow the easiest environmental practice and no other practices they presume to be difficult. For instance, employees may see it as a norm to simply shut down computers before leaving the offices but may not necessarily turn off the water taps, microwaves or kettles should they be in a hurry unless this equipment are automated. In the midst of several other responsibilities, it is expedient that managers endeavour to track and ensure that all the environmental practices are practised.

Moreover, when a special committee is set to monitor the effectiveness of environmental practices in a company, some sort of incentives would have to be given to encourage and motivate such committee due to the extra time they have to dedicate for monitoring. Despite the financial incentives to be given, one can argue that the benefits that would result from such monitoring cannot be unnoticed either. According to studies by Konar and Cohen (2001) and Porter (1991), the possibility of firms enjoying a win-win benefit when their environmental when firms manage their environmental practices, the tendency of enjoying a win-win benefit is very high. Considering the discussions above, it is hypothesised that:

H5a: There is a significant positive relationship between environmental monitoring and environmental operational performance

H5b: There is a significant positive relationship between environmental monitoring and corporate financial performance

6.1.2.2 Environmental Objective

Environmental objectives refer to specific environmental goals and targets that need to be translated into environmental policy and actions eventually (Aravind and Christmann, 2011; Darnall and Edwards, 2006). Setting achievable objectives may require experts with the requisite skills and knowledge as those objectives have to be realistic considering current economic and market conditions. One could argue that having environmental objectives in place might not necessarily imply the implementation of measures to achieve them. Nonetheless, setting up goals and targets is the first step to indicate the extent to which a company is determined to engage in better and improved environmental practices. The process of establishing set target and objective needs to be professionally done to avoid over and under-ambitious goals. Thus, hiring professionals and experts to review and assist in establishing realistic environmental targets would be needed and therefore the related costs of hiring form part of operational costs. The study hypothesises therefore that:

H6a: there is a positive relationship between environmental objectives and environmental operational performance

H6b: there is a negative relationship between environmental objectives and corporate financial performance

6.1.2.3 Environmental Policy

Environmental Policy constitutes an organisation’s wide pledge for responsibility towards the natural environment by stating the organisation's philosophy regarding improvements of the EOP (Darnall and Edwards, 2006). Prior literature has pointed out that environmental policies need to be examined by companies to ensure their emissions are reduced sustainably while improving their efficiency (Lambooy, 2011). Firms that develop and implement pollution prevention policies have the greater possibility of reducing their energy consumption and controlling their respective costs than those which do not (Hart, 1995).

The adoption of environmental policies by companies could be motivated by a number of reasons but the main object is mostly to reduce their operational impact on the natural environment. It has been argued that companies with environmental policies in place could have an increase in their average productivity while decreasing their environmental damage levels (Xepapadeas and Zeeuw, 1999). Supportively, Freeman III (2002) emphasised that such policies could aid firms in protecting the ecosystem and achieving technical feasible emissions control level. In other words, organisations that follow strictly their environmental policies could end up saving lots of costs and improving their environmental performance. Given the empirical emphasis from previous studies, we hypothesise that:

H7a: There is a significant positive relationship between environmental policies and environmental operational performance

H7b: There is a significant positive relationship between environmental policies and corporate financial performance

6.1.2.4 Environmental Processes

Environmental processes refer to concrete organisational procedures designed to enhance environmental operational performance (Ilinitch et al., 1999). Emission prevention demands a complete redesigning of the manufacturing process to include green technologies (Sarkis and Cordeiro, 2001). However, the "Porter Hypothesis" suggests that simple prevention measures such as the installation of innovative end-of-pipe techniques could result in costs savings through efficiency and productivity. A continuous improvement and innovative methods might not necessarily lead to a direct financial performance but competitive advantage from firm-specific capabilities development (Christmann, 2000; Hart, 1995). Some researchers have advised that industries should focus more on the beginning-of-pipe processes by reducing the level of emissions and materials required. A suggestion such as adopting of lightweight design of final products has also been advanced by previous researchers (Skelton and Allwood, 2013).

It is highly possible that businesses use few materials for packaging while ensuring that customers' hygiene, interest and safety are still of high standards. The uses of proactive environmental strategies by firms as argued by Hart (1995) have a high potential of eliminating hazardous processes of production and lower product cycle cost. Reduction in pollution can also attract “green customers” to demand more of ecological products thus, increase firms’ revenue (Elkington, 1994). This could also give a competitive advantage to those firms in the long run (Rivera, 2002). Therefore, the researcher hypothesises that:

H8a: There is a significant positive relationship between environmental processes and environmental operational performance

H8b: There is a significant positive relationship between environmental processes and corporate financial performance.

6.1.2.5 Environmental Management System

The prime purpose of EMS is to develop, implement, manage, coordinate and monitor corporate environmental activities in order to achieve emission reduction and compliance (Melnyk et al., 2003). Solomon (2005) stressed the urgency for firms to adopt environmental management systems (EMS) to help them in reducing their emissions. His study of the sugar mills discovered a range of activities that he believes other firms could adopt in their quest to reduce emissions and achieve environmental excellence. He suggested that firms in that industry and other related ones can engage in recycling condense and cooling water as well as installing efficient demister and entrainment separator to reduce emissions efficiently. It is no doubt that large and well-established corporations usually have certified EMS in place which they follow to control and manage their environmental impacts (Campos and Melo, 2008; Perotto et al., 2008).

In the UK, the most popular and implemented standards are the European Eco-management and Audit scheme system (EMAS) and ISO 14001. ISO 14001 is an international environmental standard that specifies requirement related to EMS in order for firms to follow when devising their policies and objectives. The implementation of EMS in most industries has been evidenced to have a positive influence on their environmental performance in both the short and long run. Testa et al. (2014) for instance explored the impact of ISO 14001 and EMAS on the reduction of the emission of carbonic anhydride by 229 energy-intensive plants in Italy. Their study supported the general assertion that the implementation of EMS has a positive influence on environmental performance. Hence, we hypothesise that:

H9a: There is a significant positive relationship between the environmental management system and environmental operational performance.

H9b: There is a significant positive relationship between the environmental management system and corporate financial performance.

6.2 Corporate Governance Characteristics

6.2.1 Board Size

Considering the heightened attention paid to corporate governance related issues in literature recent times, it is imperative for researchers to investigate its core (i.e., corporate board of directors) where governance practices and principles are first initiated. In order to fully examine how the board function, the size of the board cannot be overlooked. Corporate board of directors' size simply refers to the number of directors (i.e., executive and non-executive) on a firm's board which tends to vary from one company to another and from one country to another (Levrau and Van den Berghe, 2007). For example, the UK, Netherlands and Switzerland has a smaller size corporate board of directors due to the single-tier/unitary board structure whereas countries like Germany and France have a much larger board size as a result of the two-tier structure. As such, it is difficult to conclude on the ideal board size without considering how effective and useful the operations and decisions made by the whole board has being to the company's overall performance (Conger and Lawler, 2009).

Due to this underlying argument, existing literature has failed to conclude on the efficacy of the relationship between firm performance and board size. Some empirical findings that support a negative relationship like the work of Guest (2009) vehemently emphasises the negative impact of board size on firm profitability. He used Tobin's Q and share returns as proxies for firm profitability and the same negative relationship was found for both. Such findings are in line with agency problems which might be as a result of inability to communicate smoothly without issues of bureaucratic disagreements as the board size increases. Supportively, CEOs have pointed out that they are able to easily manage a board of about eight directors and improve their effectiveness (Jensen, 1993) but any number more than that is likely to slow down decision making. One can highlight here that the possible benefits from engaging an additional director might rather be less when compared to the communication costs and time wasted.

From the positive relationship perspective of argument, the quality of decision made and the diverse experiences to improve firm reputation and overall performance have been emphasised to be benefits that could be derived from large board size (Coles et al., 2008; Pearce and Zahra, 1992; Dalton et al., 1998). Despite the likelihood of delayed decision making, the emphasis should be on the quality of the decision and not a quick decision which will have dangerous impact on the company's social and financial performance. According to Golden and Zajac (2001), not only does the quality and scope of decision making improves, but also having more directors on board will guarantee that skills diversity, experience, and intellect for the companies' performance. Since it appears that the support for the negative relationship focuses more on time and cost but not on the long-term benefits that could be achieved as a result of the heterogenous pool of skills and experience, it seems theoretically appropriate to assume for future positive benefits. As such, the thesis hypothesised that:

H10: There is a significant positive relationship between board size and corporate financial performance

6.2.2 Gender Board Diversity

Recent pressure from female activist globally has influenced most companies to increase the female presentation on the board (Dawar and Singh, 2016). Consequently, several studies have examined the relationship between gender diversity and firm general performance and financial performance (Pletzer et al., 2015). One school of thought asserts that women directors are likely to improve overall board performance due to the nature of women to naturally attend to issues and monitor committee performance. Similarly, others posit that female board directors are more committed, diligent and create a better environment for board discussions (Harjoto et al., 2015). Recent development in the literature has started focusing on the effect of gender diversity on corporate social responsibility and environment (Walls et al., 2012; Fernandez-Feijoo et al., 2014). Some studies, in contrast, claim that female directors may not necessarily play a significant role in deciding on environmental issues (Rodriguez-Dominguez et al., 2009; Hayes, 2001; Galbreath, 2011).

Lu (2016) investigated the association between gender diversity and environmental performance of firms in the USA from 2009 to 2012. Arguing from the resource dependence theory, Lu (2016) emphasised that since male and female provide different human resource, skills and interests, a balanced percentage of women tends to lead to improved environmental performance. Kassinis et al. (2016) also investigated the relationship between gender diversity and environmental sustainability and found evidence to support that demographic and structural gender diversity all statistically significant. Furthermore, some existing researchers have also emphasised that most women are not able to withstand unethical business behaviour and will, therefore, advocate for responsible practices such as those related to CSR and environment (Huse et al., 2006; Boulouta, 2013). Others also claim that women averagely possess better interpersonal and relational skills such as emotional aptitude and ability compared to men, which helps reflect diverse needs of stakeholders.

According to Biggins (1999), women are better at managing complex relationships and dealing with uncertainties than men in diversified stakeholder circumstance. Therefore, it is likely that women may not encourage some risky projects the company may want to undertake, they also stand as a pillar to ensure that finances are used wisely. By so doing, having significant female board representatives would have a greater possibility of improving corporate financial performance. Based on the supporting literature, the study hypothesises that:

H11: There is a significant positive relationship between female gender diversity and corporate financial performance

6.2.3 Corporate Social Responsibility (CSR) Committee

An emerging phenomenon regarding board of directors' delegations is the creation of committees and sub-committees to handle specific duties and improve effectiveness (Fuente et al., 2017). To encourage sustainability and improve environmental performance, CSR committees are created to handle sustainability, health and safety, ethical and environmental issues. According to Godos-Díez et al. (2011), the existence of such committee is relevant for monitoring and implementation of quality CSR practices. Some listed firms realise that CSR covers a broader spectrum and therefore create environmental committees just to handle environmental related issues (Michaels, 2009). Since it is time consuming and perhaps costly to establish many committees, not all firms have environmental committees, hence CSR committees are the most popular in that regards. With the presence of environmental committees, it is expected that directors on such committee will advise and monitor CEOs and management on developing strategic environmental policies and strategies emphasising agency theory (Dixon-Fowler et al., 2017).

From resource dependence theory perspective, directors on environmental committees are more likely to link and approve their company's association with other environmentally concerned bodies. This may bring environmental expertise, skills and resources to the business while pursuing effective environmental initiatives. Drawing from a stewardship theory, directors on environmental committees will more concerned with their company's environmental performance and insist on strategies to improve the performance while building a good social reputation (Dixon-Fowler et al., 2017; Fama, 1980). An environmental committee may further boost and create the awareness of employees to the negative impacts and consequences of their activities on the environment. The committee could also set incentives and targets for employees to inspire and motivate them to engage in environmental management practices from a stakeholder theory viewpoint. A study by Michelon and Parbonetti (2012) emphasised that the existence of environmental committees will encourage businesses to account for GHG emissions and reduce such emissions eventually. Therefore, the study hypothesises that:

H12: There is a significant positive relationship between CSR committee and environmental operational performance

6.3 Firm Characteristics

6.3.1 Firm Size

Firm size has been a debatable subject in literature over the decades and started gaining firm grounds in research in the 1960s. It has, just like most topical issues, yielded contrasting results in the literature. While some suggest a positive relationship with firm performance (e.g., Hall and Weiss, 1967; Majumdar, 1997; Doğan, 2013), others suggest a negative relationship (e.g., Shepherd, 1972; Vintila and Duca, 2013) and others could not establish any relationship (e.g., Whittington, 1980; Khatap et al, 2011). Despite the contradictions, it appears that the arguments in support of a positive relationship have received favourable recognition. For instance, it has been pointed out that large firms have a greater tendency of adopting environmental management practices and invest in technologies to improve their performance compared to smaller firms with small capital base (Dixon-Fowler et al., 2017). On the flip side, small firms may put in extra efforts to improve their environmental performance and avert fines and charges due to their financial constraints. However, the tendency of an increase in GHG emissions, for instance, as firm size expands in operation is very likely and cannot be overlooked though strategies and techniques to revert those impacts could easily be implemented. This paper supports the possible increase in corporate performance as firms grow alongside other aspects including environmental performance. The study, therefore, hypothesises that:

H13: There is a positive relationship between firm size and corporate financial performance

6.3.2 Financial Leverage

Like any other firm related characteristic, financial leverage has equally been explored by researchers over the years in relationship to corporate financial performance but has yielded inconclusive results (Murphy, 1968; Wachowicz, 2007;

Iqbal et al., 2014). It has been defined in literature as the long-term debt ratio to the long-term capital of a firm. In other words, if a firm relies greatly on long term creditors, it is seen to be of high leverage and could be unattractive to investors. For instance, the relationship between financial leverage and firm performance was investigated in Pakistan by Iqbal et al. (2014) on 21 cement companies. Their analysis showed a significant negative association between the two variables which implied that higher leverage firms tend to do poorly in their overall financial performance. In the same vein, another study discovered that the debt obligations of firms with high leverage increases to a point where the value of the firms' assets decreases on the market as a result of poor investment decisions.

In Thailand, a study by Vithessonthi and Tongurai (2015) on large sampled firms from 2007 to 2009 which covers the period of global financial crisis similarly yielded negative results. However, their results were quite interesting as the negative relationship was only found in the domestic firms and not the internationally oriented companies. The main arguments raised with regards to the findings were the concept of resource-based view theory as emphasised by Wernerfelt (1984) and international business viewpoint by Ganotakis and Love (2012). These underlying arguments highlights the already existing perception that international firms have the opportunity to invest in better yielding projects globally than domestic firms.

From this line of reasoning, domestic firms were regarded as those who lose their financial value even after ascertaining long term debts. However, after Ojo (2012) examined the domestic firms in Nigeria's financial leverage and financial performance, he found both negative and positive results depending on the proxy used. For instance, his study found a positive link with net assets per share but a negative association with earnings per share. Despite the fact that he and other researchers (e.g., Iqbal et al., 2014) blame the inadequate measurement proxies explored for such mixed results, it is still undeniable that when all other moderating factors work well, a positive relationship could be established. This could be also as a result of the efficient and effective decisions that these companies would have to make when they are provided long term debts to expand their business projects. As such, a positive relationship is highly possible in circumstances like this where they can pay off their debts over a long period of time. Therefore, the current study hypothesised that:

H14: There is a positive relationship between financial leverage and corporate financial performance

6.3.3 Capital Intensity

According to Sen and Farzin (2000) businesses that require huge deposits of financial resources before the production of goods and services can be made are known as capital-intensive companies. In terms of measurement, Lee and Xiao (2011) pointed out intensity is the ratio of the required capital of the company to the labour of the firm. Alternatively, one can also calculate the ratio of total firm assets to sales or labour input (Chang and Singh, 1999). There are two primary schools of thoughts that cover the capital intensity of firms' argument in recent literature. The first one (e.g., Shapiro and Titman, 1986) highlights the riskiness of having high fixed cost levels which remains unchanged even when sales levels changes (i.e., negative relationship). The other school of thought (e.g., Reitenga, 2000) refutes the first argument by emphasising that high capital-intensive firms can reduce their risk levels and by so doing improve their performance (i.e., positive relationship).

Empirically, many studies have found significant results to support the positively related school of thought. For example, by using the operating the operating profit margin ratio, Harris (1988) found a positive relationship with capital intensity by pointing out that higher profit margins are showed by firms with high capital intensity. His findings were supported by the work of Reitenga (2000) who carried out an event study on Bhopal chemical incident and the estimated cumulated abnormal returns. His study suggests that already committed capital resources could help reduce the capital expenditure through the returns made on them, especially the market returns.

In the same vein, even when a U-shaped relationship is found such as in the case of Lee and Xiao (2011), the short and the long term will all experience positive relationship except during the mid-period where a declining performance would be experienced. From Lee and Xiao (2011) exploration of US hospitality industry from 1990 to 2008, they discovered the same U-shape association in the hotels and not the restaurants where the relationship found was not significant. In a nut shell, the empirical evidences strongly support more positive relationship even in a curvilinear analysis. They also stressed that capital intensity might enhance may enhance a firm's performance and reduce related risks based on the rationale of those firms enjoying cost savings from a capital commitment to tangible fixed assets. Thus, an increase in capital intensity such as those invested in advanced technological assets may lead to a reduction in GHG emissions. The author therefore hypothesised that:

H15: There is a positive relationship between capital intensity and corporate financial performance

6.3.4 Industry

Existing studies (e.g., Tagesson et al., 2009; Amran and Haniffa, 2011) have shown that overall corporate performances do vary according to specific Industrial sector a firm belongs to. For instance, firms in the most "sensitive" industries/sectors attract an increased pressure from stakeholders for transparent information due to the high level of risks (Young and Marais, 2012; Deegan and Gordon, 1996). Thus, a greater magnitude of stakeholder pressure on a firm regarding its environmental management issues could result in that company putting in efforts to improve the corporate environmental performance. This is in line with the institutional theory where mimetic and normative forces tend to push firms in the same industry or sector to adopt common environmental practices (Chithambo, 2013). An earlier study by Schmalensee (1985) discovered that industry-specific effects caused 75% of asset variation rate relating to industrial returns. In the same study, he found that manufacturing firms in the USA that belonged with a particular industry enjoyed 20% more profits. This result is an indication of the pivotal role played by the industrial effect in assessing firms' performance.

Similarly, Schiefer et al. (2013) also found that industrial effect on corporate performance was neither less than 5% nor more than 18% when they used ROA to measure firms' financial performance of food processing companies in the Europe. In 1988, Wernerfelt and Montgomery conducted a similar research and found that 19% of the performance variation of companies was explained by industrial effect (Wernerfelt and Montgomery, 1988). A major reason attributed to such finding is that a united Industrial sector can lobby for better regulatory deals, prevent rivalry problems within the sector and also restrict entry of businesses that may have a negative impact to be involved the sector's operations (Schmalensee, 1985). From these empirical evidences, it is hypothesised that:

H16: There is a significant relationship between industry classification and corporate financial performance.

6.3.5 Gearing Ratio

To minimise agency costs as outlined in the agency theory, highly geared companies are expected to indicate the environmental performance level and disclose other relevant information (Jensen and Meckling, 1976). Most often, creditors of a highly geared firm are concerned about how wealth may be transferred to shareholders in the case of improper management. When they are not given full disclosure of information regarding all inherent risks, they end up finding their own means of monitoring management activities which in turn also results in increased agency costs (Depoers, 2000). Studies that investigated the relationship between gearing and financial performance have found empirical evidence to support that firm financial performance is affected by gearing (Leng, 2004). The direction of the relationship could be positive or negative depending on how the company manages its borrowings. For instance, Alalade and Oguntodu (2015) found a negative association between gearing and ROA of listed firms in Nigeria. However, Siyanbola et al. (2015) found the opposite result when they tested the relationship between corporate performance and gearing.

Since gearing indicates the inherent operational risk of business, it is prudent that companies mix the equity and debt sources of capital. Regarding debt equity, companies have to ensure that the borrowings are secured and do not exceed equity contribution towards the capital. Investors usually consider the gearing ratio as a measure that aids them to make investment decisions. Highly geared companies may find it difficult to amass additional funds for companies' operations and planned activities. Concerning the fact that gearing ratio has to be at the moderate level to cater for activities while attracting investors, it can thus be hypothesised that:

> *H17: There is a significant positive relationship between gearing ratio and accounting-based measures and a negative relationship with market-based measures*

6.4 Summary and Conclusion

The chapter has discussed the various hypotheses this study will be testing from environmental operational performance, environmental management performance through corporate governance to firm characteristics. A total of seventeen hypotheses involving GHG emissions scope 1 and 2; water use; resource reduction; environmental policies, processes, monitoring, objectives and management systems; board size; board gender diversity; CSR committee; firm size; financial leverage; capital intensity; gearing ratio and Industrial sector have been thoroughly presented and justified with reference to extant literature. Testing of hypotheses is relevant process which supports the scientific approach in research design as highlighted in positivism paradigm.

CHAPTER SEVEN

RESULTS, ANALYSIS AND DISCUSSIONS

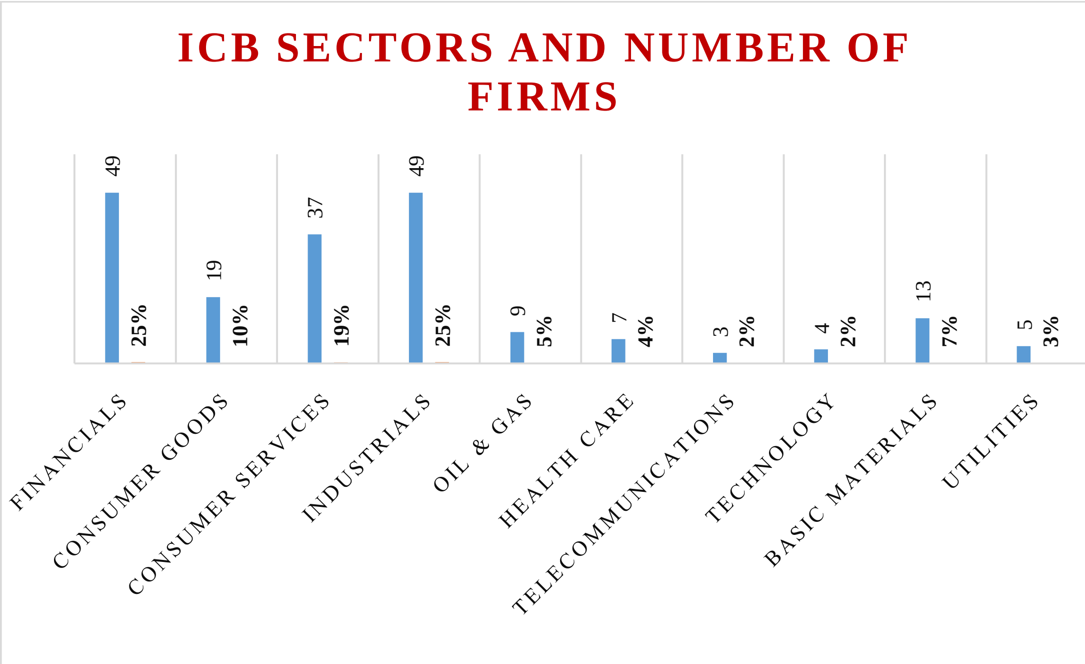
7.0 Introduction

This chapter examines the relationship of the variables in the econometric models as specified in the preceding chapters. It will also report and analyse the results obtained from the economic modelling tests in the bid to achieve the research objectives. First of all, the chapter presents discussions of the descriptive statistics of the variables in the model while ensuring that the statistical assumptions are adhered to. Afterwards, the panel regression analysis tests of the stated hypotheses will also be discussed. In addition to that, the results will also be categorically discussed to match the research objectives outlined in this thesis from both empirical and theoretical underpinnings. Drawing from an econometric viewpoint, the results obtained and presented in this chapter are analysed comprehensively to help understand the relationship between corporate environmental performance and financial performance across the ICB sectors. It will further present evidence to establish the different non-linear CEP-CFP relationship that exists in non-carbon intensive and carbon-intensive firms. Also, the results indicating a mediational relationship between the multi-construct CEP variables and corporate financial performance are discussed in this chapter. The final part discusses the robustness test results which indicate the extensiveness and originality of this research.

7.1 Descriptive Statistics

After utilising the sample selection criteria outlined in chapter five, 196 firms listed on the FTSE All-Share qualified to be used for analysis in this thesis. In Figure 5, the sampled firms and their distribution across the 10 ICB sectors are presented. The most dominant sectors are Financials and Industrial both having 49 firms and weighing 25% out of the total firms sampled. The next large sector represented in the sample is consumer services which have 37 firms (i.e., 19%) and Consumer Goods Sector with 10% weight respectively. The least represented sectors were Technology and Telecommunication sectors with 4 and 3 firms respectively. It is also evident that utilities, healthcare and oil & Gas sectors had few firms included in the sample as a result of the inclusion criteria procedure taken.

Figure 6: Sampled Firms according to ICB Sectors



Source: Author's construction from sampled firms

Since the first objective of this thesis is to investigate the CEP-CFP relationship that exists in the various ICB sectors, the summarised descriptive statistics are consolidated and shown together in Table 4 below. There is the need to re-emphasise that the data used in this research is an unbalanced panel and therefore not all years from 2009 to 2015 were equally captured due to limited data on environmental performance variables. From Table 4, the highest observations of 237 were recorded for the Financial Sector whereas the sector with the least observations of 11 was the Technology sector.

