

Carbon Behaviour, Carbon Reputation and Corporate Economic Performance: A Comparative Study of Carbon Intensive and Non-intensive Industries

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Abstract

Climate change and global warming have received heightened attention over the last few decades across different societies. As one of the biggest polluters of CO₂e, companies can play an important role in tackling climate change and global warming. Despite such an important role, a limited numbers of studies have been conducted in the carbon accounting discipline. The major concern that this study addresses is whether voluntary carbon disclosure, and especially self-serving (symbolic) information, may actually hinder future improvements in corporate carbon performance. This study investigates this concern by proposing a model that investigates the interrelationships between carbon performance, carbon disclosure, carbon reputation and a firm's economic performance within a single inclusive model.

Following previous studies suggesting that the relationship between corporate environmental behaviour and a firm's environmental reputation may vary across environmental sensitive and non-sensitive industries, and in line with the aim and objectives of this study, separate path analysis models have been run for carbon intensive and non-intensive industry sectors. Therefore, a comparative study was employed to understand the similarities and differences between these two different industry sectors. Based on the pooled cross-sectional time series data of 95 UK firms (40 carbon intensive companies and 55 non-intensive companies) over the period 2009 to 2014 and by employing a time sequence design, this study found that poor carbon performers disclose more carbon information in non-intensive industries. The results showed that corporate carbon performance is not reflected in corporate carbon reputation and, more interestingly, the worst performers in carbon non-intensive industries have a better carbon reputation. The results also showed that, unlike carbon non-intensive companies where only the quality of carbon disclosure improves carbon reputation, the quantity of such disclosure (irrespective of its quality) enhances the carbon reputation of the firms with greater carbon exposure (i.e. carbon intensive companies). No direct and indirect (through carbon reputation) relationship was found between carbon performance, as well as carbon disclosure and a firm's economic performance, plus carbon reputation as an intangible asset only improves economic performance of carbon intensive companies. Finally, the bootstrapping method indicated that carbon reputation fully mediates the impact of the quantity of carbon disclosure in carbon intensive companies on corporate economic performance. In other words, by disclosing more carbon information (irrespective of its quality), carbon intensive companies can improve their carbon reputation and subsequently enjoy better economic performance.

This study has several implications for corporate managers, investors, media and policy makers. The results showed that carbon reputation appears to be an important factor in the decision making of investors who invest in carbon intensive companies. Since carbon reputation of these companies is not based on either real carbon performance or quality of carbon disclosure, investors need to be cautious when making a decision. The results also showed a certain degree of naivety on the part of the media in evaluating corporate carbon behaviour. Such investors and media behaviour can actually reduce management's incentive to improve their real carbon performance in the future. The results send a clear message to regulatory bodies whose current policy for voluntary carbon disclosure is not sufficient enough to address the heart of climate change and global warming. Finally, the results also send a message to corporate managements that improving corporate carbon performance does not come out of shareholders' pockets.

Dedication

To my parents (Majid and Mahin) for their continual love and support during my journey to complete this thesis.

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Declaration

I hereby declare that this thesis has been composed in its entirety by me and I confirm that it has not been submitted for the award of any other degree at Anglia Ruskin University or any other educational institution.

I also declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct.

Alireza Rohani

List of Conference Papers and Presentations

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Abbreviations

ASX	Australian Stock Exchange
BGMEA	Bangladesh Garments and Manufacturing Enterprise Association
BMAC	Britain's Most Admired Companies
BOP	Basic of the Pyramid
BP	British Petroleum
BPS	Book Value per Share
CDP	Carbon Disclosure Project
CEP	Council on Economic Priorities
CER	Community and Environmental Responsibility
CO ₂ e	Carbon Dioxide Equivalent
CSR	Corporate Social Responsibility
EPA	Environmental Protection Agency
EPS	Earnings Per Share
ESI	Environmental Sensitive Industries
IO	Institutional Organization
IPCC	Intergovernmental Panel on Climate Change
IRRC	Investor Responsibility Research Centre
ISO	International Organization for Standardization
NPI	National Pollutant Inventory
NRBV	Natural Resource-Based View
RBT	Resource-Based Theory
R&D	Research and Development
ROA	Return on Assets
ROE	Return on Equity
ROIC	Return on Invested Capital
ROS	Return on Sale
SEM	Structural Equation Modelling
S&P	Standard and Poors
TRI	Toxics Release Inventory
UK	United Kingdom
US	United States
VW	Volkswagen
WBCSD	World Business Council for Sustainable Development