In the Financial Sector, the average resource use reduction performance was 65.82% with a minimum of 3% and a maximum of 95%. Regarding scope 1 GHG emission, a geometric mean of 7.54 (i.e., 47,764 tonnes) was recorded compared to scope 2 GHG emission which had a geometric mean of 9.41 (i.e., 129,153 tonnes). Thus, in this sector, scope 2 emissions are on the higher side considering the average emissions. In other words, the use of purchased and imported electricity probably led to increased indirect emissions rather than the emissions from direct sources. The minimum emissions for scopes 1 and 2 were 0.59 (i.e., 1.81 tonnes) and 5.14 (i.e., 171 tonnes) respectively. The maximum emissions, on the other hand, recorded the same quantity of 15.34 (i.e., 4,600,000 tonnes). Regarding water consumption performance, the minimum performance recorded was 51% and highest of 52%.

Table 4: Consolidated Descriptive Statistics

ICB SECTORS		TQ	M2B	STKPX	ROA	ROCE	ROS	logSC1	logSC2	WATER	RR	BS	BD	CEOD	CI	FS	FL	GR
BASIC MAT	**Obs.**	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*	*77*
	Mean	12.39	2.83	1828.10	19.54	20.78	33.41	14.19	13.92	51.14	69.78	9.96	45.19	0.73	2.16	23.02	0.91	0.29
	Std. Dev	10.92	2.39	1371.17	13.19	12.38	18.49	2.48	2.32	0.35	29.84	2.30	32.18	0.45	1.15	1.69	1.49	0.19
	Min	0.68	-3.28	310.68	2.40	3.62	7.98	9.57	6.26	51.00	7.00	6.00	0.00	0.00	0.00	19.45	0.05	0.04
	Max	45.82	10.25	7600.00	91.36	54.04	94.85	17.46	17.12	52.00	93.00	14.00	98.00	1.00	6.00	25.29	11.64	1.38
CONS. GDS	**Obs.**	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*	*93*
	Mean	15.18	3.61	1359.82	15.87	18.95	26.82	11.52	11.43	51.15	74.98	9.85	57.68	0.76	1.99	22.24	0.96	0.29
	Std. Dev	13.56	2.59	1297.09	9.37	10.69	12.18	2.38	1.80	0.36	25.67	2.77	37.44	0.43	1.09	1.57	0.70	0.15
	Min	2.15	0.47	26.55	0.99	3.89	10.08	6.83	5.92	51.00	7.00	5.00	0.00	0.00	1.00	19.71	0.04	0.03
	Max	80.00	14.36	6042.00	57.32	55.00	68.62	17.04	14.25	52.00	94.00	18.00	100.00	1.00	6.00	24.40	3.48	0.62
CONS. SERV	**Obs.**	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*	*163*
	Mean	12.79	10.93	604.15	20.75	17.80	29.32	10.71	11.19	50.89	66.47	10.07	56.46	0.77	2.01	21.67	2.68	0.26
	Std. Dev	14.11	66.83	656.76	14.20	13.84	17.94	2.81	1.85	3.56	30.09	2.70	36.09	0.42	3.14	1.53	6.28	0.14
	Min	0.22	-68.60	15.17	2.17	0.45	9.82	2.76	4.16	6.00	3.00	5.00	0.00	0.00	-4.00	17.31	0.05	0.02
	Max	81.45	805.12	3958.00	69.98	79.13	85.83	16.21	14.96	52.00	95.00	17.00	100.00	1.00	28.00	24.64	42.10	0.60
FINANCIALS	**Obs.**	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*	*237*
	Mean	6.80	1.80	617.20	20.15	18.45	27.51	7.54	9.41	51.16	65.82	10.92	50.67	0.77	12.18	22.72	1.56	1.25
	Std. Dev	8.32	2.79	548.76	14.15	13.26	15.84	2.43	2.16	0.36	31.26	2.95	34.03	0.42	11.66	2.44	2.47	5.73
	Min	0.13	-11.13	35.70	1.15	0.66	9.54	0.59	5.14	51.00	3.00	6.00	0.00	0.00	1.00	18.75	0.05	0.00
	Max	53.00	29.66	3643.00	79.37	69.42	81.21	15.34	15.34	52.00	95.00	21.00	100.00	1.00	58.00	28.16	15.98	45.95

HEALTH CARE	**Obs.**	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*	*31*
	Mean	18.34	4.76	1709.66	17.26	21.08	24.27	10.96	11.35	51.19	68.90	10.61	45.48	0.55	2.48	22.52	0.77	0.22
	Std. Dev	5.45	3.20	1153.65	4.91	8.78	12.23	2.12	1.65	0.40	33.45	2.35	42.91	0.51	1.90	1.63	1.00	0.12
	Min	11.04	2.14	470.00	7.11	3.93	10.51	6.42	7.45	51.00	1.00	7.00	0.00	0.00	1.00	19.52	0.10	0.06
	Max	35.42	15.64	5215.00	27.45	34.73	63.77	13.85	13.93	52.00	93.00	15.00	96.00	1.00	9.00	24.42	4.41	0.49
INDUSTRIALS	**Obs.**	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*	*223*
	Mean	12.26	3.24	681.99	21.26	17.35	28.32	10.83	10.53	51.20	67.53	9.17	35.82	0.67	1.95	21.29	0.80	0.25
	Std. Dev	9.19	5.03	653.55	15.48	11.98	17.05	2.36	1.59	0.40	26.77	1.90	32.81	0.47	4.06	1.22	0.93	0.36
	Min	2.02	-13.73	21.00	0.91	0.87	5.42	4.04	7.12	51.00	4.00	4.00	0.00	0.00	-9.00	17.34	0.02	0.01
	Max	52.69	46.12	3277.00	74.67	89.61	85.70	16.94	14.56	52.00	94.00	15.00	99.00	1.00	56.00	24.18	9.87	4.64
OIL & GAS	**Obs.**	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*	*45*
	Mean	8.85	2.22	833.85	22.94	14.93	34.91	13.42	10.60	51.16	63.38	11.11	44.82	0.89	1.78	23.07	0.44	0.17
	Std. Dev	4.98	1.69	611.22	15.55	14.00	21.71	3.54	3.92	0.37	32.29	2.48	25.76	0.32	1.48	2.13	0.35	0.10
	Min	3.11	0.75	237.25	2.65	1.88	10.91	7.26	4.80	51.00	6.00	6.00	0.00	0.00	1.00	20.01	0.05	0.02
	Max	22.25	9.68	2191.00	59.62	75.81	88.78	18.15	16.12	52.00	94.00	15.00	86.00	1.00	7.00	26.44	1.42	0.47
TECHNOLOGY	**Obs.**	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*	*11*
	Mean	6.78	3.97	594.25	19.87	18.27	28.31	6.56	9.07	51.18	57.45	9.45	44.91	0.73	2.09	20.51	0.14	0.08
	Std. Dev	9.00	2.47	341.19	15.46	10.25	9.89	1.19	0.97	0.40	31.93	2.77	31.03	0.47	0.83	0.69	0.19	0.13
	Min	0.54	1.17	152.20	4.68	4.83	14.36	4.67	7.33	51.00	6.00	6.00	0.00	0.00	1.00	19.43	0.01	0.01
	Max	31.84	7.52	1363.00	59.91	36.03	42.87	8.55	10.12	52.00	93.00	13.00	86.00	1.00	3.00	21.45	0.56	0.38

TELECOM	**Obs.**	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*	*16*
	Mean	8.47	-2.24	307.67	19.29	10.31	30.34	11.51	13.27	51.19	73.81	11.81	24.06	0.38	4.63	24.10	7.12	0.28
	Std. Dev	3.77	22.57	189.65	12.39	6.73	18.52	2.29	2.07	0.40	34.89	1.80	33.02	0.50	15.33	1.50	12.75	0.17
	Min	3.74	-62.61	135.80	6.14	1.71	10.49	6.42	8.31	51.00	9.00	8.00	0.00	0.00	-40.00	21.31	0.36	0.04
	Max	14.18	37.25	702.00	45.03	21.95	67.47	13.15	14.70	52.00	95.00	14.00	81.00	1.00	32.00	25.77	51.20	0.52
UTILITIES	**Obs.**	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*	*30*
	Mean	5.65	3.26	754.95	26.25	8.53	31.12	14.09	12.36	49.73	75.47	10.43	52.17	0.70	4.60	23.38	3.20	0.50
	Std. Dev	1.37	1.63	451.75	26.32	3.60	11.92	1.87	0.47	8.27	23.34	2.24	32.75	0.47	2.44	0.86	1.56	0.14
	Min	3.15	2.12	243.10	4.79	2.40	16.26	11.53	11.65	6.00	9.00	7.00	0.00	0.00	3.00	22.08	0.69	0.21
	Max	8.87	10.43	1887.00	79.66	22.40	74.70	16.31	12.96	52.00	93.00	14.00	94.00	1.00	16.00	24.73	6.75	0.62

The Industrial Sector recorded 223 observations out of the total observations over the period of study. Scope 1 emissions had a geometric mean of 10.83 which in absolute figures is 1,224,282 tonnes. Scope 2 emissions on the flip side had an average emission amounting to 138,458.5 tonnes which is the lowest among the two mean values of emissions. This is an indication that the Industrial sector emits more GHG from direct sources than electricity consumption. It could also imply that some firms in the Industrial sector may have generated their electricity and that might have led to the increase in direct emissions. However, the minimum emissions of scope 2 recorded were 7.12 (i.e., 1236 tonnes) with a maximum of 2,100,000 tonnes whereas the minimum of scope 1 was 57 tonnes (i.e., 4.04) and maximum of 22,731,418 tonnes (i.e., 7.12). Considering the higher minimum emission of scope 2 in comparison to scope 1, it could be suggested that electricity importation is common among firms in the Industrial sector. Also, the maximum resource reduction performance recorded was 94%, and the minimum was 4% with an average performance of 67.5%. With water consumption, the average among the firms was 51% and the minimum and maximum range from 51% to 52%.

Though the number of observations for the Oil and Gas sector was 45, the quantity recorded for both scope 1 and scope 2 emissions were on the higher side. For instance, the maximum recorded emissions were 76,000,000 tonnes and 10,000,000 tonnes for scope 1 and scope 2 respectively. The minimum emissions were 1417.1 tonnes for scope 1 and 122 for scope 2. With regards to the average emissions for both scopes, 2,749,400 tonnes (i.e., 13.42) was recorded for scope 2 and 2,400,000 tonnes (i.e., 10.60) for scope 1 emissions. The mean resource reduction performance in this sector was 63.3% with a minimum of 6% and a maximum of 94%. Water consumption also had an average use of 51.1% while the minimum consumption was 51% and a maximum of 52%.

In the Basic Materials sector, 77 firm observations were made over the period under study. The average performance for resource reduction was 69.7% whereas the maximum was 93%. The minimum recorded performance, on the other hand, was 7%. Regarding GHG emissions, scopes 1 and 2 emissions had averages of 9,064,944 (i.e., 14.19) and 5,320,905 tonnes (13.92) respectively. The least reported scope 2 emissions were 521 tonnes, and the highest recorded was 27,000,000 (i.e., 17.12) tonnes. With scope 1 emissions, 38,000,000 (i.e., 17.12) tonnes was reported as the maximum emissions whereas the minimum recorded emissions were 27,000,000 tonnes (i.e., 17.46). These outcomes suggest that direct emissions are the greatest source of GHG emissions in this sector due to the type of activities.

The Technology Sector had the least observations among all the sectors with only 11 firms over the period. Despite the average scope 2 emissions of 12,052 tonnes (i.e., 9.07) of emissions, the smallest and maximum emissions were 1531 and 24,949 tonnes (i.e., 7.33 and 10.12) respectively indicating a reasonable standard deviation of 8241 tonnes from one recorded emission to another. Scope 1 emissions on the flip side recorded the highest emission of 5191 tonnes (i.e., 8.55) and a minimum of 106.5 tonnes (i.e., 4.67) with an average emission of 1750.6 tonnes (i.e., 6.56) by the firms in this sector. It can be inferred from these results that the Technology Sector relies a lot on imported electricity and thus, causing scope 2 emissions to be more than scope1. The average resource reduction performance in this sector was recorded to be 57.5% while the minimum and maximum performances were 6% and 93% respectively. Considering the standard deviation of 31.9% and the average performance score, it can be deduced that most of the firms in this sector are working towards improving resource use.

One other sector with intriguing variable descriptive is the Health Care Sector which had 31 firms under observation. The highest emissions quantity for scopes 1 and 2 were quite close to each other as scope 1 recorded 1,037,288 tonnes and scope 2 had 1,121,600 tonnes with indirect emissions leading by extra 84,312 tonnes. It is also noticed that scope 1 emissions had lowest minimum emissions (i.e., 613 tonnes) among the two scopes. On the other hand, it appears that some firms in this sector placed little relevance on resource reduction performance looking at the 1% minimum performance recorded.

The seventh sector to be considered based on the descriptive statistics is the consumer services sector which is the third largest sector represented in this study with 163 observations. Due to the variety of sub-sectors under consumer services, recorded minimum emissions of 15.8 and 64.1 tonnes for scopes 1 and 2 respectively is not entirely surprising. Nonetheless, the highest recorded emissions were 10,900,000 tonnes for scope 1 and 3,145,907 tonnes. With 3% as the minimum performance for resource reduction, it can be deduced that perhaps not all the firms rely so much on natural resources considering the average performance of 66.4% and a standard deviation of 30.1%. Also, water consumption recorded the least score in this sector of 6% and the highest of 52%. Such little water consumption score could be attributed to the type of customer service business a firm is involved in. It is likely that those with small percentages of consumption do not rely so much on the water to deliver services.

Next is the Consumer Goods Sector which had 93 firms' observations. Scope 1 emissions were on the higher side of 25,200,000 tonnes and the lowest of 923 tonnes. This implies that the Consumer Goods Sector emits more GHG emissions from direct sources than from indirect sources. The average emission of scope 1 is 1,403,394 tonnes in this sector whereas that of scope 2 is 293,866 tonnes. Scope 2 on the other side recorded the minimum emissions quantity of 373 tonnes and a maximum of 1,540,294 tonnes with a mean of 293,866 tonnes. Considering the mean, minimum and maximum values of water consumption scores, it is evident that firms in this sector have an intense use for water in carrying out their businesses.

The Telecommunications Sector is currently one of the fast-growing sectors worldwide. As seen from the descriptive results, it appears the sector relies heavily on imported electricity. That is scope 2 recorded maximum emissions of 2,430,000 tonnes compared to that of scope 1 which was 1,272,593 tonnes. Also, the minimum emissions value recorded for scope 2 was 4050 tonnes whereas that of scope 1 was 612 alongside the average values of 247,281 and 1,272,593 tonnes for scopes 1 and 2 respectively. Regarding resource use performance, the telecom sector had an average performance of 73.8% which shows that firms in this sector give attention to improving the use of the resource. Also, among all the sectors, this is only with the highest minimum value recorded for the performance of 9%.

The final sector to discuss descriptively is the Utility sector which had 30 firms' observation. Between the largest emissions values of scopes 1 and 2, direct emissions recorded the highest value of 12,100,000 tonnes while scope 1 had a value of 424,697 tonnes. Though the maximum value of scope 2 emissions was lower compared to that of scope 1, its minimum value was slightly higher (i.e., 101,992 tonnes) than that of scope 1 (i.e., 115,050 tonnes). The average emissions however still show that direct emissions are on the increase in this sector than the indirect emissions. Also, just as recorded in the telecommunication sector, the smallest value recorded for resource reduction performance is 9% and a maximum of 93% with an average performance of 75.5%. The least water consumption in this sector was 6% while the maximum recorded consumption is 52%. Thus, the firms in the Utility sector might not have depended on using more water in conducting their businesses.

7.1.1 Correlations and Multicollinearity

The Table below shows variance inflation factor test carried out to determine the multicollinearity and possible correlation between the variables used in this thesis.

Table 5: Variance Inflation Factor (VIF) test for Multicollinearity

Variables	VIF	SQRT VIF	Tolerance	R-Squared
ROA	1.05	1.02	0.95	0.05
ROS	1.10	1.05	0.91	0.09
ROCE	1.17	1.08	0.85	0.15
Market-to-Book Ratio	1.08	1.04	0.93	0.18
Stock Price	1.16	1.08	0.86	0.14
Tobin's Q	1.39	1.18	0.72	0.28
Log Scope 1	2.97	1.72	0.34	0.66
Log Scope 2	3.42	1.85	0.29	0.71
Water	1.01	1.01	0.99	0.01
Resource Reduction	1.10	1.05	0.91	0.09
Financial Leverage	1.09	1.04	0.92	0.08
Gearing Ratio	1.14	1.07	0.87	0.13
Firm Size	3.86	1.97	0.26	0.74
Board Size	1.83	1.35	0.55	0.45
Board Diversity	2.57	1.60	0.39	0.61
Capital Intensity	1.61	1.27	0.62	0.38
CEO duality	2.47	1.57	0.40	0.59

The VIF test was carried out to measure how inflated the variance of a slope is as a result of the non-orthogonality of the independent variables above the expected variance should the variables be uncorrelated (Liao and Valliant, 2012). From the Table above, the highest value of VIF for the independent variable is 3.86 which is still below the standard threshold of VIF of 5 (see Akinwande et al., 2015).

This is an indication that there is no need to remove any independent variable as there is no evidence of multicollinearity. However, before concluding on whether to include all the variables in the regression model, a pairwise Pearson's correlation matrix is also run. Table 6 below shows the pairwise correlation between the dependent and independent variables. The control variables are also included in the correlation matrix.

As hypothesised, scopes 1 and 2 GHG emissions are all positively correlated to firm size, board size, financial leverage, gearing ratio, board diversity and CEO duality. However, they are both negatively correlated with capital intensity. Also, scope 1, scope 2 and Resource reduction performance has a negative correlation with Tobin's Q, Market-to-Book, ROCE and ROS. A positive association is seen between water consumption and all the financial performance variables. Further, some significant correlations were found between the independent variables with the highest being the link between scope 1 and scope 2 emissions at 0.79. Nonetheless, this cannot be considered as a major threat according to Field (2009) who pointed out that the maximum threshold is 0.9 or 90%. The initial absolute value obtained for the correlation coefficient was 0.785 but was rounded up to two decimal points. An additional look at the VIF values which have been disclosed earlier gives the assurance that there is no issue of multicollinearity and therefore the researcher could continue with the analysis.

Table 6: Pearson's Pairwise Correlation Matrix

	TQ	M2B	STK PX	ROCE	ROS	ROA	SC1	SC2	Water	RR	FS	FL	GR	CI	BD	BS	CEOD
TQ	1.00																
M2B	0.22***	1.00															
STK PX	0.19***	0.07*	1.00														
ROCE	0.46***	0.16***	0.08**	1.00													
ROS	0.24***	0.13***	0.01	0.20***	1.00												
ROA	-0.05**	0.02	-0.06*	0.04	-0.06*	1.00											
SC1	-0.08**	-0.06**	0.21***	-0.10***	-0.01	0.07*	1.00										
SC2	-0.16***	-0.09*	0.24***	-0.08**	-0.05	0.01	0.79*	1.00									
Water	0.03	0.01	0.02	0.04	0.01	0.04	-0.06**	-0.02	1.00								
RR	-0.04**	-0.06**	0.02	-0.03	-0.01	0.02	0.21***	0.24***	-0.04	1.00							
FS	-0.44***	-0.12***	0.18***	-0.14*	-0.13***	0.04	0.44***	0.59***	-0.03	0.17***	1.00						
FL	-0.06**	0.09*	-0.08**	0.05	-0.02	-0.04	0.08**	0.10*	-0.01	0.03	0.12***	1.00					
GR	0.23***	0.01	-0.04	0.13***	0.17***	-0.08**	0.01	0.01	0.01	0.07*	-0.13***	0.01	1.00				
CI	-0.23***	-0.06	-0.10*	0.04	-0.06	0.01	-0.20**	-0.06	0.01	-0.03	0.37***	0.17***	0.05	1.00			
BD	0.07*	0.04	0.04	0.02	0.01	-0.05	0.04	0.09*	-0.01	0.11***	0.16***	0.01	0.08*	0.09**	1.00		
BS	-0.11***	-0.03	0.19***	0.01	-0.05	0.02	0.18***	0.31***	-0.03	0.16***	0.60***	0.07*	0.05	0.22***	0.13***	1.00	
CEOD	-0.11**	0.02	0.04	0.01	-0.06	0.01	0.05	0.07*	-0.03	0.06**	0.12***	0.02	0.03	0.10**	0.76***	0.09**	1.00

****significant at 0.01 level, ** significant at 0.05 level, * significant at 0.10 level*

7.1.2 Normality Test

One of the fundamental assumptions of panel data is normality of the data set by testing the residuals to identify misspecification of models (Osborne, 2013). Though it has been emphasised that regression residuals cannot be normally distributed Osborne (2013) still argued that it improves the analysis results by making them more ‘trustworthy’. The skewness and kurtosis tests work together in checking data normality. If skewness is 0 and kurtosis is 3, then it can be said that a variable is normally distributed. The researcher carried out the Jarque-Bera (S-K) test in Stata (i.e., using sktest command) and it was found that scope 1, scope 2 and Tobin’s Q were not normally distributed. To transform these variables, another test was carried out to find the best transformation which suggested that the log of each variable would result in a normal distribution (i.e., using ladder command). After taking the natural logarithm of the variables, their skewness and kurtosis fitted within the normality range.

7.2 Panel Regression Tests Results

There are some distinct tests embedded in Panel regression analysis that need to be carried out before arriving at the final results. So, the next step the researcher took after going through the descriptive and normality diagnostics is to test the method that will result in reliable parameter estimates, and that test is termed as the Poolability test.

7.2.1 Poolability and Hausman Tests Results

This test widens the database of the time series of cross sections in order to ascertain reliable parameter estimates. The null hypothesis is that the model is an OLS model which is estimated as: $Y_{it} = a + b'X_{it} + \varepsilon_{it}$ whereas the alternative hypothesis is the Fixed Effects (FE) model estimated as: $Y_{it} = a + b'X_{it} + a_i + \varepsilon_{it}$. In simple words, the presence of individual effects was tested in this section by considering the F statistics. The Hausman Test was also carried out to choose between Random Effects (RE) and FE models in the panel data analysis. The result showed Prob>chi2=0.0416 indicating that FE model is the best fit model to deal with unobserved heterogeneity and give the best linear unbiased estimates (BLUE).

7.2.2 Heteroskedasticity and Serial Correlation Results

The Fixed Effect model was run and the issues of heteroskedasticity and serial correlated were tested in the model. After carrying out the modified Wald test for GroupWise heteroskedasticity, it was found that Prob>chi2=0.0000, indicating the presence of heteroskedasticity and that the null hypothesis of homoscedasticity must be rejected. The serial correlation test which was done by using Wooldridge Test resulted in a Prob>F=0.5056 indicating that there is no serial correlation in the model and therefore the null hypothesis has to be accepted. As used in studies such as Tolbert et al. (2001) and Stuckler et al. (2009), the current research uses panel corrected standard errors (PCSE) to correct for heteroskedasticity. According to Beck and Katz (1995), PCSE is effective in panel data with shorter period compared to the number of panels (i.e., T<N).

7.2.3 Sectoral Result Analysis

Table 7 presents the consolidated fixed effects panel regression model covering all the sectors in the ICB apart from Technology and Telecommunication sectors which were omitted due to few observations which disqualify for panel analysis. Control variables results were omitted as the differences in coefficient and direction of the relationship were not significantly different in the sectors. The standard errors presented are the panel corrected standard errors which correct heteroskedasticity as mentioned in the preceding section. From the Table, both environmental operational performance (i.e., SC1, SC2, water and RR) and environmental management performance (i.e., total environmental monitoring, objective, policies, processes and management systems scores) were tested to identify their relationship with corporate financial performance. Investigating how each sector performs regarding this relationship is the first objective of the current thesis, and therefore the findings below are imperative to achieving that.

Table 7: The Sectoral Regression Results of the CEP-CFP Relationship

ICB SECTORS	Variable	(1) ROA	(2) ROS	(3) ROCE	(4) Tobin's Q	(5) M2B	(6) Stock Price
FINANCIALS	SC1	0.548	-2.052***	-1.206	0.991	0.118	0.049
		(0.694)	(0.755)	(0.777)	(1.035)	(0.272)	(0.036)
	SC2	0.710	1.504	2.011*	4.150***	0.306	-0.132***
		(0.959)	(1.012)	(1.063)	(1.503)	(0.228)	(0.048)
	RR	0.058*	0.001	0.053	-0.072	0.002	0.0024
		(0.035)	(0.037)	(0.034)	(0.071)	(0.005)	(0.002)
	Water	0.817	-2.278	0.358	0.006	0.171	0.182*
		(2.203)	(2.739)	(2.101)	(4.309)	(0.239)	(0.110)
	TMS	-0.016	-0.018	0.007	-0.027	-0.007	0.001
		(0.023)	(0.022)	(0.020)	(0.035)	(0.008)	(0.001)
	TOS	0.079**	-0.046	0.010	0.187**	-0.006	-0.001
		(0.036)	(0.044)	(0.039)	(0.075)	(0.006)	(0.002)
	TPS	-0.003	0.035	-0.035	0.017	0.015***	0.001
		(0.060)	(0.047)	(0.041)	(0.055)	(0.005)	(0.002)
	TPRS	-0.183***	-0.021	-0.041	-0.138*	-0.026*	0.001
		(0.056)	(0.051)	(0.040)	(0.074)	(0.015)	(0.002)
	TEMS	-0.095**	0.005	-0.074*	0.176**	0.002	-0.007***
		(0.042)	(0.046)	(0.040)	(0.073)	(0.005)	(0.002)
	Adj. R^2	*0.23*	*0.26*	*0.17*	*0.20*	*0.15*	*0.26*
INDUSTRIALS	SC1	1.471***	-1.793***	-0.322	-0.863**	-0.584***	-0.030
		(0.477)	(0.574)	(0.421)	(0.360)	(0.147)	(0.039)
	SC2	-0.419	1.276	1.013	0.498	0.493*	0.057
		(0.946)	(1.077)	(0.766)	(0.487)	(0.271)	(0.056)
	RR	-0.062	0.010	-0.005	-0.031	-0.001	-0.002
		(0.041)	(0.045)	(0.027)	(0.020)	(0.016)	(0.002)
	Water	-0.365	0.326	-1.450	2.116*	-0.112	0.296**
		(2.226)	(2.702)	(1.890)	(1.166)	(0.707)	(0.141)
	TMS	0.100***	-0.102***	0.001	-0.017	-0.029***	-0.004**
		(0.031)	(0.033)	(0.019)	(0.013)	(0.010)	(0.002)
	TOS	0.022	-0.047	0.045*	0.013	0.015	0.004*
		(0.030)	(0.037)	(0.024)	(0.012)	(0.015)	(0.002)
	TPS	0.045	0.187***	-0.057	0.055**	-0.001	0.003
		(0.042)	(0.045)	(0.039)	(0.027)	(0.013)	(0.003)
	TPRS	0.097***	-0.124**	0.007	-0.077***	-0.017	-0.001
		(0.033)	(0.049)	(0.026)	(0.023)	(0.012)	(0.002)
	TEMS	0.040	0.107***	-0.011	-0.039*	0.016*	-0.008***
		(0.041)	(0.038)	(0.026)	(0.020)	(0.009)	(0.003)
	Adj. R^2	*0.26*	*0.18*	*0.11*	*0.26*	*0.29*	*0.34*
OIL & GAS	SC1	-0.087	-4.226**	4.682***	1.520***	0.662***	-0.002
		(1.639)	(2.122)	(1.405)	(0.328)	(0.154)	(0.021)
	SC2	0.294	0.466	4.036**	-0.671*	0.209	-0.137***
		(2.184)	(3.762)	(1.898)	(0.383)	(0.166)	(0.036)
	RR	0.107	0.053	0.019	0.036***	0.016***	0.001
		(0.072)	(0.095)	(0.059)	(0.013)	(0.006)	(0.001)
	Water	-6.568	6.489	-7.540**	-1.107	-0.874**	0.049
		(4.008)	(7.339)	(3.612)	(0.779)	(0.358)	(0.079)
	TMS	0.110	0.144	0.135**	-0.073***	-0.012**	-0.013***
		(0.079)	(0.089)	(0.056)	(0.013)	(0.006)	(0.001)
	TOS	0.069	-0.205	-0.101	0.014	0.001	0.004***
		(0.114)	(0.182)	(0.088)	(0.022)	(0.009)	(0.002)
	TPS	-0.214	0.045	0.606***	0.034	0.049***	-0.001
		(0.181)	(0.305)	(0.168)	(0.034)	(0.016)	(0.003)
	TPRS	-0.127	0.443***	-0.142*	0.064***	-0.002	-0.003**
		(0.086)	(0.139)	(0.075)	(0.015)	(0.007)	(0.001)
	TEMS	-0.203***	0.021	0.202***	-0.002	0.012	0.003***
		(0.078)	(0.116)	(0.066)	(0.016)	(0.007)	(0.001)
	Adj. R^2	*0.19*	*0.15*	*0.25*	*0.26*	*0.34*	*0.24*
BASIC	SC1	-4.494*	0.961	-0.444	3.926***	0.259	-0.070

MATERIALS							
		(2.362)	(2.438)	(1.585)	(0.757)	(0.229)	(0.083)
	SC2	0.212	-0.261	-3.573***	-1.923**	-0.743***	-0.043
		(1.791)	(1.683)	(1.124)	(0.936)	(0.241)	(0.067)
	RR	0.079*	0.039	0.046	-0.040*	-0.003	-0.002
		(0.046)	(0.055)	(0.036)	(0.023)	(0.005)	(0.002)
	Water	1.974	-4.121	0.473	1.778	-0.131	0.030
		(3.763)	(4.872)	(3.263)	(1.862)	(0.448)	(0.153)
	TMS	-0.128**	-0.068	-0.164***	-0.081**	-0.002	-0.008***
		(0.057)	(0.063)	(0.062)	(0.035)	(0.008)	(0.003)
	TOS	0.083	-0.160	0.065	-0.050	-0.018*	-0.001
		(0.082)	(0.106)	(0.077)	(0.041)	(0.011)	(0.003)
	TPS	0.901***	-0.791**	0.538**	-0.221	-0.018	0.003
		(0.295)	(0.361)	(0.242)	(0.146)	(0.037)	(0.012)
	TPRS	-0.022	0.221*	-0.071	-0.041	0.006	1.320
		(0.097)	(0.122)	(0.081)	(0.046)	(0.012)	(0.004)
	TEMS	0.105*	0.029	0.130**	0.037	0.005	0.010***
		(0.057)	(0.086)	(0.060)	(0.037)	(0.009)	(0.003)
	Adj. R^2	*0.29*	*0.11*	*0.18*	*0.22*	*0.10*	*0.24*
HEALTH CARE	SC1	0.017	-3.492	-6.044	-5.861***	-0.863**	0.026
		(2.625)	(5.855)	(3.883)	(1.578)	(0.350)	(0.134)
	SC2	5.254**	6.359	13.49***	6.691***	1.049***	-0.127
		(2.490)	(5.940)	(3.992)	(1.799)	(0.397)	(0.153)
	RR	-0.029	0.020	-0.096**	-0.016	-0.003	0.001
		(0.024)	(0.065)	(0.041)	(0.012)	(0.003)	(0.001)
	Water	-2.667	-6.378	-1.633	-0.870	-0.351	0.012
		(1.730)	(4.334)	(2.759)	(0.975)	(0.257)	(0.100)
	TMS	-0.047	-0.252**	-0.197***	-0.012	-0.005	-0.009***
		(0.042)	(0.101)	(0.068)	(0.027)	(0.006)	(0.002)
	TOS	0.020	0.079	-0.182**	0.003	-0.004	0.003
		(0.056)	(0.136)	(0.085)	(0.032)	(0.007)	(0.003)
	TPS	0.145**	0.276	0.322***	0.128***	0.017	0.006
		(0.072)	(0.169)	(0.113)	(0.045)	(0.011)	(0.004)
	TPRS	-0.171***	-0.300**	-0.206**	-0.205***	-0.037***	-0.009***
		(0.049)	(0.119)	(0.082)	(0.036)	(0.008)	(0.003)
	TEMS	-0.029	-0.090	0.029	-0.194***	-0.034***	-0.002
		(0.059)	(0.143)	(0.094)	(0.037)	(0.008)	(0.003)
	Adj. R^2	*0.12*	*0.16*	*0.20*	*0.20*	*0.22*	*0.15*
CONSUMER GOODS	SC1	-2.395***	0.303	1.289	2.194*	-0.356***	-0.137**
		(0.815)	(0.905)	(0.879)	(1.157)	(0.128)	(0.063)
	SC2	1.879	0.617	0.549	-0.158	0.373**	0.296***
		(1.277)	(1.341)	(0.979)	(1.315)	(0.186)	(0.088)
	RR	0.027	-0.032	0.019	0.020	0.004	0.002
		(0.032)	(0.046)	(0.028)	(0.035)	(0.006)	(0.002)
	Water	-0.760	-2.629	2.199	3.761	0.556	0.104
		(1.965)	(2.852)	(2.120)	(2.665)	(0.381)	(0.158)
	TMS	-0.109***	-0.124***	-0.126***	-0.202***	-0.015***	0.004
		(0.038)	(0.045)	(0.028)	(0.041)	(0.006)	(0.003)
	TOS	0.058*	0.153***	0.106***	0.118***	0.026***	0.004*
		(0.031)	(0.035)	(0.027)	(0.030)	(0.005)	(0.002)
	TPS	0.172**	-0.060	-0.114**	-0.003	0.002	0.009
		(0.086)	(0.081)	(0.047)	(0.065)	(0.010)	(0.007)
	TPRS	-0.074*	0.046	0.046	-0.020	0.001	0.007***
		(0.042)	(0.055)	(0.031)	(0.039)	(0.007)	(0.003)
	TEMS	0.084**	0.086	0.193***	0.327***	0.023***	0.011***
		(0.040)	(0.055)	(0.037)	(0.049)	(0.007)	(0.003)
	Adj. R^2	*0.21*	*0.10*	*0.21*	*0.15*	*0.24*	*0.20*
CONSUMER SERVICES	SC1	2.190***	2.814***	0.506	0.156	5.025*	-0.017
		(0.716)	(0.790)	(0.493)	(0.405)	(2.917)	(0.060)
	SC2	-3.496***	-0.322	0.252	0.090	-10.51	-0.070

		(1.094)	(1.327)	(0.852)	(0.701)	(7.254)	(0.103)
	RR	0.032	-0.013	-0.043	-0.055**	-0.107	-0.004
		(0.037)	(0.049)	(0.031)	(0.028)	(0.102)	(0.002)
	Water	-0.250	0.460	0.265	0.203	1.184	0.004
		(0.231)	(0.405)	(0.272)	(0.171)	(1.399)	(0.011)
	TMS	0.060**	-0.020	0.030	0.031	0.207*	0.005**
		(0.027)	(0.036)	(0.025)	(0.020)	(0.126)	(0.002)
	TOS	-0.030	0.071	0.118***	0.078**	0.045	-0.002
		(0.046)	(0.054)	(0.039)	(0.037)	(0.105)	(0.003)
	TPS	-0.167***	-0.138*	-0.058	-0.076	-0.711	0.005
		(0.058)	(0.080)	(0.062)	(0.060)	(0.479)	(0.004)
	TPRS	-0.020	0.042	0.079	0.141**	0.051	0.004
		(0.066)	(0.072)	(0.058)	(0.059)	(0.361)	(0.004)
	TEMS	0.057	-0.048	-0.051	-0.015	-0.330	0.003
		(0.047)	(0.054)	(0.037)	(0.033)	(0.227)	(0.003)
	Adj. R^2	*0.26*	*0.20*	*0.12*	*0.15*	*0.17*	*0.18*
UTILITIES	SC1	13.48	-0.460	-0.790	-0.768	-0.242	-0.327**
		(9.302)	(3.242)	(1.185)	(0.468)	(0.303)	(0.159)
	SC2	36.02*	4.974	-0.207	-2.071***	-0.943	-0.465*
		(19.79)	(7.318)	(2.575)	(0.764)	(0.695)	(0.256)
	RR	0.171	0.067	0.044**	-0.002	-0.001	-0.001
		(0.174)	(0.064)	(0.022)	(0.006)	(0.005)	(0.002)
	Water	-0.381*	-0.099	-0.038	0.009	0.036***	0.007***
		(0.211)	(0.112)	(0.040)	(0.012)	(0.009)	(0.003)
	TMS	-0.039	-0.024	-0.011	0.003	0.006	-0.001
		(0.149)	(0.066)	(0.024)	(0.007)	(0.006)	(0.002)
	TOS	0.594**	0.091	0.056	-0.007	-0.003	-0.004*
		(0.302)	(0.120)	(0.044)	(0.009)	(0.006)	(0.002)
	TPS	1.292	0.052	-0.050	-0.042	-0.021	-0.006
		(0.889)	(0.310)	(0.113)	(0.038)	(0.029)	(0.013)
	TPRS	0.641*	-0.054	-0.024	-0.015	-0.015**	-0.007***
		(0.331)	(0.125)	(0.046)	(0.009)	(0.007)	(0.003)
	TEMS	-0.157	0.117	0.040	0.007	0.009	-0.006**
		(0.246)	(0.092)	(0.034)	(0.009)	(0.007)	(0.003)
	Adj. R^2	*0.21*	*0.16*	*0.23*	*0.10*	*0.12*	*0.19*

Panel Corrected Standard Errors (PCSE) in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

7.2.3.1 Financial Sector Analysis

Starting with the Financial Sector, it was found that all the market –based variables (i.e., Tobin's Q, Market-to-Book and Stock price) and ROA had a positive relationship with scope 1 GHG emissions. ROS and ROCE, on the other hand, recorded a negative relationship with scope 1 emissions. These results are quite interesting as it was hypothesised (see H1a) that at least the Stock market will react to the news of emissions negatively even if all other financial performance variables were unreactive. Scope 2 on the other hand which was hypothesised to have a negative relationship with the financial performance variable turned out to have positive links with ROA, ROS, ROCE, Tobin's Q and market-to-book. The stock price was the only variable found to have a negative relationship with scope 2 emissions. These findings could be attributed to the fact that the Financial Sector does not engage in energy-intensive activities that may result in more direct emissions. Thus, the amount emitted directly from sources may not be in large quantities compared to that of other sectors. Explaining from scope 2 emissions' perspective, it may be obvious that since the Financial Sector delivers most of their services indoors, usage of imported electricity will be high. It is not too surprising to see that the more scope 2 emissions go up in this sector, the lower the Stock Price. However, it appears all the other financial performance variables are insensitive to scope 2 emissions as the stock prices of the companies in the sector.

As expected, resource reduction performance had a positive relationship with ROA, ROS, ROCE, Market-to-book and Stock Price but a negative relationship with Tobin's Q. Out of the five positive relationships found, ROA was the only financial performance variable was statistically significant at all significance levels. Such negative relationship could be as a result of the replacement value of asset which is inclusive in the measurement of Tobin's Q. Replacement value of asset might not have been a major decisive factor for stakeholders in relation to the reduction in the use of resources at the time of valuation and thus, would contribute to Tobin's Q having a negative influence. Though it was hypothesised in H3 that water consumption will have a negative impact on financial performance only ROS recorded the negative relationship. Other performance variables such as ROA, ROCE, Tobin's Q, market-to-book and Stock Price all had a positive relationship with water consumption. This could be attributed to the fact that water consumption value used in this research was the performance score and not the actual quantities consumed. It is also worth noting that apart from the relationship with Stock Price which was statistically significant, the remaining variables did not have any significant links.

Regarding the environmental management performance variables, apart from total objective score, monitoring, policy, processes and management system scores were all hypothesised to have a positive association with both market and accounting-based financial performance. However, mixed results were found instead which could be ascribed to a number of reasons. First, TPRS had a negative link with Tobin's Q, market-to-book, ROA, ROS and ROCE but not with Stock Price. The obvious reason could be that within the Financial Sector, there are not lots of processes that need to be refined and redesigned to meet green and sustainable standards. As such, no matter the processes score, it is likely that the firms did not properly and adequately manage other performance factors in this sector and that led to the negative links found. Also, it appears that in this sector, shareholders react positively to good environmental policies and monitoring about the stock prices.

7.2.3.2 Industrial Sector Analysis

Analysing the results from the Industrial sector, scope 1 and 2 had contrast results for market and accounting-based measures. For instance, scope 1 emissions were negatively associated with Stock Price, market-to-book and Tobin's Q whereas scope 2 emissions had a positive relationship with the same variables. This could be because the Industrial sector tends to emit more GHG from direct sources than indirect (i.e., imported electricity consumption) due to the type of business activities and operations the firms in the sector engage in. Apart from ROA, ROS and ROCE were also found to have a negative relationship with scope 1 emissions. Though none of the findings for scope 2 and the financial performance variables was statistically significant, it had a negative link with ROA. The other variables were positively linked scope 2 emissions with strong coefficients aside Stock Price. It seems like resource reduction performance was not recognised as a key factor in assessing firms' financial performance. Aside from the negative links found between resource reduction performance and ROA, ROCE, Tobin's Q, Market-to-book and Stock price, it appears the coefficients are not strong and statistically significant. Water consumption, on the other hand, was found to have a negative association with ROA, ROCE and market-to-book while the other variables had a positive relationship. Looking at the statistical significance of the positive link between Stock Price and water consumption, it can be deduced that stakeholders and shareholders with interest in this sector do not consider water consumption as a significant factor in trading on the Stock market.

In this sector, ROS recorded a statistically significant positive relationship with environmental management system score. This could be because firms in the Industrial sector get involved in both goods and services and therefore increasing revenue regarding sales is a relevant aspect of their performance. It cannot be denied that having an environmental management system in a company provides a good guideline for firms to produce their goods with lesser emissions and regard for the natural environment. Though one may expect that environmental processes would have a positive relationship with the financial performance it appears other factors such as those controlled in the tests were not favourable to increase financial performance. It can be deduced from the findings that having environmental objectives in place contributes to better financial performance regarding ROA, ROCE, Tobin's Q, market-to-book and Stock Price. Also, total monitoring score was found to be a positive and statistically significant factor to improved ROA. This could be explained from the perspective of monitoring which may cover fixed assets that may lead to environmental damage in one form or other through its usage. It may be inadvertent yet a proper monitoring would not only reduce environmental impact but also ensure that those assets are maintained and used to its maximum capacity for enhanced performance.

7.2.3.3 Oil and Gas Sector Analysis

The oil and Gas sector is one of those sectors expected to have a huge impact on the environment. As seen from the results, ROA, ROS and stock price reacted negatively to increase in scope 1 emission. This may be possibly because the sector is already in the limelight for contributing to environmental damage and therefore shareholders tend to penalise the stocks when any damage to the environment is made known. Also, in this sector, does not only direct emission gets penalised by the Stock market through prices but also, indirect emissions are negatively related to stock prices as well. However, finding a positive association between scope 1 emissions and market-to-book, Tobin's Q and ROCE is quite convincing because firms in this sector focus more on satisfying shareholders. Perhaps these results were found because these performance variables are relevant to shareholders.

As anticipated resource reduction performance had a positive relationship with all the financial performance variables in this sector. This could be linked to the fact that extracting oil and gas has to do with accessing the natural resources and therefore when these firms reduce amount or measure of resources used; their financial performance would end up being improved. Water consumption had negative associations with ROA, ROCE, market-to-book and Tobin's Q while positive links were found for ROS and Stock price. It appears that though water is an essential resource in drilling oil and gas, it might affect some aspects of the business performance and operations but not necessarily get penalised by the Stock traders or by sales revenue from consumers.

Regarding environmental management performance variables, mixed results were found for accounting and market-based measures. For instance, environmental monitoring was found to be negatively associated with all the market-based measures whereas positive links were found with the accounting-based measures. Also, positive associations were established between environmental objectives and the market-based measures used in this study as well as ROA while a negative link was found for ROS and ROCE. It is likely that setting environmental objectives in the Oil and Gas sector is an essential factor in improving environmental performance and market financial performance. Environmental management system had a positive relationship with Stock Price, ROCE, market-to-book and ROS while negative links with ROA and Tobin's Q were found. These findings could be as a result of the more exceptional emphasis management consultants and researchers have placed on the relevance of EMS.

7.2.3.4 Basic Materials Sector Analysis

Scopes 1 and 2 GHG emissions were found to relate differently to accounting and market-based measures. For example, ROA, ROCE and Stock Price had a negative relationship with direct emissions whereas ROS, Tobin's Q and market-to-book recorded a positive relationship with scope 1. Though this sector tends to emit more GHG due to the business operations of the firms, it appears that a negative or positive relationship would be found depending on the financial performance measure under both accounting and market-based measures. A negative relationship was found between indirect emissions and the market-based measures as well as ROCE and ROS. Despite the positive link found between ROA and scope 2 emissions, it is likely that because direct emissions had already had a substantial negative impact on it, indirect emissions influence was subdued. Also, resource reduction performance was found to have reacted positively to accounting-based measures and negatively to market-based measures. This could be because the accounting-based measures have the element of profit in it and the likelihood of an increase in material resource cost reducing net profit is quite high. Thus, better performance in reducing resource use leads to enhanced ROA, ROS and ROCE.

It was quite intriguing to discover that total monitoring score had a negative link with all the financial performance measures in this sector. This could be related to the fact that the Basic Materials sector deals with mining and other activities that require constant monitoring to ensure the environment is not damaged thus costly. Though it was expected in this study for environmental objectives to be positively associated with financial performance, however, the results indicate that ROS, Tobin's Q, M2B and Stock price had negative links instead. Environmental management systems, on the other hand, were found to be positive with both the accounting and market-based financial performance measures. This is an indication that EMS is indeed valued financially in the basic material sector.

7.2.3.5 Health Care Sector Analysis

The Health Care Sector in the UK appears to also have a mixed relationship between GHG emissions and financial performance. For instance, a negative association was found between scope 1 direct emissions and ROCE, Tobin's Q and Market-to-book financial performance measures. However, apart from a negative relationship found between Stock price and indirect emissions, the other financial performance measures (i.e., ROA, ROS, ROCE, Tobin's Q and Market-to-book) were found to be positively associated with it. The Health Care Sector is likely to use more water because of the kind of services it provides and thus, an increase in the usage of water leads to a decrease in financial performance. Resource reduction performance, on the other hand, was expected in this study to have a positive influence on firm performance. Nevertheless, it was found that only ROS and stock prices reacted positively to it.

The other performance measures related negatively to Resource reduction performance unexpectedly but could imply that because the sector might not necessarily rely heavily on natural resources, some measures of performance would not be able to capture it. Environmental processes and monitoring both appeared to have a negative influence on firm financial performance measures signifying that they may be costly in carrying, but perhaps no financial benefits could be reaped as a result of those.

7.2.3.6 Consumer Goods Analysis

In the Consumer Goods Sector, total environmental management system and environmental objectives are valued financially considering that both the accounting and market-based measures are positively influenced when those two are in place. It is also clear from the results that the Stock market tends to react positively to environmental processes, policies and monitoring. Apart from stock prices, the other performance measures are all negatively linked with the environmental monitoring score. Considering GHG emissions, it is evident that indirect scope 2 emissions tend not to have an effect on the accounting-based measures (i.e., ROA, ROS and ROCE). Also, apart from Tobin's Q, the other market-based measures which are Stock Price and market-to-book were also positively associated with scope 2 emissions. The direct emissions instead were found to be penalised by ROA, Stock Price and market-to-book financial performance measures. This implies that the Consumer Goods Sector tends to use sources that emit more emissions directly than when electricity is imported or consumed, and therefore the direct emissions affect the firm's financial performance instead.

As expected, the Consumer Goods Sector possibly uses a higher percentage of natural resources, and that might have led to the positive relationship between the financial performance measures apart from ROS which was found to be negatively associated. The Consumer Goods Sector appears not to suffer a lot of financial losses across when the consumption of water increases considering that only ROA and ROS were affected negatively.

7.2.3.7 Consumer Services Sector Analysis

The accounting-based measures were found to be positively linked with scope 1 emissions in the Consumer Service Sector alongside Tobin's Q and the market-to-book measures. The results show that imported electricity consumption tends to negatively affect the ROA, ROS, Market-to-book and Stock Price but not ROCE and Tobin's Q. These findings could be attributed to the highly concentrated service activities undertaken by the firms in this sector and therefore using electricity to deliver services is inevitable. Furthermore, due to the delivery of services and perhaps less production or manufacturing in this sector, resource use reduction was not found to have a positive influence on the financial performance measures aside ROA. Similarly, water consumption only impacted negatively on ROA and not the other variables perhaps due to the less reliance on water use regarding service delivery.

From the environmental management performance perspective, it was established that environmental processes, objectives and monitoring scores were beneficial to improving all the market-based-measures and some other accounting-based-measures. The results also indicate that the stock prices are positively influenced when environmental monitoring, policies, processes and management systems are in place aside environmental objectives

7.2.3.8 Utilities Sector Analysis

The findings in the Utility sector are dissimilar from those of the other sectors analysed above. For example, apart from the negative association found between scope 1 emissions and ROS, the other financial performance measures were found to be positively related to both scopes 1 and 2. Also, the results show that resource use reduction negatively influences the market-based financial performance measures whereas ROA, ROS and ROCE do improve positively in the event of an improved resource reduction performance. Furthermore, when the consumption of water increases in this sector, ROA, ROS and ROCE tend to react negatively but not with Tobin's Q, market-to-book and Stock Price.

On the other hand, it was found that the stock prices in the Utility sector were not positively impacted no matter the environmental monitoring, objectives, policies, processes or management systems in place. However, some market performance measures such as Tobin's Q and market-to-book were rather positively associated with environmental management systems and environmental monitoring. Also, the results indicate that the accounting-based performance measures are positively influenced when a company has environmental objectives in place. Though the utility sector does not have relatively adequate presentation of firms in the sampled firms, their products and services are used by individual citizens and companies. As such, prioritising environmental management practices in their activities yielded positive impact on financial performance.

7.2.3.9 Econometric Models (Exclusion and Inclusion)

This study further analyses the relationship of EOP and CFP in the non-financial sectors in addition to the sectoral analyses presented above. Table 8 below shows the results of the EOP and CFP relationship in non-financial sectors. The purpose of running this additional analysis is mainly to investigate and also provide further evidence to support sectoral analysis. Most especially, to explore the hypothesis that even when all the other sectors exclusive of Financials are pooled together, different results would be obtained when compared to the results that would be found in case the individual sectors are analysed separately as done in this study. It was observed that the accounting-based measures (i.e., ROA and ROS) had a negative relationship with scope 2 emissions but positively linked with direct emissions. Also, it could be noticed that that the Stock market prices tend to react negatively to the increase in scope 1 emissions but positively to scope 2. This could be because the Financial Sector which covers 25% of the overall study sample is excluded in this analysis. Moreover, water consumption which was expected in this study to be negatively associated with the financial performance was surprisingly found to be positively related to the performance measures aside ROA. Similarly, a resource use reduction performance score which was hypothesised to have a positive relationship with CFP turned out to only be true for ROS and ROS but not the other variables.