CHAPTER 1: Introduction

1.1 Introduction

Corporate social responsibility (CSR) is a complex concept that has received heightened attention in the accounting literature for more than two decades (Haniffa and Cooke, 2005). The European Commission defines CSR as an attempt for companies to voluntarily decide to improve their quality of social and environmental operations.

CSR has been defined in various ways, and there is no specific definition for it. Apart from the European Commission, The World Business Council for Sustainable Development defines CSR as the continuing commitment by a business to contribute to economic development while improving the quality of life of the workforce and their families, as well as the local community and society at large. The World Bank defines CSR as the commitment of a business to contribute to sustainable economic development, working with employees, their families, the local community and society at large to improve quality of life, in ways that are both good for business and development. Finally, under the CSR standards of the International Organization for Standardization (ISO) 26000, CSR is the responsibility of an organisation for the impacts of its decisions and activities on society and the environment through transparent and ethical behaviour that: is consistent with sustainable development, takes into account the expectation of stakeholders, is in compliance with applicable law and consistent with international norms of behaviour and is integrated throughout the organisation and its relationship.

Among current social and environmental issues, carbon footprints, climate change and global warming can be considered as the most urgent concerns facing society and the key issues of corporate responsibility (Hrasky, 2011). According to the Intergovernmental Panel on Climate Change (IPCC), since 1880 the earth's average temperature has risen by approximately 0.85 centigrade. A significant increase in atmospheric CO₂e concentration, as well as surface temperature, is also expected to be experienced and the sea levels are expected to rise between 26 and 81 centimetres by 2100. In addition, we are on track for more global warming by the end of this century (more than two or possibly four centigrade of warming). Therefore, it is not surprising that the term 'carbon footprint' is now found in much mass media showing a range of concerns about environmental impacts and degradation.

The role of companies cannot be ignored in tackling climate change and global warming. A number of factors including carbon tax and carbon offset schemes, growth in emissions trading, and voluntary initiatives such as the Carbon Disclosure Project (CDP) confirm the important role of firms (Hrasky, 2011). In spite of such an important role, a limited number of studies have addressed carbon related issues in the accounting field. Thus, the main concern driving this study is to examine corporate carbon behaviour in mitigating the effects of climate change and global warming.

This chapter aims to provide a brief overview of this study and its contents. The rest of this chapter is structured into eight sections. The next section explains the background of the study. Section 3 and 4 provide the research problem and research aim, and objectives and questions respectively. Section 5 provides the motivations of conducting this research. Section 6 and 7 present research methodology and the rationale and significance of this study respectively. Section 8 indicates the structure of the thesis and the last section is the conclusion of this chapter.

1.2 Background of the Study

Over the past two decades, a large body of literature has examined the pairwise association between environmental performance, environmental disclosure, environmental reputation and corporate economic performance. The association between environmental performance and economic performance has been at the centre of academic researchers' attention of from management, finance and economic disciplines. Meanwhile, accounting researchers have mainly focused on adequacy of social and environmental disclosure in annual reports and/or sustainability reports, and the impacts of such disclosure on corporate legitimacy and corporate reputation (Al-Tuwaijri et al., 2004).