It is undeniable from the results that CEO duality role does not augur well for firm financial performance when ROS, ROCE, TQ, M2B and Stock prices are used as measures. Similarly, findings were observed for firm size and CFP where firms tend to struggle with their financial performance as they increase in size. Nonetheless, the stock prices are quite sensitive to the increase in firm size. Thus, a further increase in the size of the firm causes stock prices to increase by £192.5. In other words, large firms on the Stock markets have the higher prices for their stocks. To get a broader perspective on the EOP and the CFP relationship, the researcher further analyses the relationship using the whole sample size inclusive of the financial firms. The results are exhibited in Table 9.

Though the direction of the EOP-CFP relationship of some of the variables may be quite similar to that of Table 8 when Financial Sector was excluded, there are still some few differences that are worth noting. For instance, similar negative associations were found between ROA, ROS and scope 2 emissions and a positive link with direct emissions in both scenarios. Though Stock Price was negatively influenced by the increase in scope 1 emissions when financial firms were excluded, they were, however, found to be positively related to Stock Price at the inclusion of the Financial Sector.

It could be deduced from this result that the Financial Sector indeed affects the overall sample in this study when GHG emissions are the focus of analysis. This study can thus suggest that researchers should analyse the CEP-CFP relationship from sectoral perspective than collectively as done previously in previous studies (see Wagner et al., 2002; Brammer and Millington, 2008; Tatsuo, 2010; Hatakeda et al., 2012; De Burgos-Jimenez et al., 2013) to get a clearer understanding and insight on the different actions and reactions in the sectors.

Table 8: EOP and CFP Relationship in the Non- Financial Sectors

VARIABLES	(1) **ROA** *Exc. Fin.*	(2) **ROS** *Exc. Fin*	(3) **ROCE** *Exc. Fin*	(4) **Tobin's Q** *Exc. Fin*	(5) **M2B** *Exc. Fin.*	(6) **Stock Price** *Exc. Fin*
LogSC1	0.566*** (0.185)	0.495*** (0.191)	0.215 (0.133)	-0.167* (0.098)	0.143 (0.099)	-17.42** (8.179)
LogSC2	-0.189 (0.267)	-0.475 (0.292)	0.735*** (0.175)	0.471*** (0.125)	-0.190* (0.112)	31.94*** (9.656)
Water	-0.121 (0.275)	0.034 (0.131)	0.045 (0.085)	0.060 (0.056)	0.031 (0.068)	13.83 (10.17)
RR	0.012 (0.008)	0.009 (0.011)	-0.012* (0.007)	-0.015*** (0.006)	-0.015** (0.006)	-0.0620 (0.438)
FL	-0.157** (0.064)	0.015 (0.134)	0.122* (0.073)	-0.073 (0.052)	0.488*** (0.175)	-16.69*** (4.282)
GR	2.325** (1.118)	1.344* (0.706)	-3.515*** (0.757)	0.945 (1.080)	2.352** (1.160)	101.3 (74.05)
FS	-0.737*** (0.283)	-1.113*** (0.405)	-3.548*** (0.275)	-2.933*** (0.215)	-2.017*** (0.193)	192.5*** (14.74)
BS	0.172 (0.116)	0.072 (0.134)	0.609*** (0.112)	1.002*** (0.091)	0.668*** (0.091)	24.39*** (6.509)
BD	-0.027* (0.014)	0.055*** (0.014)	0.050*** (0.011)	-0.002 (0.008)	0.052*** (0.008)	-0.532 (0.576)
CI	-0.058 (0.070)	0.394* (0.208)	-0.131** (0.059)	-0.139*** (0.047)	-0.032 (0.117)	0.196 (4.892)
CEO duality	2.443** (1.123)	-7.251*** (1.160)	-3.716*** (0.824)	-2.722*** (0.594)	-3.158*** (0.531)	-0.452 (43.99)
Obs.	689	689	689	689	689	689
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.24	0.15	0.30	0.20	0.27	0.20

Panel Corrected Standard Errors (PCSE) in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

From the established results so far, it can be opined that the exclusion and inclusion of financial sector alone in a study is not sufficient and rigorous. In a heterogenous classification of sectors, it would be difficult to point out a specific sector performing well financially as a result of improved financial performance.

Table 9: EOP and CFP Relationship (All Sectors Inclusive)

VARIABLES	(1) ROA	(2) ROS	(3) ROCE	(4) Tobin's Q	(5) M2B	(6) Stock Price
LogSC1	0.279** (0.134)	0.083 (0.153)	-0.295** (0.115)	0.126* (0.065)	-0.126** (0.062)	23.27*** (5.779)
LogSC2	-0.250 (0.210)	-0.024 (0.245)	0.497*** (0.149)	0.551*** (0.085)	0.022 (0.076)	17.38** (8.814)
Water	-0.136 (0.288)	0.017 (0.125)	0.141 (0.128)	0.058 (0.054)	0.031 (0.059)	14.71* (8.704)
Resource Red.	-0.005 (0.007)	0.007 (0.010)	-0.025*** (0.005)	-0.006 (0.004)	-0.013*** (0.004)	0.293 (0.344)
FL	-0.092 (0.057)	-0.004 (0.111)	0.147** (0.072)	-0.046 (0.037)	0.559*** (0.093)	-18.61*** (3.509)
GR	-0.333*** (0.068)	0.968*** (0.178)	0.389* (0.218)	0.563*** (0.130)	-0.110*** (0.027)	-5.946*** (2.267)
FS	0.013 (0.185)	-0.859*** (0.286)	-1.596*** (0.200)	-2.901*** (0.098)	-0.718*** (0.131)	65.37*** (10.54)
BS	0.070 (0.107)	0.250** (0.121)	0.563*** (0.089)	0.635*** (0.054)	0.302*** (0.060)	47.02*** (5.062)
BD	-0.018 (0.012)	0.045*** (0.012)	0.0318*** (0.008)	0.023*** (0.005)	0.022*** (0.005)	-0.417 (0.442)
CI	0.049 (0.038)	-0.088* (0.046)	0.092** (0.042)	-0.061*** (0.017)	-0.113*** (0.023)	-14.49*** (1.641)
CEO duality	1.361 (0.882)	-5.309*** (1.011)	-1.008 (0.619)	-3.001*** (0.367)	-0.835*** (0.315)	28.99 (33.18)
Obs.	926	926	926	926	926	926
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.15	0.26	0.28	0.30	0.32	0.34

Panel Corrected Standard Errors (PCSE) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

For example, while the Utility sector alone experienced a positive relationship between resource reduction performance and the accounting-based measures, table 8 presents a contrary finding. Accordingly, it could be pointed out that such significant negative relationship definitely does not stretch to the Utility sector. In other words, such findings reiterate the current study's viewpoint that the CEP-CFP relationship should be analysed according to the sectors.

In addition to the EOP and CFP tests shown above, a further step was taken to explore how the environmental management performance variables related to CFP when all sectors are combined. Table 10 shows the econometric results of the relationship between EMP and CFP. Though it was hypothesised (i.e., H5b) that total environmental monitoring score (TMS) should be positively associated with financial performance, it was found that ROS, ROCE and Tobin's Q all had a negative relationship instead. The results are contradictory to those of Darnall and Edwards (2006). The current findings could be ascribed to the fact that monitoring environmental performance itself might not necessarily lead to increase in sales or increase in return on capital employed.

On the contrary, it was found that aside ROS, the remaining CFP variables (i.e., ROA, ROCE, Tobin's Q, M2B and Stock price) established a positive relationship with environmental objective contradicting the hypothesised negative relationship (i.e., H6b). One could assert that perhaps these aims were not merely developed but also implemented to achieve improved environmental performance (Aravind and Christmann, 2011). All the EMP variables recorded positive relationships with stock price though only environmental objective and monitoring were significantly related. Such results could be elucidated from the signalling theory (Bergh and Gibbons, 2011) in that the awareness of corporate environmental management performance might have alerted potential investors to patronise stocks and plough money into companies. In furtherance to this, other economic and market conditions could also affect the increase in stock prices and therefore though environmental management variables might have influenced the positive relationship, there could have been some other mediating and moderating factors.

An interesting finding that is contrary to studies that excluded financial firms is the different relationships found between gearing ratio and financial performance under the two scenarios. For instance, when all the sectors were analysed together, gearing ratio demonstrated a negative effect on only ROCE which contradicts H17. However, upon the inclusion of the financial sector, the expected negative relationship was established with ROA, M2B and Stock price. This is an indication that the inclusion of the financial sector is highly relevant in assessing overall corporate financial performance and should not be excluded as done in studies by Pfeffer (1972) and Chithambo (2013).

Table 10: EMP and CFP Relationship

VARIABLES	(1) ROA	(2) ROS	(3) ROCE	(4) Tobin's Q	(5) M2B	(6) Stock Price
TMS	0.033*** (0.012)	-0.053*** (0.014)	-0.009 (0.010)	-0.012 (0.009)	0.008 (0.011)	1.655** (0.679)
TOS	0.031* (0.018)	-0.022 (0.020)	0.054*** (0.014)	0.042*** (0.010)	0.024 (0.017)	3.615*** (0.906)
TPS	-0.046* (0.027)	0.016 (0.029)	-0.049** (0.024)	-0.002 (0.021)	-0.172 (0.137)	0.878 (1.138)
TPRS	0.004 (0.020)	0.011 (0.025)	0.012 (0.020)	-0.006 (0.016)	0.047 (0.058)	0.346 (1.012)
TEMS	0.032* (0.017)	0.066*** (0.019)	0.004 (0.016)	0.024** (0.012)	-0.060 (0.048)	0.818 (1.019)
FL	-0.197*** (0.075)	0.008 (0.163)	0.182** (0.090)	0.008 (0.065)	0.865* (0.514)	-20.02*** (5.506)
GR	-0.418*** (0.087)	0.910*** (0.183)	0.384* (0.222)	0.576*** (0.136)	-0.276* (0.149)	-7.656** (3.861)
FS	0.070 (0.351)	-1.245*** (0.402)	-1.367*** (0.343)	-2.872*** (0.284)	-1.937* (1.168)	84.54*** (19.35)
BS	0.072 (0.228)	0.194 (0.216)	0.551*** (0.182)	0.875*** (0.163)	0.729* (0.425)	44.88*** (11.86)
BD	-0.050** (0.021)	0.045* (0.023)	0.023 (0.019)	0.020 (0.013)	0.073 (0.049)	-0.225 (1.343)
CI	0.036 (0.055)	-0.008 (0.077)	0.095 (0.060)	-0.123*** (0.026)	-0.210** (0.094)	-22.40*** (3.198)
CEO duality	1.787 (1.746)	-5.330*** (1.868)	-1.354 (1.539)	-3.557*** (1.115)	-0.598 (1.200)	-44.22 (97.81)
Observations	926	926	926	926	926	926
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.23	0.22	0.29	0.25	0.20	0.27

Panel corrected standard errors (PCSE) in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

It is also evident from Table 10 that environmental process was the only proxy which did not register a statistically significant relationship with any of the financial performance variables. Rationally, it was expected that initiating efficient and green means of manufacturing and providing services would influence substantial financial benefits. In the health care sector, for instance, environmental process score was found to be significantly associated with all the financial performance proxies employed in this study (refer to Table 7). However, the results are contradictory, and this could be due to the fact that majority of the sampled firms do not engage in manufacturing or production. As such, the next section is dedicated to providing further discussion of the sectoral analysis carried out.

7.2.3.10 Discussion of Sectoral Results

Subsequent to analysing the regression results of all the sectors and also the exclusion of financial firms' scenario, it is imperative that these results are discussed thoroughly in order to understand the underlying theories. The financial performance in the various sectors reacted differently to the environmental performance variables. The Financial Sector, for instance, is known to have recently increased its attention on corporate social and environmental performance most especially, to protect its reputation (Soana, 2011). This is clearly evidenced in the current analysis where a percentage increase in electricity consumption which falls under the scope 2 GHG emissions category will lead to about £5 decrease in the Stock Price of the company. The Industrial sector however established a negative association with scope 1 emissions and Stock Price. Moving from the market-based measures, the accounting-based measures kept changing their reactions based on the environmental performance proxy tested. Though Soana (2011) investigated the relationship between CSP and CFP in Italian banks and found no significant relationship, the current study found statistically significant relationships when corporate environmental performance is considered as a multi-dimensional construct. It can be argued that the stakeholder theory plays a massive role in this sector as well because the financial firms engage in environmental activities to maintain and improve their reputation (Scholtens, 2009).

In the Oil and Gas sector, however, resource reduction performance was found to be very relevant in improving financial performance though only M2B and Tobin's Q were statistically significant. These findings are reasonable and support

H4 since the sector is one of those that heavily rely on natural resources for operations. The results also suggest that a rise in water consumption in the sector causes the ROA to be penalised alongside ROCE and Tobin's Q and M2B. It appears that apart from scope 2 emissions which significantly and negatively affect the stock prices, the other EOP proxies do not meaningfully influence the Stock market. Nonetheless, when EMP proxies are used instead, the results show a substantial reaction on the stock prices.

It can thus be inferred that when a few proxies of corporate environmental performance are used as seen in existing studies (Misani and Pogutz, 2015; Hatakeda et al., 2012; Sariannidis et al., 2013) instead of multiple proxies, the final result cannot be generalised to the overall environmental performance. The current study analysis of the CEP-CFP relationship has shown how the different the sectors are and how environmental management performance and environmental operational performance measures are distinct from each other. Thus, studies that use environmental management performance proxies such as Lo et al. (2012) who explored the relationship between ISO 14000 certification and financial performance discovered a positive direct link as compared to the research by Saeidi et al. (2015) who found a moderated relationship between CSR and financial performance. They also emphasised that such a moderated relationship which was found in the Service Sector might not be the same in other sectors. Sahu and Narayanan (2011) and Goldar (2010) pointed out that energy-intensive firms have to be investigated separately from other sectors when considering environmental performance issues, most especially, GHG emissions because of the relationship that could be discovered when explored individually.

The positive relationship between Tobin's Q and scope 1 emissions does not support the author's hypothesis. We may attribute such positive relationship to the possibility that investors may instead use Tobin's Q to determine future profitability of current investment as underscored by Bond et al. (2004). Logically, since investors look for more profits, Bond et al. (2004) pointed out that Tobin's Q does not always capture relevant information for investors decision making. This result supports the argument by Lioui and Sharma (2012), who emphasised that some stakeholders might consider environmental initiatives as potential penalties and costs instead of benefits cannot be sidelined.

Unfortunately, upon the aggregation of the various sectors, it was found that environmental processes score was not statistically significant in any of the relationships with financial performance. This was not the case when the sectors were investigated separately as every sector appeared to have at least a significant relationship with one financial performance variable. Also, the significant negative association was found between environmental policies and ROA and ROCE whereas the other relationships were found to be insignificant statistically. As hypothesised in H8b, the accounting-based measures were found to be positively linked with environmental management systems alongside M2B and Stock price. It is established from all the tests carried out so far that the two dimensions of corporate environmental performance (i.e., environmental operational performance and environmental management performance) do affect financial performance based on the measure (i.e., accounting or market-based) used in a study.

As emphasised by Brammer et al. (2008), low emissions may improve and yield higher earnings per share and vice versa. Explaining from the angle of direct emissions perspective, the study can suggest the likely impact on net income. One can argue that shareholders and investors may not immediately notice direct emissions activities. From a school of thought, we can cite an example in the case of business expansion which results in the inevitable increase in materials and inventory transportation. In such case, fuel costs and drivers’ wages may increase and thus with improper management and failure to increase sales relatively will result in a decrease in net income. Considering empirical evidence from Ćirović et al. (2014), Wu and Dunn (1995) and Delaney (1991), less use of transport or cheap alternative fuels and effective organisation of direct business logistics will help reduce CO_2 emissions and related costs.

From a logical instance, an indirect emission which results from an increase in electricity buying and consumption could arise from additions in companies’ assets in the form of expansion. In the absence of effective cost management, the returns on assets will decrease as hypothesised. This result is supported by Delmas and Nairn-Birch (2011) who found a negative relationship between ROA and GHG emissions. The finding encourages the adoption of voluntary carbon reductions as a policy instrument in addressing climate change issues effectively. Though a negative relationship was found for ROS (Model 2) as hypothesised, it was statistically insignificant.

7.2.4 Non-Linear Relationship

The second objective of this thesis is to explore the non-linear relationship that exists between environmental operational performance and financial performance in the carbon and non-carbon intensive firms. The study supports the argument by Fujii et al. (2012) that the CEP-CFP relationship could be negative or positive linear and when explored further shows a U-shaped or inverted U-shaped. Thus, linear relationships do not always fit nor provide better insights into such relationships.

To group the sectors into carbon and non-carbon intensive companies, the researcher used the GHG emissions in tonnes as the yardstick. Due to the heterogeneity in the quantity of emissions by firms in sectors that are suggested by extant studies (see Chithambo, 2013) to be non-carbon intensive such as the Financial institutions, the current study used the observed individual quantities of the firms instead of their sectoral output. The average emissions in tonnes for the overall sample was taken for scope 1 (i.e., an average of 2,476,726 tonnes) and scope 2 (i.e., an average of 751,345.8 tonnes). Considering the difference of over 1 million tonnes, an average (i.e., 1,614,036 tonnes) of the means of scopes 1 and 2 were taken to be the yardstick for classifying a firm under of carbon and non-carbon intensiveness. With the use of bivariate analysis, each scope of GHG emissions was paired with a financial performance measure. To thoroughly comprehend the non-linear relationship, all six financial performance proxies used in this study were examined. As suggested by Albers (2012), the current study uses the pictorial diagrams to indicate the existence of non-linear relationship than only presenting the results in a tabular form.

Tables 11 and 12 presents the quadratic non-linear relationship starting with the relationship between EOP and the accounting-based measured and then with the market-based measures. From both tables, it is apparent that the relationship between environmental operational and financial performances is a statistically significant and non-linear one. Nonetheless, figures 5 to 10 in the appendices provide a clearer picture of the U-shaped and inverted U-shaped relationships.

Figure 6 in the appendix shows the pictorial link between GHG emissions and Stock Price in the carbon and non-carbon intensive firms. It can be seen that non-linear relationship exists among firms involved in carbon and non-carbon intensive activities. However, the carbon-intensive firms tend to experience negative stock prices in the long run but not in short-term. It appears that companies with emissions between one million and 5 million tonnes continue to experience an increase in the stock prices. It seems like shareholders and stakeholders might want to give some leeway to companies to operate even in the face of more emissions to allow the firms some time to implement carbon reduction measures. When the emissions get closer to approximately 6 million tonnes, it is observed that the value of stock prices start falling.

A significant difference in the two categories is how the non-carbon intensive firms react to GHG emissions. The fall in stock prices upon the increase of direct emissions appears to be a gentle one when compared to that of scope 2 emissions. This could be related to the fact that since these firms are not carbon intensive in their operations, shareholders and investors expect them to ensure that emissions from the use of electricity should at least be managed well.

Such non-linear relationship could be due to the relatively cheaper investment associated with the enforcement of electricity consumption carbon reduction measures than with direct emissions which might place huge financial burdens on the company. The found U-shaped was not expected as the assertion of the study is for stock prices to decrease in the face of increased emissions. Though there is a little fall in stock prices, a further increase in direct emissions among both firms does not have any impact on the Stock Price as it keeps soaring high.

Table 11: Non-Linear Relationship with Accounting-based Financial Performance

VARIABLES	(1) ROS *Non-Carbon*	(2) ROS *Carbon*	(3) ROA *Non-Carbon*	(4) ROA *Carbon*	(5) ROCE *Non-Carbon*	(6) ROCE *Carbon*
LogSC1	-4.685***	3.480***	0.954*	4.660***	0.814	-6.586***
	(0.582)	(0.746)	(0.491)	(1.106)	(0.574)	(0.702)
LogSC1^2	0.254***	-0.169***	-0.954*	-0.177***	-0.037	0.281***
	(0.029)	(0.032)	(0.492)	(0.047)	(0.030)	(0.027)
LogSC2	-3.724**	-0.554	-0.448	-0.345	1.233	-3.634**
	(1.549)	(1.973)	(0.891)	(1.826)	(1.011)	(1.171)
LogSC2^2	0.174*	0.013	0.023	0.032	-0.061	0.214***
	(0.075)	(0.084)	(0.044)	(0.081)	(0.050)	(0.052)
Water	1.257	1.779	3.036*	-1.697	0.390	0.866
	(1.200)	(1.591)	(1.411)	(1.395)	(0.807)	(0.918)
Water^2	-0.018	-0.031	-0.049*	0.016	-0.006	-0.012
	(0.019)	(0.027)	(0.023)	(0.018)	(0.014)	(0.014)
RR	0.040	-0.313***	0.097*	-0.284***	-0.030***	-0.013
	(0.064)	(0.089)	(0.043)	(0.069)	(0.009)	(0.010)
RR^2	-0.001	0.003***	-0.001*	0.003***	-0.002	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FL	-0.149	-0.203	-0.059	-0.805**	0.221***	-0.362**
	(0.130)	(0.322)	(0.060)	(0.360)	(0.078)	(0.182)
GR	0.958***	1.183*	-0.317***	3.007***	0.440**	-4.006***
	(0.173)	(0.710)	(0.067)	(0.462)	(0.224)	(0.445)
FS	-0.884***	0.302	0.240	-0.819	-1.115***	-4.103***
	(0.336)	(0.834)	(0.242)	(0.516)	(0.221)	(0.457)
BS	0.401***	-0.215	0.038	0.160	0.566***	0.746***
	(0.142)	(0.285)	(0.130)	(0.290)	(0.109)	(0.177)
BD	0.045***	0.054**	0.004	-0.035	0.024	0.038**
	(0.017)	(0.024)	(0.013)	(0.021)	(0.015)	(0.016)
CI	-0.063	1.030***	0.081*	-0.128	0.090**	-0.112
	(0.048)	(0.369)	(0.041)	(0.110)	(0.042)	(0.168)
CEO Duality	-1.910	-5.963***	-0.789	3.145**	-0.454	-3.533***
	(1.482)	(1.722)	(1.061)	(1.502)	(1.138)	(1.172)
Constant	30.16**	33.62**	56.44**	15.42	24.90**	86.63***
	(13.32)	(15.40)	(23.06)	(17.48)	(11.92)	(7.080)
Observations	551	375	551	375	551	375
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.25	0.15	0.21	0.18	0.20	0.28

Panel Corrected Standard Errors (PCSE) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

However, when a different measure of financial performance (i.e., ROCE) was tested against direct emissions, the U-shape found was in favour of positive relationship where a continuous increase in scope 1 emissions leads to a fall in ROCE performance in the carbon-intensive firms. From Table 5, it is also observed that a linear relationship exists in the non-carbon intensive firms when ROCE and scope 1 emissions association is explored. A marginalised drop in ROCE is noted when direct emissions increase with time. The non-linear relationship found in the carbon-intensive firms could be related to the fact that such emissions may impact company's profit due to emissions related charges. There is the possibility of carbon emissions fines being incurred by companies in this category as a result of the intensity of activities that emit greenhouse gases.

Scope 2 emissions were equally found to have non- linear relationship among carbon intensive and non-carbon intensive firms. For non-carbon intensive companies, an inverted U-shaped link was observed over the long run when indirect emissions from imported electricity were examined. This implies that when such firms do not take measures over time to reduce emissions from electricity usage, their ROCE eventually declines. Carbon-intensive firms, on the other hand, shows a U-shaped relationship between ROCE and indirect emissions implying that in the short-term, such indirect emissions result in further decline in ROCE but after a while, its influence on ROCE declines causing the returns to increase again.

Table 12: Non-Linear Relationship with Market Based Financial Performance

Variables	(1) Tobin's Q *Non-Carbon*	(2) Tobin's Q *Carbon*	(3) M2B *Non-Carbon*	(4) M2B *Carbon*	(5) Stock Price *Non-Carbon*	(6) Stock Price *Carbon*
LogSC1	1.981***	-5.614***	0.272	-1.203***	0.031	-0.131*
	(0.435)	(0.431)	(0.239)	(0.130)	(0.023)	(0.053)
LogSC1^2	-0.069**	0.217***	-0.018	0.036***	-0.011	0.005**
	(0.023)	(0.017)	0.013	(0.005)	(0.001)	(0.002)
LogSC2	1.780	-5.898***	-5.500***	0.075	0.189**	0.137*
	(1.045)	(0.410)	(1.300)	(0.187)	(0.062)	(0.061)
LogSC2^2	-0.037	0.259***	0.262***	-0.037	-0.010**	-0.001
	(0.051)	(0.017)	(0.062)	(0.007)	(0.003)	(0.002)
Water	-0.841	-1.072**	-0.054	-0.104	-0.110	-0.144**
	(0.905)	(0.524)	(0.529)	(0.178)	(0.062)	(0.046)
Water ^2	0.016	0.019**	0.002	0.002	0.002*	0.003***
	(0.015)	(0.009)	(0.009)	(0.003)	(0.001)	(0.001)
RR	-0.214***	0.049	0.040	0.005	-0.007*	0.006
	(0.048)	(0.035)	(0.032)	(0.010)	(0.003)	(0.004)
RR^2	0.002***	-0.001**	-0.001	-0.001	0.001**	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
FL	0.004	-0.623***	0.500***	0.537***	-0.017***	-0.120***
	(0.038)	(0.156)	(0.156)	(0.124)	(0.004)	(0.028)
GR	0.576***	2.730*	-0.141***	0.125	-0.003	0.489***
	(0.127)	(1.418)	(0.043)	(0.241)	(0.003)	(0.116)
FS	-2.615***	-1.900***	-0.875***	-0.031	0.066***	0.236***
	(0.119)	(0.304)	(0.205)	(0.094)	(0.015)	(0.024)
BS	0.433***	0.667***	0.205**	0.156***	0.073***	0.040***
	(0.073)	(0.109)	(0.103)	(0.034)	(0.009)	(0.014)
BD	0.040***	-0.009	0.027***	0.012***	0.002**	0.003***
	(0.006)	(0.009)	(0.010)	(0.003)	(0.001)	(0.001)
CI	-0.055***	-0.074	-0.051	0.018	-0.015***	0.012
	(0.017)	(0.058)	(0.038)	(0.073)	(0.002)	(0.011)
CEO Duality	-3.379***	-1.033	-0.308	-1.217***	-0.332***	-0.182**
	(0.546)	(0.662)	(0.793)	(0.237)	(0.056)	(0.076)
Constant	45.02***	48.06***	18.42**	4.386	4.230***	1.738***
	(9.887)	(4.895)	(9.250)	(2.979)	(0.274)	(0.492)
Observations	551	375	551	375	551	375
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.34	0.28	0.21	0.26	0.23	0.21

Panel Corrected Standard Errors (PCSE) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Yet, the upsurge in returns causing the U-shaped curve might not have been substantial enough to cause a steep shape as compared to the sharp decline in the returns when emissions increased. An intriguing result was found when the non-linear relationship between ROS and scope 1 emissions were examined. Though both categories of firms had a non-linear connection, those in the non-carbon intensive firms had a U-shaped link while the carbon-intensive firms revealed an inverted U-shaped relationship. From figure 8, one could deduce that profits and sales of carbon-intensive firms all suffer a significant loss when firms increase their direct emissions in the long-term but not the short run.

ROS in the carbon-intensive firms starts at the lowest point when corporate scope 1 emissions begin to increase, after a short while; the effect on ROS appears to be eliminated as it increases in value. The returns then rise to a point and drops when the quantity of emissions appears to have gone beyond average tonnes and tends to slide lower than the initial starting value of ROS. However, those firms with activities which are not carbon-intensive experience a different impact on sales and profit when scope 1 emissions shoot up.

In the short-run, it was observed that ROS dropped sharply at the increase in emissions, reached a base and started to increase again in the long run. This could lead to the inferrence that customers continue to patronise goods and services in the non-carbon intensive firms after they perceive that the companies have been penalised enough when the ROS reaches the lowest point. This argument can be backed up by the stakeholder theory where in addition to shareholders; other interested parties need equal attention. Equivalently, scope 2 emissions relationship with ROS also showed non-linearity among both categories of firms. Nonetheless, a slight distinction can be made between the two scopes of emissions. It is apparent that returns on sales for carbon-intensive firms started on a higher note but started to decline quickly when emissions increased. This suggests that in the short run, returns were not affected by firms in those categories but after the realisation of escalation in electricity used emissions, it is likely that customers decided to boycott the products/services and patronise less. Also, in the non-intensive firms, the increase in ROS could not record a high value as compared to the previous values of low emissions.

Regarding the relationship between ROA and GHG emissions, contrasting results were found. For instance, when ROA and direct emissions were paired to identify the non-linear relationship existence, a negative association was discovered. Perhaps the results were found to be coherent for both categories due to the nature of assets and the measurement criteria used in calculating ROA. That is, since total assets cover both non-current and current assets, it is not likely for the value to decline to a shallow base even in the face of an increase in direct emissions. Accordingly, it is seen that a reduction in the ROA is not as rapid as noted in the earlier graphs in both categories of firms. Nonetheless, it is also pertinent to point out that ROA in the carbon-intensive firms reacts to increase in scope 1 emission in the long run whereas the non-carbon intensive firms do so in the short run.

In figure 9, the lowest value of ROA was recorded for the carbon-intensive firms as emissions started on a higher quantity note when compared to non-carbon intensive firms. Suggestively, one could conjecture that at the first instance, most of the assets were utilised in production, but fewer returns on sales were made because most products might not have been ready for procurement in the short period. In other words, it is likely that products manufactured do take some more time to mature before putting up for sale. Also, it could be associated with the fact that these firms may have to make considerable investments in efficient machinery and other forms of assets to get products and services delivered with the brand of environmental friendliness for increased revenue.

For scope 2 emissions and ROA, it was found that ROA of the non-carbon intensive firms drop to the lowest when these emissions increase before it starts rising. It is also observed that the intensive firms get penalised when their emissions from electricity consumption rise. However, the returns in these firms do not drop to the lowest in the event of an increase in emissions when compared to that of the non-carbon intensive firms. It could be asserted that in the case because assets are used more in generating goods that emit direct emissions, their relative importance placed on indirect emissions is low.

On a further note, because the non-carbon intensive firms are not necessarily involved in emitting more direct GHG, companies would want to achieve more regarding profit and proper management or assets. Thus, an increase in emissions would not be appreciated under such circumstances in the short-term, nevertheless, in the long run, ROA picks up and starts increasing at a slow pace which makes it difficult to reach the peak it was before dropping. These findings are consistent with that of Fujii et al. (2013) who also found an inverted U-shaped relationship between ROA and carbon emissions.

It is likely that any of the variables used in measuring ROA could have been affected by GHG emissions. For instance, there is a high possibility the firms' net income could be affected by both direct and indirect emissions depending on the intensity level. In this sense, customers might have withdrawn from patronising companies' products, or perhaps expenses might have gone up because of emissions charges. In a nutshell, efforts to improve environmental operational performance attracts increasing economic and financial benefits at the onset of direct emissions, but beyond a point, it turns to be a one of trade-off relationship as noticed from the results of Tatsuo (2010). Tobin's Q reacted similarly as ROCE to scope 1 GHG emissions when the non-linearity in their relationship was studied. In the short-term, carbon-intensive firms experienced reduced Tobin's Q value as direct emissions quantity increases. It can be seen from Table 8 that the marginal reduction and increase in Tobin's Q when direct emission quantity expands appears to be slightly slow among non-carbon intensive firms when compared to the sharp decline in Tobin's Q among carbon-intensive companies. It could be deduced that the carbon-intensive firms suffered a significant amount in their firms' value when scope 1 increases until it reached the lowest point where Tobin's Q might almost be equal to zero.

Indirect emission from the use of electricity was observed to have a non-linear relationship with Tobin's Q among the carbon-intensive and non-intensive firms. Undoubtedly, the carbon-intensive firms tend to have their Tobin's Q decrease in value upon the realisation of increase in GHG emissions. The value of Tobin's Q does not rise to make a complete U-shape because those firms with high carbon intensity are expected by stakeholders to be responsible towards the environment primarily by releasing less scope 2 emissions due to the organisational operations which are more of direct emissions than indirect. The non-carbon intensive firms, on the other hand, appeared to have their Tobin's Q react to increase in emissions in the long run than short. The increase in Tobin's Q in the short-term and the fall in the value in the long-term when related with scope 2 emission is observed to be quite sharp and steeper than that of scope 1 emissions. Though the findings are similar to that of Misani and Pogutz (2015) who found that the highest financial performance of firms in the non-carbon intensive sectors is achieved when carbon emissions performance is at the intermediate levels, their study was however concentrated only on carbon-intensive sectors.

The final financial performance measure to analyse alongside scope 1 emission is the market-to-book value. Both categories of firms showed a sharp decline in M2B upon the increase in direct emissions. This can be related to the fact that the stock-market places much emphasis and relevance on GHG emissions and when the direct emissions are not managed well but escalate, the market then penalises the companies no matter whether their activities are carbon intensive or not. Figure 11 in the appendix shows the pictorial presentation of how the market reacts. There is a slight non-linearity in among both firm categories.

Upon further consideration of figure 11, an inference could be made that a possible U-shaped relationship might happen in a much longer-term among the carbon-intensive firms. This may be possible because those firms might reduce the percentage increase in their direct emissions and perform better in other aspects of the business which would then run the market-to-book value up despite the minimal addition in emissions. The result for the non-carbon intensive firm could be related to the fact that emissions in these firms are not expected to be huge and increasing at a faster rate. Consequently, the Stock market reacts negatively to companies in such category who do not take measures to reduce their GHG emissions.

To expound more on all the findings presented above, the current study supports the argument by Misani and Pogutz (2015) that deeper understanding of the appropriate time to develop environmental policy or implement environmental management practice is vital to controlling organisational impacts on the environment. Evidently, companies that are responsive to reducing their environmental impacts through a reduction in GHG emissions, water and natural resource use benefits financially at some point whether in short or long-term. It is also imperative to note that both U-shape and inverted U-shaped relationships between environmental operational performance and financial performance are substantiated according to the sector a firm operates it, the specific operational activities and the carbon intensity of the activities.

In the case where manufacturing and production firms, for instance, invest in efficient equipment, they might emit less GHG which would cause their capital productivity to fall temporarily but after a while due to competitive nature of green products, companies' revenue will start increasing alongside reduction in emissions whether direct or through energy consumption (Fujii et al., 2012). It is worth noting that resource efficiency does have an impact on the quantity of emissions emitted however when resource slack sets in, financial benefits from such efficiency starts diminishing. From the perspective of resource-based view theory, environmental performance should be aligned with resources as all the environmental operational performance variables can be linked to one natural resource or the other (Yu and Ramanathan, 2015).

7.2.5 Mediation Analysis and Discussion

Table 13 below shows the results from the Sobel-Goodman tests carried for mediation analysis. Considering the fact both environmental operational and environmental management performances have influences on corporate financial performance measures, the perceived conception that EMP influences financial performance through its effect on EOP was examined. Results of direct, indirect effects and total mediation are shown using scopes 1 and 2 GHG emissions as the mediating variables are presented in Table 13. Though other EOP measures such as water consumption and resource use reduction performance had an influential relationship with corporate financial performance proxies, none of them appeared to have more than 30% total mediation effect and was therefore excluded from the results shown. The threshold to claim a total mediation effect is asserted in existing literature to be 40% or over (Gunzler et al., 2013).

The first step was to find out which environmental management performance variables had a significant impact on CFP proxies, i.e., the direct effects. It was found that environmental policies had a substantial association with ROA, Stock price and Tobin's Q. Environmental processes also had a relationship with Stock price, ROCE and Market-to-book. Environmental monitoring is linked to Stock price, ROCE and Tobin's Q while environmental management systems recorded significant relationships with Stock price, ROCE and ROS. It was observed that all four EMP proxies (i.e., TPS, TPRS, TMS and TEMS) had a significant relationship with Stock price which signifies the relevance placed on it as a market-based financial performance measure.

To proceed with the mediation analysis, the current study tested the individual indirect mediation effect of scope 1 and scope 2 GHG emissions. Using scope 1 as the mediator variable, it was found that environmental policies, monitoring, processes and management systems relationship with financial performance were mediated. There was a total mediation of 79% by scope 1 emissions on the EMS and Stock price relationship implying that before EMS have any notable influence on a company's Stock Price, direct emissions have to be improved to some extent. The next highest total mediation effect of 77% was found between environmental policies and ROA where the establishment of policies would lead to lesser direct emissions which would then positively improve ROA. Environmental processes had a mediated relationship with Stock Price and ROCE with 43% and 47% total mediation respectively.

On the other hand, when scope 2 GHG emissions were used as the mediated variable, it was found that environmental policies, monitoring, management systems and processes had a significant association with corporate financial performance. Again, stock prices appeared to be the only financial performance measures that were influenced by all the environmental management performance variables followed by Tobin's Q with a relationship with policies, monitoring and EMS. Establishing environmental policies seemed to motivate a reduction in scope 2 emissions which then might have led to the improvement in companies' stock prices in a fully mediated relationship of 72%. Apart from environmental policies which had a significant relationship with two market-based measures and no accounting-based measure, the other EMP proxies had at least one statistically significant relationship with accounting-based measures alongside the market-based performance measures. For example, the relationship between environmental monitoring score and ROCE, EMS versus ROCE and ROS, environmental processes and ROCE were all fully mediated by scope 2 GHG emissions.

Table 13: Mediation Results of EOP of EMP and CFP Relationship

Variables Relationship	Standardized Coefficient	T-value	Total Mediation
Direct effects			
TPS → ROA	-0.20	-0.96	
TPS → STOCK PRICE	4.50	3.62	
TPS → TOBIN'S Q	-0.06	-3.88	
TPRS → STOCK PRICE	3.44	3.27	
TPRS → ROCE	-0.02	-1.37	
TPRS → MARKET TO BOOK	-0.06	-1.90	
TMS → STOCK PRICE	0.18	9.68	
TMS → ROCE	-0.04	-1.36	
TMS → TOBIN'S Q	-0.03	-3.03	
TEMS → STOCK PRICE	3.65	3.82	
TEMS → ROCE	0.03	12.45	
TEMS → ROS	0.17	0.95	
Indirect and Total Mediation: Scope 1			
TPS → SC1 → ROA	0.39	2.61	-0.77
TPS → SC1 → STOCK PRICE	58.40	6.40	0.49
TMS → SC1 → ROCE	-0.37	-2.92	0.50
TPRS → SC1 → STOCK PRICE	59.34	6.60	0.43
TPRS → SC1 → ROCE	-0.37	-2.93	0.47
TEMS → SC1 → STOCK PRICE	59.62	6.05	0.79
Indirect and Total Mediation: Scope 2			
TPS → SC2 → STOCK PRICE	85.94	6.59	0.72
TPS → SC2 → TOBIN'S Q	-0.60	-3.85	0.40
TMS → SC2 → STOCK PRICE	79.76	12.65	0.40
TMS → SC2 → ROCE	-0.41	-2.28	0.53
TMS → SC2 → TOBIN'S Q	-0.66	-4.30	0.45
TEMS → SC2 → ROCE	-0.39	-2.08	0.49
TEMS → SC2 → STOCK PRICE	84.97	6.50	0.68
TEMS → SC2 → ROS	-0.54	-2.16	-0.83
TEMS → SC2 → TOBIN'S Q	-0.67	-4.28	0.63
TPRS → SC2 → MARKET TO BOOK	-0.91	-2.19	0.40
TPRS → SC2 → STOCK PRICE	86.70	6.77	0.70
TPRS → SC2 → ROCE	-0.41	-2.26	0.58

7.3 Robustness Tests

Further tests were carried out for robustness purpose and to deal with possible biases towards the environmental performance proxies used in testing the relationship between corporate financial performances. This allows the justification of the argument made by Trumpp et al., (2015) that corporate environmental performance should be assessed multi-dimensionally and not to focus on one proxy.

7.3.1 CFP Measures Lagged Forward 1 Year

First, the financial performance measures were lagged one year forward to investigate if current EOP performance would have a different influence on future financial performance. Based on the results shown in Table 14, it was found that scope 1 emissions would only a negative impact on ROCE+1 but the positive link with the remaining performance measures (i.e., ROA, ROS, Tobin's Q, M2B and Stock price). The same negative relationship was found for ROCE when the current year's value was shown in Table 9 above. This could imply that firms get penalised on their returns on capital employed when direct emissions increases.

From agency theory perspective, managers are expected to act in the best interest of the company and maximise shareholders wealth. Reducing environmental fines and cutting down costs in addition to maintaining the excellent reputation of a company is very relevant. In the case such as this, shareholders may sell their stocks upon the realisation that companies are damaging the natural environment through an increase in direct emissions and they stand a risk of losing their investment. The flip side of the coin is the inference that due to increase in direct emissions, the liabilities of companies tend to go up as a result of environmental fines and taxes. Consequently, ROCE will reduce in value and keep declining even in the subsequent year. The other financial performance measures contradict the hypotheses but similar to findings from Teles et al. (2015), Nakao et al. (2007), Pulver (2007) among others. One could also attribute the results to that fact that majority of the firms studied are not in the carbon-intensive sectors thus, the hypothesised negative relationships were not confirmed.

Table 14: CFP Measures Lagged One Year Forward

VARIABLES	(Model 1) ROA+1	(Model 2) ROS+1	(Model 3) ROCE+1	(Model 4) TQ+1	(Model 5) M2B+1	(Model 6) Stockprice+1
LogSC1	0.865***	0.139	-0.114	0.629**	0.436**	0.916
	(0.271)	(0.285)	(0.210)	(0.261)	(0.222)	(17.58)
LogSC2	-1.311***	0.269	0.638**	1.019**	0.870	89.21**
	(0.405)	(0.432)	(0.287)	(0.421)	(0.955)	(40.18)
Water	-0.109	0.124	0.189	0.124	0.026	11.28
	(0.331)	(0.126)	(0.128)	(0.096)	(0.117)	(9.307)
RR	0.003	-0.008	-0.027**	-0.011	-0.037	-1.491
	(0.017)	(0.020)	(0.014)	(0.021)	(0.035)	(1.261)
FL	-0.118	-0.028	0.188**	-0.108	0.243	-22.80***
	(0.086)	(0.162)	(0.088)	(0.138)	(0.333)	(5.833)
CI	0.061	0.053	0.139**	0.411*	0.105	-13.03***
	(0.066)	(0.095)	(0.068)	(0.226)	(0.079)	(3.998)
GR	-0.183	0.530**	0.307	-0.050	-0.320***	-11.20*
	(0.117)	(0.221)	(0.223)	(0.231)	(0.121)	(6.513)
FS	0.757*	-1.594***	-1.543***	-6.220***	-1.956***	-20.44
	(0.412)	(0.521)	(0.425)	(1.325)	(0.657)	(33.66)
BD	-0.057***	0.029	0.009	0.0774**	0.046*	0.517
	(0.021)	(0.025)	(0.019)	(0.0361)	(0.025)	(1.462)
BS	-0.252	0.360	0.684***	2.205***	0.874**	62.25***
	(0.235)	(0.235)	(0.187)	(0.452)	(0.398)	(15.12)
CEOD	3.932**	-3.518*	0.208	-4.581**	-1.455	31.41
	(1.713)	(1.920)	(1.482)	(1.952)	(0.896)	(108.5)
Constant	16.31	49.85***	30.87***	104.6***	31.85**	-606.7
	(18.43)	(11.07)	(9.776)	(21.50)	(12.79)	(710.6)
Obs	925	925	925	925	925	925
R-squared	0.13	0.18	0.20	0.17	0.21	0.25
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	No	No	No	No	No	No

Panel Corrected Standard Errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The findings for scope 2 emissions were different when lagged CFP measures were used. For instance, originally, scope 2 emissions were negatively associated with ROA and ROS while positively related with the other measures. However, from Table 14, only ROA+1 recorded a negative relationship with scope 2 emissions. This could imply that ROS starts to decrease immediately after the indirect emissions also start appreciating but a year, the value of ROS begins to increase after a year despite the quantities emitted from that point. On the other hand, the earlier results found for water consumption remains the same where a negative relationship is established between ROA and water usage. On the flip side, resource use reduction rather had a negative relationship with all the variables apart from ROA which completely opposite from the previous results. Previously, stock prices did not fall with a poor resource use performance, however, after a year, stock prices start to decrease upon a decline in the resource use performance.

7.3.2 CEP Measures Lagged Backwards 1 Year

Due to the interesting findings after a forward lag in the CFP measures, it became relevant for the reverse situations to be considered as well. That is, the environmental operational performance was lagged a year backwards to investigate if the previous year's performance has a significant influence on the current year's financial performance. The findings were presented in Table 15 below where it appears that even after a year, some financial measures of firms would not be significantly and adversely affected by an increase in emissions or worse environmental performance. For instance, Stock Price, which formerly was found to be positively associated with scope 1 emissions had a negative relationship after the emissions variable was lagged one year backwards. This could imply that though investors and shareholders may not want to penalise firms' right at the onset of realising their poor performance in dealing with carbon emissions, yet after some time, they start to withdraw their interests in the companies' stocks. ROCE, on the other hand, maintained its relationship with scope 1 emissions despite the lagging effect. It appears that the business equity and current assets tend to decrease or perhaps liabilities pile up because of emissions taxes and environmental fines that a company would have to face under such circumstances. Though the hypothesised relationship was found for these two measures, none was statistically significant. Therefore this study cannot emphasise strongly that such relationship would occur throughout.

With scope 2 indirect emissions, the accounting-based measures ROA and ROS were found to have a negative relationship as expected. Market-to-book value also recorded a negative relationship with scope 2 emissions which signifies that if companies do not take great caution when increasing emissions from electricity consumption, they stand at a risk of getting undervalued in the market from customer and competitor perspectives.

Table 15: Environmental Operational Performance Lagged One Year Back

VARIABLES	(1) ROA	(2) ROS	(3) ROCE	(4) Tobin's Q	(5) M2B	(6) Stock Price
Scope1 – 1	0.572**	0.503*	-0.033	0.251	0.208	2.446
	(0.263)	(0.282)	(0.202)	(0.222)	(0.232)	(18.95)
Scope2 – 1	-0.493	-0.298	0.177	0.661*	-0.508	39.67
	(0.389)	(0.418)	(0.273)	(0.352)	(0.938)	(35.79)
Water – 1	-0.195	0.273*	0.171	0.170*	0.225	14.82
	(0.302)	(0.141)	(0.133)	(0.095)	(0.143)	(9.788)
RR – 1	0.001	0.007	-0.011	0.006	-0.027	-1.496
	(0.017)	(0.019)	(0.014)	(0.020)	(0.025)	(1.229)
FL	-0.218***	-0.035	0.231**	-0.202*	0.806	-23.40***
	(0.082)	(0.175)	(0.097)	(0.114)	(0.504)	(5.794)
CI	0.063	-0.021	0.105	0.325	-0.033	-19.88***
	(0.062)	(0.090)	(0.066)	(0.214)	(0.134)	(3.221)
GR	-0.376***	0.839***	0.352	0.093	-0.294	-6.796*
	(0.082)	(0.186)	(0.225)	(0.221)	(0.204)	(3.629)
FS	0.059	-1.273***	-1.659***	-6.100***	-2.631	64.30***
	(0.358)	(0.449)	(0.400)	(1.106)	(2.059)	(24.67)
BD	-0.049**	0.045*	0.0224	0.096***	0.056	0.159
	(0.021)	(0.024)	(0.019)	(0.036)	(0.037)	(1.419)
BS	0.128	0.203	0.645***	2.111***	0.879	54.48***
	(0.234)	(0.221)	(0.192)	(0.444)	(0.549)	(13.23)
CEOD	2.990*	-4.524**	-0.775	-5.295***	-1.003	46.26
	(1.714)	(1.891)	(1.521)	(1.832)	(1.096)	(111.6)
Constant	29.41*	36.15***	38.28***	104.7***	42.26	2.925***
	(16.85)	(10.87)	(9.668)	(18.17)	(29.34)	(0.667)
Obs	925	925	925	925	925	925
R-squared	0.29	0.16	0.28	0.22	0.14	0.35
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	No

Panel Corrected Standard Errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Water consumption recorded the same relationship with ROA in both cases though not statistically significant. Perhaps, this is because most of the sampled firms do not rely heavily on water usage in providing their goods and services and therefore it is not recognised as a relevant determinant in corporate financial performance assessment. Resource use reduction performance, however, was found to have a negative relationship with only the market-based performance (i.e., M2B and Stock price). Though the found negative relationship was not statistically significant, it still presents a relevant insight into how the Stock market. Thus, it highlights the fact that the Stock market does not pamper firms who undermine the effects and damages of exploiting natural resources. The natural resource-based view theory does apply here where firms are expected to know that resources are scarce and therefore should be used prudently while having the concept of sustainable development in mind. Investors and shareholders who are inclined to this concept would not regard any exploiting company as worthy of investment.

7.3.3 Environmental Performance Score

Following the argument by Trumpp et al. (2015) and Trumpp and Guenther (2017) where they pointed out that CEP should be measured as a multi-dimensional construct, the current study went further to test using a one-dimension construct that represents CEP to see how deviating the results would be if the CEP were measured with a single proxy. As a result, the environmental performance (EP) score collected from ASSET4 ESG was used to represent the overall performance of all environmental activities ranging from GHG emissions to the adopting of environmental management systems. The expectation was that a better environmental performance score would lead to an improved financial performance, i.e., a positive relationship. The results are shown in Table 14 alongside all the six financial performance measures.

It is interesting to find out that only ROA had a statistically significant positive relationship with EP. Other variables such as ROS, Tobin’s and Stock prices also had a positive relationship with EP apart from ROCE and M2B. Using a composite variable like EP makes it challenging to identify the exact aspect of environmental performance that led to a negative or positive relationship. It is likely that any of the measures of EP could have led to the negative relationships found.

This study supports strongly the assertion that a single measure should not be used to represent EP construct. Thus, this thesis does not agree with studies by researchers (e.g., Klassen and McLaughlin, 1996; Vinayagamoorthi et al., 2015) which considered environmental performance to be measured by one representative proxy.

Table 16: Environmental Performance Score as Proxy for CEP

VARIABLES	(1) ROA	(2) ROS	(3) ROCE	(4) Tobin's Q	(5) M2B	(6) Stock Price
Environmental score	0.056**	0.027	-0.031	0.036	-0.061	2.441*
	(0.025)	(0.033)	(0.024)	(0.033)	(0.065)	(1.436)
FL	-0.199**	-0.008	0.199**	-0.138	0.889*	-21.19***
	(0.079)	(0.171)	(0.091)	(0.099)	(0.535)	(5.973)
GR	-0.403***	0.840***	0.392*	0.126	-0.305*	-5.845
	(0.083)	(0.184)	(0.225)	(0.218)	(0.169)	(3.697)
FS	-0.003	-1.120***	-1.482***	-5.510***	-2.520	83.17***
	(0.341)	(0.415)	(0.348)	(1.042)	(1.582)	(19.98)
CI	0.047	-0.055	0.117**	0.241	-0.112*	-21.98***
	(0.057)	(0.078)	(0.058)	(0.201)	(0.059)	(3.023)
BD	-0.054***	0.044*	0.021	0.095***	0.070	-0.758
	(0.021)	(0.023)	(0.019)	(0.031)	(0.050)	(1.415)
BS	0.064	0.123	0.625***	2.013***	0.854*	51.37***
	(0.228)	(0.216)	(0.182)	(0.435)	(0.515)	(12.82)
CEOD	2.994*	-4.596**	-0.513	-5.418***	-1.584	78.64
	(1.681)	(1.849)	(1.490)	(1.740)	(1.190)	-21.19***
Obs	926	926	926	926	926	926
R-squared	0.26	0.16	0.25	0.21	0.14	0.34
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes

Panel Corrected Standard Errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.3.4 Difference between Large and Small Listed Firms

To ensure that the results presented are reasonably interpreted with no biases towards the firms included in the sample from FTSE 350 and FTSE Small Cap indexes, the current study further analyses the CEP-CFP relationship according to the two indexes. 29 firms out of the total sample size are listed on the FTSE Small Cap while 168 are on the FTSE 350 index due to difficulty in accessing CEP date related to the relatively small firms. By so doing, the researcher used two main financial performance measures (i.e., Stock price and ROA) which have been found to have a statistically significant relationship with corporate environmental performance. Also, environmental operational and management performance measures were all used to analyse the different reaction of the firms in the large and small index.