The association between environmental performance and environmental disclosure is still an unresolved research issue in the environmental accounting domain. Several studies (Al-Tuwaijri et al., 2004; Cho et al., 2012, 2010; Cho and Patten, 2007; Clarkson et al., 2011, 2008; Patten, 1991) have approached this association from two competing theoretical perspectives, namely voluntary disclosure theory and legitimacy theory. On one hand, economic-based voluntary disclosure theory predicts a positive relationship between environmental performance and environmental disclosure. This theory asserts that better environmental performers are willing to provide their objective environmental performance indicators which are difficult to be mimicked

by worse performers for the sake of superior competitive advantages. On the other hand, legitimacy theory predicts a negative association between environmental performance and environmental disclosure. Legitimacy theory proposes that companies are willing to use environmental disclosure as a legitimation tool to reduce the potentially negative impacts of real performance information for the aim of mitigating social and political pressures and protecting corporate reputation. Thus, according to this theory, since the worst performers are under more social and political scrutiny, they disclose more information to protect their legitimacy and reputation. In respect of this later theme, Hopwood (2009) argued that while an increased level of voluntary disclosure can have a constructive outcome, there is a risk that such disclosures, in the pursuit of legitimation, aim to create a positive impression of corporate activities without changing the real actions (symbolism). Thus, he identified the area of environmental disclosure and legitimation as in urgent need of more research.

The association between environmental disclosure and a firm's environmental reputation has been examined by a limited number of studies¹ (Cho et al., 2012; Hasseldine et al., 2005; Toms, 2002) to assess the role of environmental disclosure as a reputation risk management tool. Bebbington et al. (2008) take a view that while reputation may be based on organisations' actions, they can be also constructed by individuals' perceptions of corporate activities and within the CSR context, social and environmental reporting can be considered a mechanism for perception creation and a tool for reputation risk management. Cooper and Owen (2007) critically argue that reputation building can be deemed as a primary motivating factor for corporations to engage in such disclosure practice since reputation can be considered an intangible asset with the potential for value creation. However, the problem arises when companies, in the pursuit of legitimation, employ such disclosure to create a positive image of the company's activities without related changes in operations (symbolism). Thus, more research is required in this area to address this concern.

As stated earlier, the financial consequences of a firm's environmental practice have been at the centre of many researchers' attention from management, finance, and economic disciplines. Several studies (Becchetti and Ciciretti, 2009; Chen and Metcalf, 1980; Hart and Ahuja, 1996;

¹ One reason may be the lack of comprehensive and reliable databases associated with corporate environmental reputation.

McGuire et al., 1988, 1988; Nishitani et al., 2011; Ullmann, 1985) have been conducted to investigate whether or not it pays to be green. In other words, they have examined whether improving corporate environmental performance can lead to better economic performance. Another set of studies (Anderson and Frankle, 1980; Freedman and Jaggi, 1992; Murray et al., 2006) has concentrated on the association between environmental disclosure and economic performance to evaluate whether the financial market is responsive to environmental disclosure and/or such information is sufficient enough to send a clear message to the market. Finally the last set of studies investigating the financial consequences of corporate environmental practice (Hussainey and Salama, 2010; Kim et al., 2007; Roberts and Dowling, 2002; Russo and Fouts, 1997) has focused on the role of corporate environmental reputation as an intangible asset in enhancing corporate economic performance. By adopting the resource-based theory, these studies have argued that corporate reputation as an intangible asset may enhance the competitive advantage of a firm, and hence improve its economic performance.

In spite of conducting several pieces of empirical research to examine the pairwise association between these four constructs (i.e. environmental performance, environmental disclosure, environmental reputation and economic performance), previous results have been mixed and inconclusive. Al-Tuwaijri et al. (2004) argue that prior mixed results can be attributable to the fact that these studies have ignored that these corporate functions are jointly determined since management's overall strategy impacts on each of these firm's responsibilities. Thus, in order to address this limitation, for the first time this study investigates the interrelationships between carbon performance, carbon disclosure, carbon reputation, and economic performance within a single inclusive model, not only to fill this gap in the literature and add to the limited number of studies in the carbon accounting field, but also to address the research problem presented in the next section.