Table 17 shows the results of the relationship between the market-based financial performance measure (i.e., Stock price) and CEP (i.e., EOP and EMP). It can be seen in Model 1 that large firms have a positive relationship between scope 1 emissions and Stock price while a negative association is found for the small firms in model 2. It can also be observed from model 1 that even when large firms emit more direct gases, the stock market fails to penalise them as compared to when small firms do same. Indirect emissions, on the other hand, are treated differently by the stock market. Though, it was expected that large companies would suffer losses in their stock prices when scope 1 emissions increase, it appeared that investors and shareholders are more concerned about emissions from electricity consumption instead.

In model 2, these small firms are penalised for increased scope 1 emissions, water consumption and resource use by shareholders. It is likely that small firms suffer these financial losses due to their relative low inflow of income and revenue. Consequently, a little nudge in their activities where environmental fines and costs increase for such firms, investors tend to start withdrawing their funds to avoid losses. There is a high possibility that these small firms are not punished for increasing scope 2 emissions perhaps due to the relatively small quantity they might emit when compared to large firms.

Table 17: CEP and Market Measure (Difference between Large and Small Firms)

VARIABLES	EOP Measures and Stock Price		EMP Measures and Stock Price	
	(1)	(2)	(3)	(4)
	Large Firms	Small firm	Large Firms	Small Firms
Scope 1	33.48*	-17.59		
	(18.13)	(66.71)		
Scope 2	-15.95	55.82***		
	(32.48)	(185.6)		
RR	-1.156	-13.83**		
	(1.030)	(6.455)		
Water	17.73*	-10.11		
	(9.555)	(361.9)		
TMS			1.971***	5.223
			(0.715)	(3.295)
TOS			4.752***	-5.594
			(0.984)	(6.759)
TPS			0.252	11.25**
			(1.249)	(5.238)
TPRS			-0.497	3.142
			(1.131)	(4.056)
TEMS			1.683	7.200
			(1.097)	(5.556)
FL	-19.69***	-39.87**	-19.01***	-33.30**
	(5.235)	(16.59)	(5.366)	(15.64)
GR	-10.49***	-20.80	-10.57***	34.38
	(3.993)	(22.24)	(3.634)	(13.23)
FS	42.51*	-46.06*	70.91***	30.11
	(23.56)	(27.34)	(20.41)	(99.45)
BS	40.39***	22.17***	26.18**	21.31***
	(11.91)	(55.03)	(11.99)	(68.88)
BD	0.360	-5.475	1.322	-0.343
	(1.508)	(4.803)	(1.448)	(6.135)
CI	-16.42***	44.42	-21.24***	49.01
	(3.159)	(64.77)	(3.223)	(66.14)
CEOD	-22.64	11.74**	-16.27	45.63
	(11.20)	(53.15)	(10.45)	(49.47)
Adjusted R^2	0.21	0.46	0.11	0.28
No. of firms	169	28	169	28
Industry Effects	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes

Panel Corrected Standard Errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Regarding the control variables, it was found that financial leverage, gearing ratio, capital intensity and CEO duality have negative associations with the stock price of the firms listed on FTSE 350. Firm size, board size and board duality, instead, had a positive relationship with stock price. It could be pointed out here that investors prefer companies whose liabilities, for instance, are less to those with the high gearing percentage. Firms should be able to make good use of equity source of finance than borrowings in this context.

Also, CEOs are expected to stick to their specific roles in ensuring the overall management and performance of the company is in line with set targets. That is, keeping a dual role by being a CEO and taking another role on the corporate board may affect individual performance and bring about principal-agent problems. A CEO with a dual role may end up looking out for their private interest which would conflict with the primary goal of shareholders. It is worth noting that as female directors increase on the board, firms' financial performance also increases. It has been argued by Konadu (2017) that female gender board diversity is critical for corporate financial performance. According to her, this is due to the sensitive and thorough nature of women where they want to ensure that everything they get involved in yield positive returns. However, this reasoning appears to work only for large firms but not the small firms as a negative relationship was found for firms listed on the FTSE Small Cap index.

Models 3 and 4 on Table 17 show the results of EMP proxies and stock price analysis grouped into large and small firms. For the large firms, environmental monitoring and objectives were found to statistically significant and positively related to stock price while environmental policy score is the only variable that is in line with the initial hypothesis in the small firms. The results of the remaining variables were as hypothesised though not statistically significant in the small firms. However, with the large firms, it was found that environmental processes were somewhat negatively linked with instead of the hypothesised positive relationship. Finding a positive relationship between CEO duality and stock price among the small firms could be attributed to the fact that these firms do have relatively small board sizes and operational scope and therefore having the CEO to play an extra role would likely save some time and costs.

Firm size for firms listed on both indexes was found to have positive impact on companies' stock prices. Such findings could probably be as a result of investors' interest in growing businesses, and therefore expansion attracts them to invest more funds. Though the firms listed on the FTSE All-Share are not in the small and medium enterprise category, it is imperative to note that their sizes are not the same and therefore would yield different results when analysed individually as shown in Tables 17 and 18.

Using the ROA as the accounting-based measure, Table 18 presents the relationship between it and CEP among the two categories of firms. Both large and small firms exhibited the same positive relationship with scope 1 and negative with scope 2. Nonetheless, the coefficients found for both scopes of emissions were not statistically significant for the small firms. This implies that profits or total assets are barely reduced when direct emissions are increased during operational activities. On the other hand, it appears that emissions arising from the consumption of electricity are harmful and dangerous to firms ROA. Such effect could be from a decrease in sales revenue due to the inefficiency tag that customers may attach to products. Also, increase in water consumption also recorded a negative relationship with ROA for both firms signifying that businesses need to reduce their use of water should they want to improve their financial performance.

Both categories of firms were found to have a positive relationship between ROA and environmental monitoring, objectives and management systems. Though environmental objectives were hypothesised to have a negative influence on financial performance, it appears that such objectives rather indicate the willingness to carry out better measures and therefore impacts on finances positively. Environmental policies, on the other hand, were found to have a negative influence in both firm categories which is contradictory to the hypothesis (H6b). Perhaps, unless the policies are implemented, firms are not recognised to be making intense efforts to improve their environmental performance.

One interesting finding was that board diversity was found to be negatively related with ROA for both categories of firms when EOP and EMP measures. Despite the anecdotal evidence in existing literature supporting the positive influence that female directors have on firms' financial performance, it appears such result only applies when market-based measures are used instead of accounting-based measures. Capital intensity, on the other hand, was found to be positively related throughout the models. It is because ROA has some capital elements embedded in the measurement and therefore the higher those assets, the higher the returns yielded eventually.

Table 18: CEP and Accounting Measure (Difference between Large and Small Firms)

VARIABLES	EOP Measures and ROA		EMP Measures and ROA	
	(1)	(2)	(3)	(4)
	Large Firms	Small firm	Large Firms	Small Firms
Scope 1	0.834***	2.019		
	(0.272)	(1.268)		
Scope 2	-1.015**	-0.986		
	(0.422)	(1.565)		
RR	-0.008	0.062		
	(0.0180)	(0.060)		
Water	-0.162	-0.469		
	(0.307)	(3.661)		
TMS			0.029**	0.032
			(0.013)	(0.044)
TOS			0.014	0.151**
			(0.018)	(0.066)
TPS			-0.034	-0.110
			(0.030)	(0.080)
TPRS			0.015	-0.018
			(0.021)	(0.049)
TEMS			0.019	0.122**
			(0.018)	(0.052)
FL	-0.175**	0.131	-0.183**	-1.979
	(0.077)	(1.425)	(0.074)	(1.490)
GR	-0.412***	2.301	-0.395***	7.027***
	(0.086)	(2.102)	(0.086)	(2.463)
FS	0.177	-1.959	0.203	0.168
	(0.422)	(2.676)	(0.372)	(1.087)
BS	0.339	-1.302	0.267	-0.999
	(0.233)	(0.810)	(0.233)	(0.844)
BD	-0.044**	-0.015	-0.054**	-0.060
	(0.021)	(0.068)	(0.022)	(0.074)
CI	0.055	2.702***	0.009	1.829***
	(0.062)	(0.677)	(0.056)	(0.532)
CEOD	2.300	-2.427	2.428	-8.033
	(1.735)	(6.366)	(1.797)	(6.561)
Adjusted R-squared	0.22	0.10	0.23	0.26
No. of firms	169	28	169	28
Industry Effects	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes

Panel Corrected Standard Errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.3.5 Corporate Governance and CEP Interaction Effect

Following arguments by researchers such as Levrau and Van den Berghe (2007) and Conger and Lawler (2009), it is essential to explore the interaction effect of corporate governance and environmental performance variables when investigation the impact on corporate financial performance. Most studies (e.g., Dalton et al., 1998; Golden and Zajac, 2001; Coles et al., 2008, Conger and Lawler, 2009) explored the relationship between corporate governance and firm value distinctively from that of corporate governance and environmental performance. Though there was no multicollinearity issue among the independent variables from the VIF tests, however, the possible interacting effect cannot be overlooked. Table 19 below shows the results of the interacting effect indicating which financial performance variable is positively or negatively related to environmental performance.

Table 19: The Interaction Effect of Corporate Governance Variables

VARIABLES	(1) ROA	(2) ROS	(3) ROCE	(4) Tobin's Q	(5) M2B	(6) Stock Price
LogSC1	**-0.788** **(0.602)**	**-1.105** **(0.726)**	**0.879** **(0.539)**	**-1.243***** **(0.347)**	**1.098***** **(0.228)**	**14.25** **(26.56)**
*LogSC1 * BS*	*0.204**** *(0.058)*	*0.075* *(0.067)*	*-0.149**** *(0.045)*	*0.115**** *(0.029)*	*-0.075**** *(0.021)*	*4.408** *(2.589)*
*LogSC1 * BD*	*-0.006* *(0.005)*	*0.001* *(0.006)*	*-0.002* *(0.005)*	*-0.014**** *(0.003)*	*0.004* *(0.002)*	*-0.559*** *(0.229)*
*LogSC1 *CEOD*	*-1.044*** *(0.414)*	*0.736* *(0.471)*	*0.766*** *(0.362)*	*1.121**** *(0.224)*	*-0.308** *(0.169)*	*-32.97*** *(15.91)*
LogSC2	**1.030** **(0.976)**	**1.103** **(1.057)**	**-2.557***** **(0.732)**	**0.077** **(0.461)**	**-1.777***** **(0.347)**	**-16.59** **(37.64)**
*LogSC2 * BS*	*-0.255**** *(0.091)*	*-0.068* *(0.091)*	*0.349**** *(0.065)*	*0.062* *(0.039)*	*0.204**** *(0.033)*	*-1.379* *(3.805)*
*LogSC2 * BD*	*0.021**** *(0.007)*	*-0.019*** *(0.008)*	*0.002* *(0.007)*	*0.016**** *(0.005)*	*-0.007** *(0.004)*	*0.599* *(0.373)*
*LogSC2 * CEOD*	*0.399* *(0.632)*	*0.330* *(0.760)*	*-0.750* *(0.534)*	*-1.299**** *(0.363)*	*0.099* *(0.220)*	*77.50**** *(28.30)*
Water	**-0.639** **(1.819)**	**-6.352**** **(2.478)**	**-3.333**** **(1.418)**	**1.117** **(1.079)**	**1.140** **(0.858)**	**40.92** **(62.86)**
*Water * BD*	*0.038** *(0.021)*	*-0.006* *(0.023)*	*-0.027** *(0.014)*	*0.004* *(0.010)*	*0.010* *(0.010)*	*0.433* *(0.634)*
*Water * BS*	*-0.116* *(0.168)*	*0.015* *(0.209)*	*0.236** *(0.122)*	*-0.075* *(0.083)*	*-0.106* *(0.085)*	*-5.169* *(5.831)*
*Water * CEOD*	*-0.502* *(1.421)*	*6.675**** *(1.809)*	*2.280*** *(1.078)*	*-0.295* *(0.868)*	*-0.479* *(0.517)*	*10.26* *(48.46)*
Resource Red.	**-0.004** **(0.031)**	**0.157***** **(0.043)**	**0.053**** **(0.027)**	**-0.023** **(0.016)**	**-0.016** **(0.015)**	**0.698** **(1.536)**

*RR * BD*	*-0.001* *(0.001)*	*0.001* *(0.001)*	*0.001*** *(0.001)*	*-0.001*** *(0.001)*	*-0.001** *(0.001)*	*0.012* *(0.015)*
*RR * CEOD*	*-0.006* *(0.031)*	*-0.122**** *(0.038)*	*-0.092**** *(0.021)*	*0.049**** *(0.014)*	*0.021*** *(0.010)*	*2.072** *(1.155)*
*RR * BS*	*0.001* *(0.003)*	*-0.008*** *(0.004)*	*-0.004* *(0.003)*	*0.001* *(0.001)*	*0.001* *(0.002)*	*-0.406*** *(0.160)*
BD	**-2.111**** **(1.058)**	**0.500** **(1.192)**	**1.399*** **(0.732)**	**-0.196** **(0.495)**	**-0.391** **(0.495)**	**-24.20** **(32.43)**
BS	**6.636** **(8.648)**	**0.073** **(10.73)**	**-13.46**** **(6.261)**	**2.564** **(4.249)**	**4.257** **(4.373)**	**302.3** **(297.3)**
CEOD	**33.60** **(73.01)**	**-349.0***** **(92.73)**	**-111.9**** **(55.09)**	**11.96** **(44.52)**	**23.64** **(26.55)**	**-1.108** **(2.467)**
FS	**0.306** **(0.213)**	**-1.510***** **(0.287)**	**-2.064***** **(0.174)**	**-3.090***** **(0.115)**	**-1.294***** **(0.130)**	**44.66***** **(11.60)**
FL	**-0.055** **(0.0496)**	**-0.158** **(0.115)**	**0.112** **(0.072)**	**-0.073*** **(0.044)**	**0.516***** **(0.084)**	**-14.79***** **(3.706)**
GR	**-0.291***** **(0.067)**	**0.877***** **(0.188)**	**0.313** **(0.216)**	**0.494***** **(0.128)**	**-0.161***** **(0.035)**	**-6.018**** **(2.479)**
CI	**0.053** **(0.040)**	**0.021** **(0.044)**	**0.141***** **(0.041)**	**-0.070***** **(0.017)**	**-0.088***** **(0.025)**	**-12.99***** **(1.781)**
Observations	926	926	926	926	926	926
R-squared	0.20	0.16	0.25	0.31	0.27	0.23
Industry Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	No	Yes	No	Yes	Yes	Yes

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Upon the inclusion of all the variables, board diversity (BD) for instance was only statistically significant when controlled for ROA and ROCE relationships with environmental performance. However, when interacted with the CEP variables, the significance of the relationship changed. When scope 1 and BD interacted, a statistically negative relationship was recorded for stock price and Tobin’s Q. On the other hand, scope 2 and board diversity interaction led to a negative influence for ROS and M2B but positive for ROA and Tobin’s Q. The interaction with both water and resource use reduction showed mixed results for accounting-based and market-based measures. Previous studies (e.g., Pelled et al., 1999; Smith et al., 2006; Ahern and Dittmar, 2012; Conyon and He, 2017) also found similar mixed results. With regards to board size, only the negative association with ROCE was statistically significant when examined separately. After the interaction between board size and the CEP variables, it was clear that all the financial performance variables could record a significant relationship when examined individually. In concurrence with the works of Pearce and Zahra (1992) and Golden and Zajac (2001), it can be highlighted that both negative and positive relationship between CFP and CEP could be established when the interaction effects are considered thoroughly.

CEO duality was also found to have a negative and statistically significant association with both ROS and ROCE. However, when explored in interaction with the environmental performance variables, it was discovered that all the financial performance measures could be statistically significant for negative and positive links when examined distinctively (Lam and Lee, 2008; Guillet et al., 2013; Rutledge et al., 2016). These results are contradictory to the findings of Dalton et al. (1996) who concluded that CEO duality has no significant effect on firm performance.

From an analytical stance, constructing an interaction term between corporate governance and environmental performance variables provides extra logical meaning for the model. These findings suggest corporate governance is indeed an important aspect to consider when examining financial and environmental performance. Corporate governance helps to strengthen the influence of corporate environmental performance on financial performance as shown in the results in table 19. In other words, when the structure of a corporate board in terms of size, duality of the CEO, gender diversity and other corporate governance mechanisms are in place, decisions taken during boards meetings will cover both environmental and financial. For example, in the case where directors have to decide whether to implement a particular environmental practice in order to improve their environmental operational performance, they would also have to consider the financial benefits and costs associated. As such, it is likely that the financial benefit would rather motivate them to initiate environmental practices that would improve the overall firm performance.

7.4 Summary and Conclusion

The chapter presented results and analysis of the secondary data in an attempt to answer the research questions that were developed in this thesis relating to the corporate environmental and financial performance relationship. Using a sample of 196 firms from FTSE All-Share index collected from 2009-2015, regression models presented were tested empirically. The statistical tests included descriptive statistics, correlation analysis, Fixed Effect panel modelling and the Sobel-Goodman mediation tests. Robustness of results was checked through running series of different regression models such as lagging of variables, using different proxies and grouping sample size differently. Also, the discussion of results is presented in line with prior literature and theoretical framework to corroborate the underlying supporting evidence.

The descriptive statistics revealed that the average GHG emissions, water and resource use varies according to the sector analysed. For instance, the Oil & Gas Sector had the highest emissions average whereas the Technology Sector recorded the lowest average emissions among the ten ICB sectors. It was also found that emissions by the sectors have been fluctuating within the period under study where the peak and the lowest emissions are recorded in different period depending on the sector under consideration. However, since 2013, it appears that emissions in most of the sectors decreased stipulating that the increased pressure on firms from government and stakeholders notably impacted on overall environmental performance.

Regarding regressions, there was lack of significant relationship between most of the CEP proxies and the financial performance measures. Again, such differences were relative and subjected to specific industries and measures used. For instance, in the Financial Sector, it was found that the direct emissions would adversely impact stock prices whereas ROA, on the other hand, recorded a positive relationship. However, if environmental process score used as the proxy instead of scope 1, a negative relationship would have been substantiated. Most of the insignificant relationships found could imply the inadequacies of practices to improve environmental performance.

When all the sectors were aggregated, most of the corporate governance variables connote that some necessary activities and responsibilities of the board are yet to be given the adequate consideration. Firm characteristics such as size, gearing and financial leverage were statistically significant in most of the regression models. The non-significance in some models tends to cast doubt about the suitability of the financial performance measures used in this study. Notwithstanding this, the results showed significant evidence to support both positive and negative relationship when both CEP and CFP are considered as a multi-dimensional construct. Furthermore, the findings suggest strongly that firms with EMPs in place can either improve or decrease their financial performance depending on the particular measure of financial measure used which confirms the results of Testa et al. (2014) and Perotto et al. (2008). The impact of EPR resonates with the natural resource-based view theory which deals with pollution prevention perspective (Skelton and Allwood, 2013; Hart, 1995; Christmann, 2000). It was also established that whether EMPs are improved or not, they would have consequences on scopes 1 and 2 GHG emissions which would then affect corporate financial performance.

Running the robust tests has given comprehensive insights into how CEP and CFP behave under different circumstances. The current study primarily supports the findings by studies that found positive and those that found negative relationships as well. Empirically, the results have shown that a positive or negative relationship could be found depending on the particular measure of CFP and CEP used.

CHAPTER EIGHT

SUMMARY, CONCLUSION AND RECOMMENDATIONS

8.0 Introduction

Environmental concerns spanning from climate change to the use of natural resources have received wider attention from all spheres of life in recent years. It is no doubt that human activities remain the primary cause of the damage to the environment. Some of these harmful activities are done partly by individuals and partly by corporations and institutions. Government bodies and agencies have taken a peculiar interest in fighting against global warming and other harmful environmental concerns. Among these initiatives are the Climate Change Act 2008 which was enacted in the UK to combat climate change and the mandatory reporting guidance issued by DEFRA (2013) to guide GHG reporting and other critical environmental performance aspects.

Against this, the current study was set out to investigate the relationship between environmental and financial performance of companies in the UK. Mainly, the sectoral analysis was conducted to appreciate how each sector performs when given the same conditions of CEP-CFP. The second part relates to the non-linear relationship within the carbon and non-carbon intensive firms while the third aspect deals with the mediational role played by environmental operational performance on the relationship between EMP and CFP. Overall, the thesis makes some contributions to the existing research on environmental and financial performances which are discussed in-depth in this chapter.

Therefore, in this concluding chapter, a summary, conclusion and recommendations of the current study are presented. The section also provides discussion on some critical policy implications, limitations of the study and possible suggestions for future studies. The remainder of this chapter are organised as follows. Section 8.1 provides the summary of the methodology and research techniques adopted in this study. Section 8.2 presents the summarised findings and contribution of the research. 8.3 summarises the policy implications of the study 8.4 presents the contribution of the study with reference to the findings 8.5 provides a summary of study’s main limitations 8.6 presents a summarised potential insight for future research.

8.1 Data and Research Methodology

The study used secondary data in answering the research questions developed which are: (1) what is the relationship between corporate environmental performance (i.e., EOP and EMP) and financial performance (i.e., Accounting-based and market-based measures) from a sectoral perspective? (2) Is the association between EOP and CFP non-linear in the carbon and non-carbon intensive firms? (3) What is the mediational impact of EOP on the relationship between environmental management performance and CFP? The researcher used secondary data to answer all the questions by estimating panel Fixed Effects. The index for the secondary data was developed by using some of the key aspects of environmental performance from the guidance by DEFRA 2009 and 2013. The study extended the date to 2009 to cover the period from the old reporting guidance through the current legislation in 2013 to 2015

The sample consisted of 196 companies drawn from a population of 634 firms from FTSE All-Share. Two primary selection criteria were adopted in this study: First, all firms with inadequate environmental performance data were excluded from the sample. Second, firms without the necessary data on the corporate financial performance were also excluded from the sample. After following through with sampling criteria only 196 firms qualified with unbalanced data on the needed environmental and financial variables. The Financial firms were not excluded from the overall sample as done in previous studies such as Chithambo (2013) but instead the researcher analysed the possible impact its exclusion and inclusion would have on the final results.

8.2 Findings and Context

The sectoral descriptive statistics indicated that overall, FTSE All-Share companies disclose little information on their environmental performance. Averagely, 30.9% out of the total 634 firms were investigated in this study over a seven-year period. Empirical evidence was found to support the arguments in the literature that there is both positive and negative relationship between CEP and CFP. The current study argues that depending on the financial performance and the environmental performance measures used, either of these directions in the relationships could be confirmed. The discovered results in this thesis are consistent with prior studies (Moore, 2001; King and Lenox, 2001; Wagner et al., 2002; Campos et al., 2015;

Horváthová, 2012; Hatakeda et al., 2012; Busch and Hoffmann, 2007; Hart, 1995; Doda et al., 2015; Melnyk et al., 2003). For instance, some of the results that were confirmed and supported by existing literature include ROA and Environmental operational performance (Delmas and Nairn-Birch, 2011); GHG Emissions (Misani and Pogutz, 2015); Environmental policies (Lambooy, 2011); Environmental processes (Elkington, 1994); Environmental management systems (Campos and Melo, 2008); Water consumption (Barberan et al., 2013); Resource use (Kollikkathara et al., 2009) and environmental management performance (Montabon et al., 2007).

It was also found that when the sampled firms are grouped into carbon-intensive and non-carbon intensive categories, a non-linear relationship runs between GHG emissions and corporate financial performance measures. There were some evidences of U-shaped and inverted U-shaped relationships. For instance, the link between ROS and stock scope 2 GHG emissions was U-shaped for the non-carbon intensive firms but inverted U-shaped for the carbon-intensive firms. The results found by Iwata and Okada (2011) is similar to the current study's findings where the impact on ROS appears not to be significant in the short run for non-carbon intensive firms, but after a while, it starts to decline gently.

Regarding the empirical results found for the mediation analysis, scopes 1 and 2 significantly mediated the relationship between environmental management performance and financial performance. From the initial regression results, it was established that scope 2 emissions association with the financial performance was mostly in line with the study's hypothesis as compared to scope 1 emissions. It therefore was not surprising to discover that scope 2 emissions recorded the highest percentage of total mediation (i.e., 83%) between environmental management systems and returns on sales. EMS has already received greater attention in existing studies where most companies have started working towards achieving the EMS certification to enhance their business status. For instance, Solomon (2005) pointed out that firms with EMS certificates tend to perform better environmentally than those who do not. It was also asserted that influential suppliers and customers are drawn to doing business with companies who have developed EMS and are also implementing the standards and strategies. Thus, this mediation result is very crucial for policy makers and companies to boost their corporate image and attract international stakeholders. Evidently, pressures from stakeholders have been pointed out to be one of the major causes for adopting EMS as backed by Donaldson and Preston's (1995) viewpoint.

The non-significance of some independent and control variables is a hint that there could be some moderation variables that catalyses the effect of those variables on corporate financial performance. Overall, the CEP and CFP relationship cannot be generalised into positive and negative without a conditional effect of the variables adopted, the types of firms and the sectors in which those firms belong.

8.3 Policy Implications and Recommendations

To begin with, the current study contributes to policy debates on what needs to be done to ensure that environmental and financial performance of firms is boosted simultaneously. Out of the environmental performance issues, GHG emission reduction has been the primary focus of most countries in combating global warming effects through efforts to achieve their climate change targets.

First and foremost, the study contributes to the on-going debate on environmental performance reporting and the mandatory GHG emission reporting. As noted in this study, the researcher could not ascertain balanced data on the key environmental performance variables because only GHG emissions were mandated to be reported and not the other environmental issues. Such voluntary disclosure of these environmental issues such as water, resource and material use, biodiversity and emissions to air, land and water is limiting the accessibility to their related information.

Though it is evident that measures to reduce GHG emissions have taken the lead in global discourse, it is no doubt that these other environmental issues are equally very damaging to the environment when not managed properly. Thus, it is quite disheartening to realise that for unbalanced data for those firms over the period, only 196 firms had released their unbalanced data. Peradventure the current study had resorted to using balanced data; probably less than 100 firms out of 694 would have passed the sampling criteria. The current study, therefore, calls for policymakers and interested bodies in the UK to move beyond GHG emissions and include all the environmental aspects of the mandatory requirements. This will ensure that at least the listed firms are accountable to divulge such information to their stakeholders. The results justify this form of intervention from legislators and regulators considering the interest of interested stakeholders and institutions who are rooting for the environment as a whole and not only climate change issues. So far, no study has emphatically pointed out the relevance of full disclosure of these environmental performance variables, but the current study asserts from the findings that developing a new policy in this regard would be regarded as putting the interests of stakeholders first.

On the same policy implication, it cannot be overlooked that neither a positive or negative linear relationship nor a U-shaped nor inverted U-shaped relationship was explicitly concluded due to the different measures and firm categories explored in this study. It could be suggested that policymakers and managers who are in charge of developing corporate policies and strategies to pick out the financial performance measures that would yield positive results when they improve their environmental performance. By so doing, they would not be blinded by the general conflict in existing literature where some support the win-win and other support the win-lose relationship. The fact from the current study's results is that each firm stands at a probability of either benefiting or losing financially from improved environmental performance depending on the form of organisational operations and sectors they are associated with. According to Porter (1980), the business environment itself sets distinct bounds on the profitability and strategies of firms. This includes the bargaining power of customers and suppliers (Porter, 1980), economic conditions (Wilson, 2008) and the industrial structure (Hawawini et al., 1986). In other words, sectors with many customers but few suppliers would have the prices of their products and service being regulated by the suppliers and therefore ensure better environmental performance at this stage would depend on the necessity compared to satisfying suppliers. Regarding economic conditions, during economic breakdowns, businesses would bear the cost of the credit squeeze, and therefore their focus would be on offering generous credit terms to attract clients for business survival (Wilson, 2008). Thus, understanding companies' specific environmental performance measures are paramount in identifying and highlighting the challenges of future regulatory efforts to improving performance (Peters and Romi, 2010). The efficacy of a firm's policy significantly depends on the firm's ability to amass internal resources to support established policies.

The relevance of categorising firms into carbon-intensive and non-carbon intensive in the UK most especially is a step closer to fighting against climate change. It would be a prerogative for regulators to group firms into their carbon intensity levels to track firms' carbon emissions according to their activities. Also, the managerial perception of how their corporate activities impact the environment can potentially assist standard setters to understand how to effect the necessary changes in ensuring emission reduction (Cormier et al., 2014). It would also help to appreciate why some firms do disclose some information regarding the scopes of emissions and others do not. Policy makers and regulators such as the DEFRA could also motivate firms in the non-carbon intensive firms to report on other aspects of environmental performance that their business activities may affect significantly. Thus, another mandatory requirement could be developed for firms in these categories to report on specific environmental issues their companies affect intensely.

The non-linear relationship found also points out the need for policymakers to properly manage the time lag between firms' environmental performance and improved financial performance. This could be done through the effect establishment of inter-relationship with customers and suppliers and also engage in environmental practices that could yield better returns in both the short and long term. Thus, understanding which particular performance would result in an inverted U-shaped instead of U-shaped relationship would enable the discussion of better practices that would rather be financially beneficial to companies. As such, these regulatory highlights in the current study points to the reporting and compliance requirements of environmentally related issues by companies. With a genuine interest in improving companies' performance, uncertainties in efforts to be put in place and the extent of ensuring that companies go all out appears to start from policy intervention.

8.4 Contribution to Knowledge

The primary contribution of this study to the accounting and finance literature is the introduction of the multi-dimensional construct of corporate environmental performance where the study argues that each dimension of CEP affects financial performance differently depending on the specific measure used. The found evidence is that environmental performance should no longer be measured with proxies from only one dimension of the construct but rather both dimensions should be analysed. This study supports the argument by Dixon-Fowler et al. (2013) that the differences in results from CEP-CFP researchers are due to the lack of unified measures. The argument by Trumpp et al. (2015) is strongly supported in this study, and that was the basis upon which CEP was measured in this research. It was found that there is an interrelationship between environmental operational performance and environmental management performance measures. Nonetheless, such interrelationship does not bespeak a substitutional relationship where one could simply select the most preferred indicator for analysis. When Misani and Pogutz (2015) decided to investigate what they termed as process-based and outcome-based measures, they found similar results to that of the current study, thereby confirming that already existing conclusion should not be generalised without further consideration of the measures used.

There was also anecdotal evidence that both the market-based and accounting-based financial performance measures are at some point significantly affected by environmental performance when both operational and management performance measures were used. The results are in line with arguments by Albertini (2013) that companies may record an increase in performance depending on the type of financial measure they employ. Hoopes et al. (2003) also mentioned the need for organisations to explain their performance from the accounting and market perspective which enforces the study by Gentry and Shen (2010). Studies such as Russo and Fouts (1997), Hart and Ahuja (1994) and Gallego-Alvarez et al. (2015) all found empirical evidences to support the view that using accounting-based measures (ABMs) would yield a different result from the market based-measures (MBMs). Gallego-Alvarez et al. (2015) went further to state that using ABMs such as ROA does reflect objectivity and efficiency in the company's profitability. On the other hand, market-based measures have been argued to be the most accurate measure of company financial performance than the ABMs because they measure the income streams present value.

Also, the study proffers statistical evidence to support existing literature that emphasises the impact of firm size on corporate performance. After decoupling the sampled firms into large (i.e., those listed on FTSE 350) and small (i.e., those listed on FTSE Small cap), the results found were different from each other. The findings indicate that companies' analysis should not be done together if the sizes are different despite the control of firm size in the model. It is established in the current study that when firms are grouped by their sizes, the relationship between CEP and CFP differs. For instance, scope 1 emissions were found to be negatively associated with the stock price for small firms but positively related to large firms. The assertion is that large firms are capable of gaining the trust of investors and also to implement measures that would benefit their operations and shareholders without incurring any outrageous related costs. Studies by Dixon-Fowler et al. (2017) and Dogan (2013) all stressed the fact that smaller firms need to put in extra efforts to improve their performance and avert environmental fines and charges.

Finally, the study also contributes to throwing light into the non-linear relationship that has also become the recent argument in the CEP-CFP literature (see, Misani and Pogutz, 2015). Thus, after categorising firms into carbon-intensive and non-carbon intensive, the researcher explored the non-linear relationship that may exist. It was found that whether scope 1 emissions or scope 2 emissions are used, a non-linear relationship of U-shaped (see Barnett and Salomon, 2012) or inverted U-shaped (see Wagner et al., 2002) would be found. It is imperative for managers to coin their environmental practices to suit the impact they expect their environmental performance to have on the financial performance measures. It cannot be said conclusively that market-based measures yield a positive result when related with environmental operational performance due to the different reasons that have been mentioned earlier in this chapter.

There is also the need for management the time lags because sometimes investing in environmental practices may not pay off immediately but would be beneficial in the years to come. If corporate strategic managers hope to reap the financial benefits right after engaging in environmental management activities, then an inverted U-shaped relationship would be suitable. However, if they wish to rather sacrifice current benefits and work towards achieving high performance that would attract investors in the long run, then a U-shaped relationship as established by Barnett and Salomon (2012) and Hatakeda et al. (2012) would be attained.

8.5 Limitations of the Study and Further Research

Though the author’s analysis was thorough and robust, there are a few limitations that cannot be overlooked. The first limitation of the study to mention relates to the sample size used which does not reflect a fair representation of each of the ICB sectors, and therefore a definite sectoral conclusion cannot be made. By fair, if each sector had almost the same number of firms, a sectoral comparison would have been easier to make. The sample is relatively small when compared to the 634 listed firms' population. Even though the sample representation (i.e., 30%) meets the benchmark proposed by Sekaran (2000), a larger size would have been preferred to provide robust evidence, especially, in support of the sectoral analysis. Nevertheless, researchers such as Gallego-Alvarez et al. (2015), Vinayagamoorthi et al. (2015), Misani and Pogutz (2015) and Hart and Ahuja (1994) used sample sizes less than 200, thus supporting the current study's sampled size. Future studies could instead use databases that are comprehensive and extensive to access data to avoid settling for a smaller sample size that may inadvertently affect the reliability and robustness of the research.

Also, the lack of insufficient environmental data from companies listed on FTSE All-Share was a massive drawback in the current study. The researcher in the pilot stages hoped to get data on GHG emissions including scopes 1, 2 and 3; water consumption; resource use performance; environmental policies; environmental processes; environmental objectives; environmental monitoring and environmental management systems from 2009 to 2015. However, it was discovered that only a few firms report on their scope 3 indirect emissions and therefore the researcher was compelled to drop scope 3 as a performance measure. It is worth mentioning that such unbalanced panel data made it impossible for the researcher to investigate how each the CEP-CFP relationship has been since the voluntary requirements and after the mandatory requirements. Prospective studies should not rely only on one database for their environmental performance variables. Other sources such as sustainability and environmental reports could also give data on environmental performance issues.

Another limitation to this study was the fact that causality tests could not be carried out. According to Beyers (1998), the lack of randomisation and repetition nullifies the use of inferential statistics for deducing a causal link thereby placing greater demands on causality descriptive statistics. The test for causal directions has been emphasised recently in literature to be relevant to understanding the relationship between CEP and CFP (Konar and Cohen, 2001; Nakao et al., 2007; Teles et al., 2015). Though the integration of stakeholder theory and the natural resource-based view did not draw causal inferences due to the unbalanced nature of the data, there is still the need to explore causality further. Nonetheless, there are still other studies (see Ziegler and Nogareda, 2009) which could not prove a causal relationship for their environmental management. Investigating to find out a causal relationship is still better than focusing only on the correlations. As such, future studies should strive to access adequate environmental performance variables and run causality tests on them accordingly.

Finally, the study resorted to the use of only secondary data for its analysis. However, it is possible that primary data could have yielded different results and helps explain some of the reasons why there are differences in the findings and that of some existing literature. According to Chithambo (2013), using both secondary and primary data enhances results credibility due to the reinforcement and provides different perspectives that could heighten the understanding of the CEP and CFP relationship. It is recommended that future studies carry out primary research to examine if the contradictions and unconfirmed hypotheses after using the secondary data could be resolved from the findings from the primary data analysis. In such instance, the researcher could decide to use interviews if there are open-ended issues that need to be analysed or administer questionnaires to ascertain the results needed.

8.6 Summary

The study set out to investigate the relationship between corporate environmental performance and corporate financial performance in the UK. The study began with a concise introduction in Chapter 1. The researcher then meticulously reviewed existing empirical literature and uncovered the evolutional developments of environmental performance/management concepts. The research methodology and hypotheses were systematically and logically elucidated. In the preceding chapter, the researcher expounded the empirical findings concomitant to the research objectives. Evidences were found to justify and validate the germane motivations for the current study.

This chapter has highlighted the outstanding contributions of the study and implications for policy, practice and theory. For policymakers, the evidence of non-linear significant relationship is a pointer that strategies and policy interventions should be developed for long-term purposes in order for a win-win to be enjoyed by both companies and the environment. From a practical perspective, the intriguing results from the sectoral analysis would guide firms to engage in the suitable environmental practices that would be financially beneficial. Thus, companies do not have to mimic other companies to feel accepted in the society but could adopt the reasonable best practice and earn societal acceptance. Moreover, stakeholder, natural resource-based view, institutional, contingency, signalling and agency theories formed the rudimentary theoretical framework in explicating the analytical outcomes.

Based on the limitations of the study, the chapter also recommended some essential investigative areas for future research. For instance, it was revealed in the current study that GHG emissions are best explored when researchers use the individual scopes (i.e., Scope 1, Scope 2 and Scope 3) instead of the total emissions.

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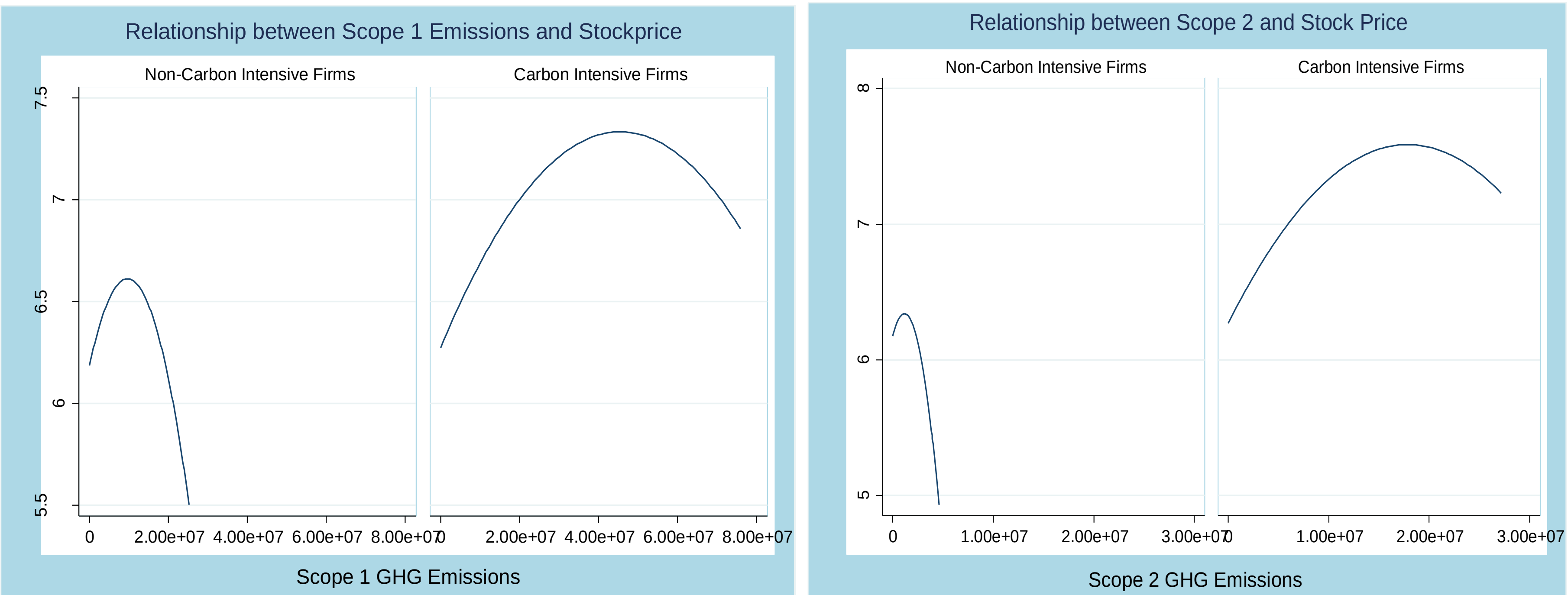
APPENDICES

Appendix 1a

Figure 7: GHG Emissions and Stock Price

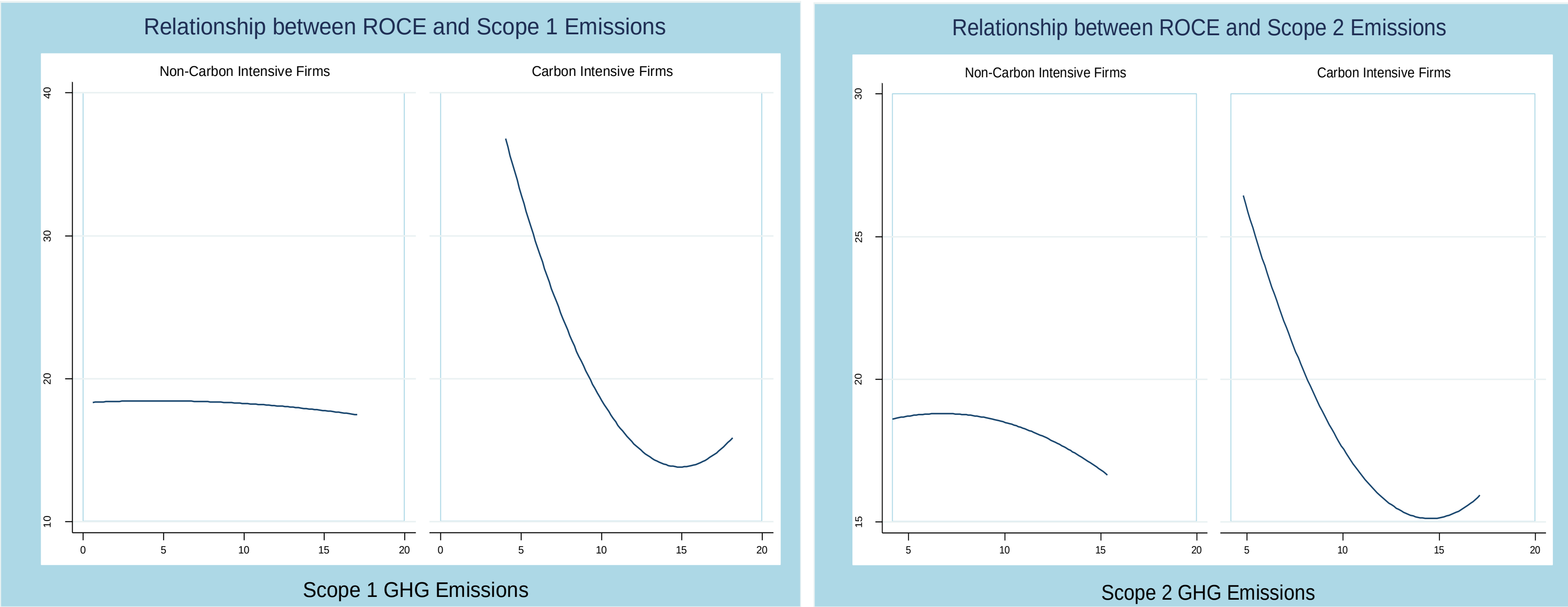


Source: Author’s construct from results

Scope 1 and Scope 2 GHG emissions are the proxies used to measure direct and indirect emissions respectively.

Appendix 1b

Figure 8: GHG Emissions and ROCE

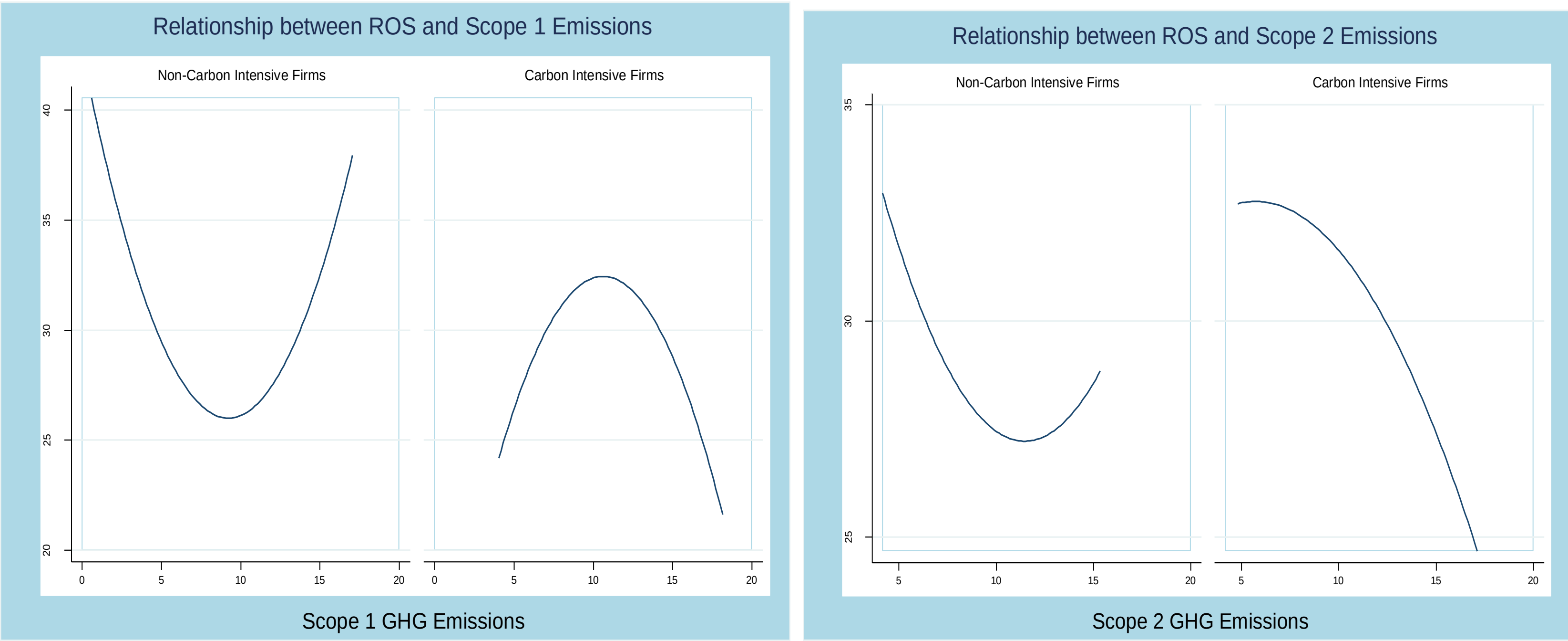


Source: Author's construct from results

Scope 1 and Scope 2 GHG emissions are the proxies used to measure direct and indirect emissions respectively.

Appendix 1c

Figure 9: GHG Emissions and ROS

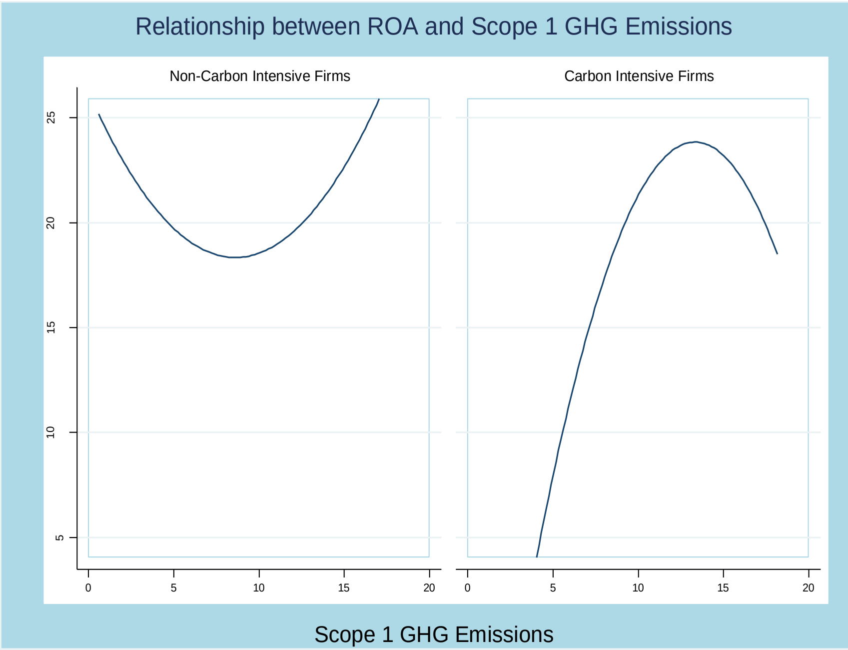


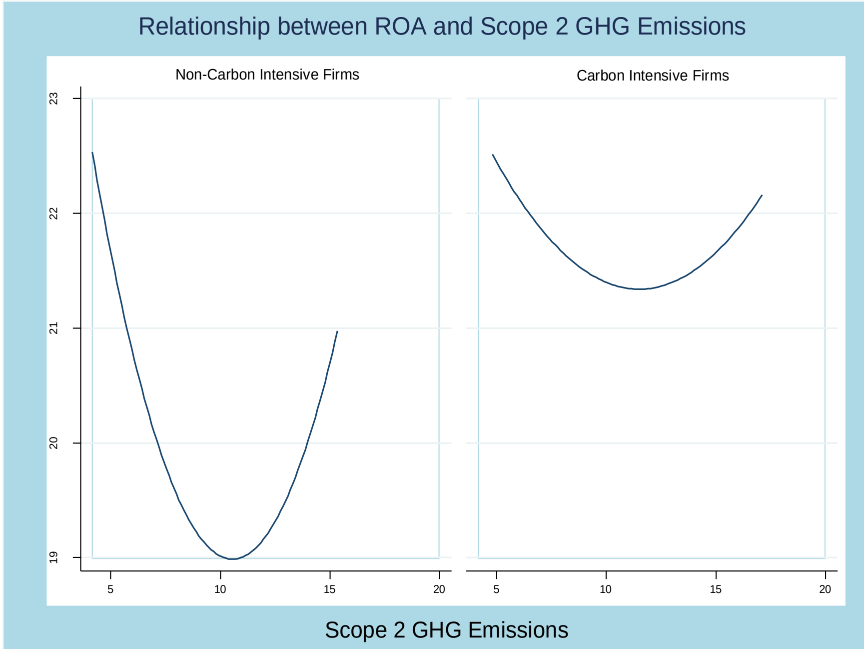
Source: Author's construct from results

Scope 1 and Scope 2 GHG emissions are the proxies used to measure direct and indirect emissions respectively.

Appendix 1d

Figure 10: GHG Emissions and ROA



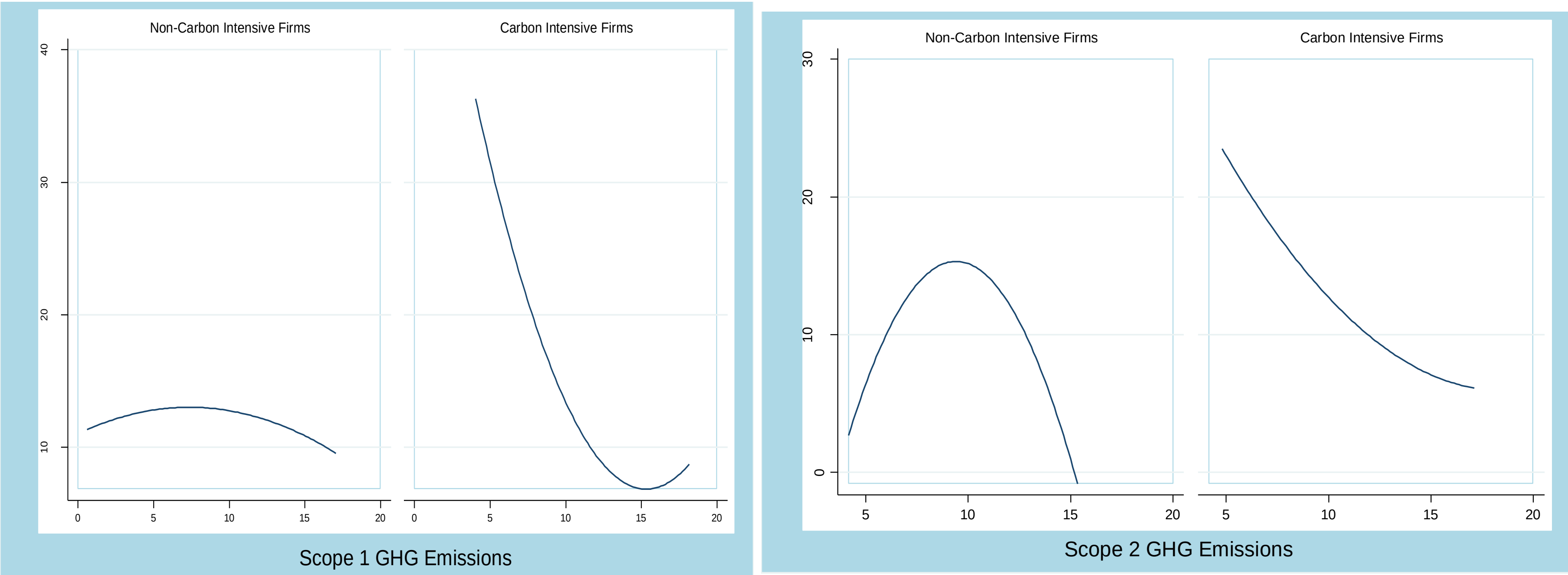


Source: Author's construct from results

Scope 1 and Scope 2 GHG emissions are the proxies used to measure direct and indirect emissions respectively.

Appendix 1e

Figure 11:GHG Emissions and Tobin's Q

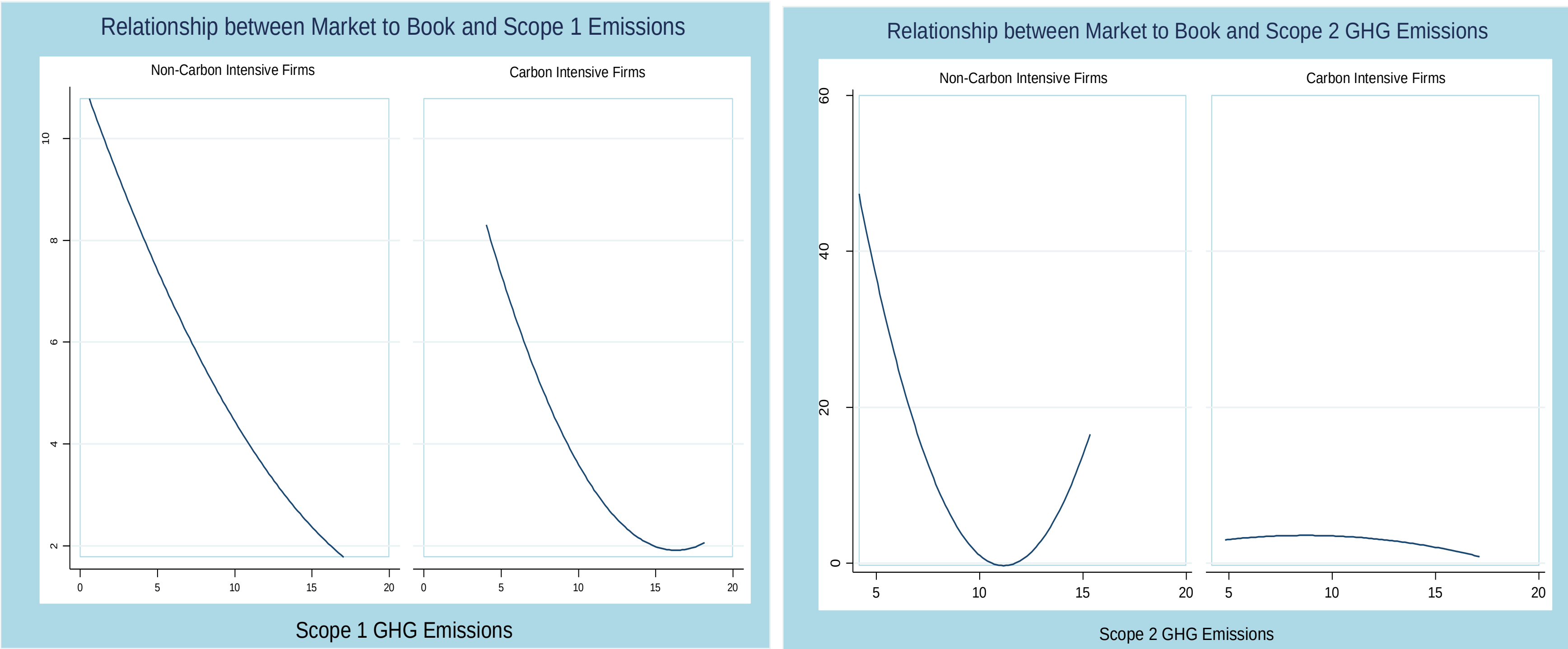


Source: Author’s construct from results

Scope 1 and Scope 2 GHG emissions are the proxies used to measure direct and indirect emissions respectively.

Appendix 1f

Figure 12: GHG Emissions and Market-to-Book Value

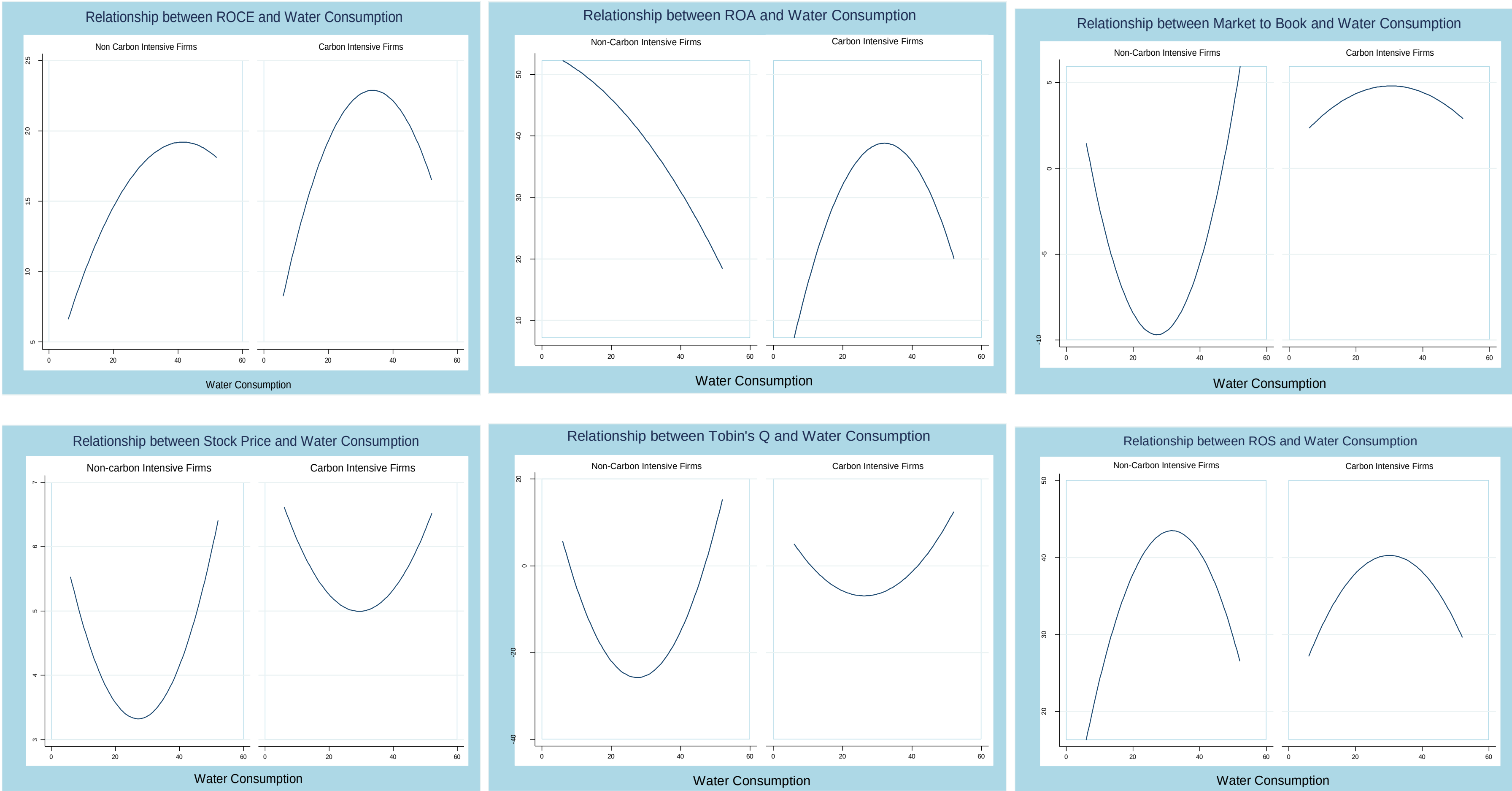


Source: Author’s construct from results

Scope 1 and Scope 2 GHG emissions are the proxies used to measure direct and indirect emissions respectively

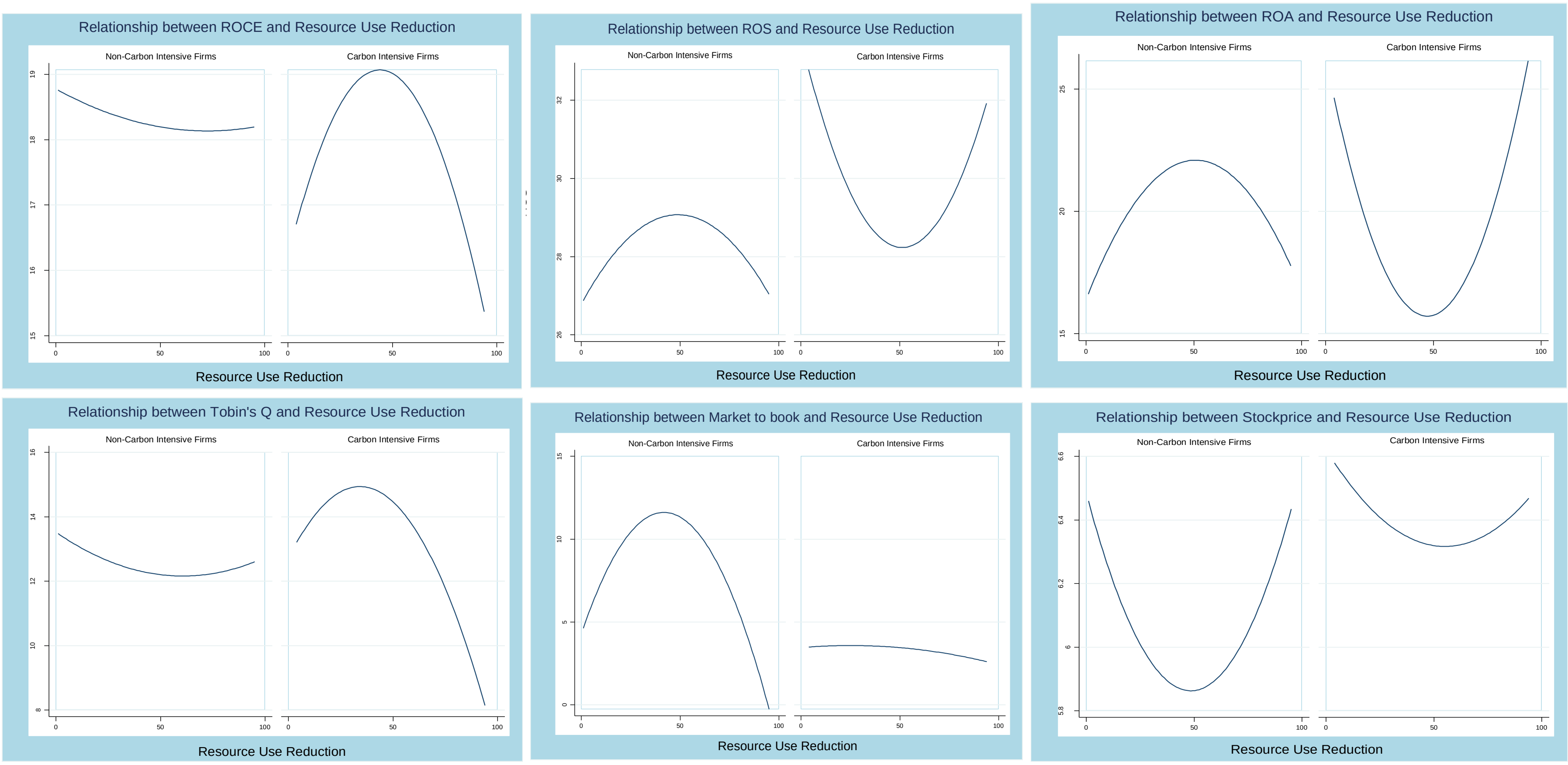
Appendix 1g

Water Consumption and CFP (Non-Linear Relationships)



Appendix 1h

Resource Use Performance and CFP (Non-Linear Relationships)



Appendix 2

	Total Sampled Firms	**Year**	**Sectors**
	FTSE 350 Index		
1	3i Group	2009-2015	Financials
2	Aberdeen Asset Man.	2010-2015	Financials
3	Admiral Group	2009-2011	Financials
4	Aggreko -	2010-2014	Industrials
5	Alliance Trust -	2010-2014	Financials
6	Amec Foster Wheeler -	2012-2015	Oil & Gas
7	Anglo American -	2009-2015	Basic Materials
8	Antofagasta -	2009-2015	Basic Materials
9	Ashmore Group -	2013	Financials
10	Astrazeneca -	2009-2014	Health Care
11	Atkins (WS) -	2010-2014	Industrials
12	Aveva Group -	2014	Technology
13	Aviva -	2009-2015	Financials
14	Babcock International -	2011-2015	Industrials
15	Bae Systems -	2009-2015	Industrials
16	Balfour Beatty -	2009-2014	Industrials
17	Barclays -	2011-2015	Financials
18	Barratt Developments -	2013-2015	Consumer Goods
19	Beazley -	2012	Financials
20	Berendsen -	2012-2014	Industrials
21	Berkeley Group Hdg.(The) -	2009-2013	Industrials
22	Bhp Billiton -	2009-2015	Basic Materials
23	Big Yellow Group -	2009-2015	Financials
24	Booker Group -	2014-2015	Consumer Services
25	Bovis Homes Group -	2012	Consumer Goods
26	BP -	2009-2015	Oil & Gas
27	Brewin Dolphin -	2014-2015	Financials
28	British American Tobacco -	2009-2015	Consumer Goods
29	British Land -	2009-2015	Financials
30	Britvic	2014-2015	Consumer Goods
31	BT Group	2009-2015	Telecommunications
32	Bunzl	2009-2014	Industrials
33	Burberry	2010-2015	Consumer Goods
34	Cairn Energy	2009-2013	Oil & Gas
35	Caledonia Investment	2014-2015	Financials
36	Capita	2011-2015	Industrials
37	Carillion	2010-2014	Industrials
38	Carnival	2009-2014	Consumer Services
39	Centrica	2009-2015	Utilities
40	Cobham -	2009-2014	Industrials

41	Computacenter	2013-2015	Technology
42	Cranswick	2010-2013	Consumer Goods
43	CRH	2009-2015	Industrials
44	Croda International	2009-2014	Basic Materials
45	Dairy Crest -	2010-2014	Consumer Goods
46	DCC	2010-2014	Industrials
47	Debenhams	2009-2010	Consumer Services
48	Dechra	2014	Health Care
49	Derwent	2009-2015	Financials
50	Diageo -	2009-2015	Consumer Goods
51	Dominos	2009-2015	Consumer Services
52	Drax Group	2012-2014	Industrials
53	Electrocomp.	2010-2013	Industrials
54	Essentra	2009-2014	Industrials
55	Euromoney	2009-2014	Consumer Services
56	Experian	2010-2014	Industrials
57	First Group -	2009-2014	Consumer Services
58	Fresnillo	2010-2014	Basic Materials
59	G4S	2009-2014	Industrials
60	Genus	2013-2014	Health Care
61	Glaxosmithkline	2009-2014	Health Care
62	Glencore	2011-2014	Basic Materials
63	Go Ahead	2011-2014	Consumer Services
64	Grainger -	2013-2014	Financials
65	Great Portland	2009-2015	Financials
66	Greene King	2009-2014	Consumer Goods
67	Halfords	2013-2015	Consumer Services
68	Halma	2013-2015	Industrials
69	Hammerson	2009-2014	Financials
70	Hays	2010-2014	Industrials
71	Helical Reit -	2013-2015	Financials
72	Henderson	2009-2014	Financials
73	Hikma	2009-2014 (Exc. 2011)	Health Care
74	Hiscox	2011-2015	Financials
75	Homeserve	2009-2014	Industrials
76	HSBC	2009-2012	Financials
77	IG Group	2009-2014 (Exc. 2011-2013)	Financials
78	IMI	2009-2013	Industrials
79	Imperial	2009-2015	Consumer Goods
80	Inmarsat	2009-2014 (Exc. 2010-2012)	Telecommunications
81	Intermediate Capital	2010-2015	Financials
82	Intertek Group -	2011-2014	Industrials
83	Intl.Cons.Airl.Gp.(CDI) -	2011-2014	Consumer Goods
84	Investec -	2009-2015 (Exc. 2011)	Financials
85	ITV -	2009-2010	Consumer Services
86	Johnson Matthey -	2009-2015	Basic Materials
87	Jupiter Fund Management -	2013-2014	Financials

88	Kingfisher -	2009-2015	Consumer Services
89	Ladbrokes -	2010-2012	Consumer Services
90	Lancashire Holdings -	2013-2014	Financials
91	Land Securities Group -	2011-2015	Financials
92	Legal & General -	2011	Financials
93	Lloyds Banking Group -	2009-2015 (Exc. 2013)	Financials
94	London Stock Ex.Group -	2010-2014	Financials
95	Man Group -	2009-2011	Financials
96	Marks & Spencer Group -	2009-2015	Consumer Services
97	Marshalls -	2009-2014	Industrials
98	Millennium & Cpth.Htls. -	2010-2015	Consumer Services
99	Mitie Group -	2009-2014	Industrials
100	Mondi -	2009-2014	Basic Materials
101	Morgan Advanced Material -	2009-2014	Industrials
102	Morrison(Wm)Spmkts. -	2009-2014	Consumer Services
103	National Express -	2010-2014	Consumer Services
104	National Grid -	2009-2015	Utilities
105	Next -	2009	Consumer Services
106	Old Mutual -	2009-2011	Financials
107	Paragon Gp. of Cos. -	2009-2015	Financials
108	Paypoint -	2013	Industrials
109	Pearson -	2009-2014	Consumer Services
110	Pennon Group -	2010-2014	Utilities
111	Persimmon -	2009-2010	Consumer Goods
112	Petrofac -	2009-2011	Oil & Gas
113	Provident Financial -	2009-2014	Financials
114	Prudential -	2009-2014	Financials
115	Qinetiq Group -	2010-2014 (exc. 2011)	Industrials
116	Randgold Resources -	2010-2012 (exc. 2011)	Basic Materials
117	Rathbone Brothers -	2009-2014	Financials
118	Reckitt Benckiser Group -	2009-2015 (exc. 2010)	Consumer Goods
119	Redrow -	2009-2015 (exc. 2013-2014)	Consumer Goods
120	Relx -	2009-2014	Consumer Services
121	Renishaw -	2010-2014	Industrials
122	Rentokil Initial -	2009-2014	Industrials
123	Rightmove -	2013-2014	Consumer Services
124	Rio Tinto -	2009-2015	Basic Materials
125	Rolls-Royce Holdings -	2009-2014	Industrials
126	Rotork -	2009-2014	Industrials
127	Royal Bank of Sctl. Gp. -	2009-2015	Financials
128	RSA Insurance Group -	2009-2014	Financials
129	Sainsbury (J) -	2010-2015	Consumer Services
130	Savills -	2009-2014	Financials
131	Schroders -	2009-2015	Financials
132	Segro -	2009-2015	Financials
133	Senior -	2011-2014	Industrials
134	Serco Group -	2009-2012	Industrials

135	Severn Trent -	2010-2014	Utilities
136	Shaftesbury -	2011-2015	Financials
137	Shanks Group -	2012-2013	Industrials
138	Shire -	2009-2014	Health Care
139	Sig -	2011-2014	Industrials
140	Sky -	2009-2015	Consumer Services
141	Smith & Nephew -	2010-2014	Health Care
142	Spectris -	2012-2014	Industrials
143	SSE -	2009-2010	Industrials
144	St.James's Place -	2009-2013	Financials
145	Stagecoach Group -	2009-2015	Consumer Services
146	Standard Chartered -	2009-2015	Financials
147	Standard Life -	2009-2015	Financials
148	Tate & Lyle -	2010-2015	Consumer Goods
149	Taylor Wimpey -	2009-2014	Consumer Goods
150	Tesco -	2010-2015 (exc. 2011-2013)	Consumer Services
151	Thomas Cook Group -	2010-2014	Consumer Services
152	Travis Perkins -	2009-2015 (exc. 2010)	Industrials
153	Tullow Oil -	2011-2015	Oil & Gas
154	UBM -	2009-2015	Consumer Services
155	Unilever (Uk) -	2009-2014	Consumer Goods
156	Unite Group -	2009-2014	Financials
157	United Utilities Group -	2009-2014	Utilities
158	Vedanta Resources -	2009-2015	Basic Materials
159	Victrex -	2011-2015	Basic Materials
160	Vodafone Group -	2010-2015	Telecommunications
161	Wetherspoon (JD) -	2010-2011	Consumer Services
162	WH Smith -	2011-2015	Consumer Services
163	Whitbread -	2009-2014	Consumer Services
164	Wolseley -	2010-2013	Industrials
165	Wood Group (John) -	2010-2015	Oil & Gas
166	Workspace Group -	2010-2015	Financials
167	WPP -	2010-2014	Consumer Services
	FTSE Small Cap Index		
168	Arm Holdings -	2009-2015 (exc. 2013-2014)	Technology
169	Brown Group	2010-2013	Consumer Services
170	Cape -	2012-2014	Oil & Gas
171	Carpetright	2010-2014 (exc. 2011-2013)	Consumer Services
172	Carpetright	2014	
173	Darty	2014	Consumer Services
174	De La Rue	2013-2014	Industrials
175	Home Retail	2010-2012 (exc. 2011)	Consumer Services
176	ICAP -	2014	Financials
177	Ictl. Htls. Gp	2009-2014 (2012-2013)	Financials
178	International Psnl. Fin. -	2009-2014	Financials
179	Interserve -	2009-2014	Industrials
180	ITE Group -	2012-2015	Consumer Services
181	Johnston Press -	2011-2012	Consumer Services

182	Lonmin -	2009-2015	Basic Materials
183	McBride -	2009-2015	Consumer Goods
184	Morgan Sindall Group -	2013-2014	Industrials
185	Mothercare -	2010-2013	Consumer Services
186	Oxford Instruments -	2014-2015	Industrials
187	Premier Farnell -	2010-2012	Industrials
188	Premier Oil -	2009-2014 (exc. 2013)	Oil & Gas
189	Rexam -	2013-2015	Industrials
190	Royal Dutch Shell A(Lon) -	2009-2015	Oil & Gas
191	RPS Group -	2009-2014	Industrials
192	Sabmiller -	2011-2015	Consumer Goods
193	SDL -	2013-2014	Technology
194	Speedy Hire -	2009-2015 (exc. 2014)	Industrials
195	SThree -	2013-2014	Industrials
196	Trinity Mirror -	2009-2014 (exc. 2011)	Consumer Services