1.3 Research Problem

As noted earlier, as one of the biggest sources of CO₂e emissions, companies have an important role in tackling climate change and global warming. However, since it is thought that improving companies' carbon performance can lead to higher financial costs, the question is raised whether or not companies are truly motivated to improve their carbon performance and emit less carbon dioxide. In respect of this latter theme, several scholars believe that management may use

different mechanisms to show their carbon related activities are legitimate without improving their real carbon performance. As noted before, consistent with legitimacy theory, carbon disclosure can be deemed as one of the tools in legitimising corporate carbon activities. According to legitimacy theory, companies may use such voluntary disclosure to show that their norms and values are congruent with the norms and values of their respective society in order to gain and/or maintain their legitimacy and reputation.

In a normative sense, corporate carbon reputation should be based on real carbon performance. However, such reputation can also be constructed by the individuals' perceptions of corporate carbon activities, and carbon reporting can be employed as a tool for perception creation. Until recently, there is no compulsory requirement for FTSE350 companies to disclose consistent and comparable carbon information and most parts of such disclosure are still voluntary and under the control of corporate management². Thus, consistent with legitimacy theory, such disclosure may concentrate on creating a good image without real changes in operations (symbolism) or it may convey a message about how the activities have changed in order to meet public expectation (behavioural management).

Therefore, the research problem embarks on carbon disclosure that stems from its voluntary basis. In other words, consistent with legitimacy theory, if such disclosure and specifically symbolic disclosure can manipulate individuals' perceptions and hence improve corporate carbon reputation and consequently financial performance, which is consistent with resource-based theory³, there is no incentive for companies to change their real operations to improve their carbon performance and mitigate their climate change impact.

To address this problem, for the first time, this study includes carbon performance, carbon disclosure, carbon reputation and economic performance within a single inclusive model. This study integrates five streams of environmental accounting research. First, few studies have examined the relationship between carbon performance and carbon disclosure. This study extends these studies by examining not only the relationship between carbon performance and

² Although the UK has introduced new regulation that companies should provide their emissions data in their annual report from September 2013, companies are still free to use different protocols and boundaries to measure their carbon emission and disclose carbon information on a voluntary basis.

³ According to the resource-based theory, corporate carbon reputation may lead to a better economic performance by enhancing corporate competitive advantage.

carbon disclosure (i.e. quantity of disclosure), but also the relationship between carbon performance and what is being disclosed (i.e. quality of disclosure⁴). Secondly, for the first time this research investigates the determinants of corporate carbon reputation by examining the impact of carbon performance and carbon disclosure (both quantity and quality) on a firm's carbon reputation. The current study also adds the association between environmental reputation and a firm's economic performance to the limited number of studies by investigating the relationship between carbon reputation and economic performance. To the best of the researcher's knowledge, this is the first time the association between carbon reputation and economic performance is being examined. Finally, this study investigates the potential direct and indirect (through carbon reputation) impact that carbon performance and related disclosure may have on economic performance to address the market reaction to corporate carbon behaviour. Prior studies on the association between environmental performance and economic performance, as well as environmental disclosure and economic performance, have not specifically focused on carbon related issues and the indirect impact (through reputation) of environmental performance and environmental disclosure on economic performance.

1.4 Research Aim, Objectives and Questions

This study aims to investigate whether corporate economic performance is influenced by carbon performance and both quantity and quality of carbon disclosure. It further examines the extent to which corporate carbon performance is reflected in its carbon reputation and whether carbon disclosure and specifically symbolic disclosure mediates the negative impacts of carbon performance on carbon reputation. In order to achieve this aim, the following objectives have been set:

- To investigate the relationship between carbon performance and both quality and quantity of carbon disclosure.
- To identify the determinants of corporate carbon reputation.
- To find out the extent to which corporate economic performance is influenced by carbon performance and carbon disclosure.

⁴ The ratio of behavioural disclosure to symbolic disclosure

- To examine the relationship between carbon reputation and economic performance and whether both carbon performance and carbon disclosure indirectly improve corporate economic performance by enhancing corporate carbon reputation.

Following the above discussion, the specific research questions of this study are:

- Consistent with legitimacy theory, do firms with the worst carbon performance disclose more carbon information? And are their disclosures consistent with symbolic management approaches towards legitimacy?
- To what extent do corporate carbon performance and carbon disclosure reflect in the carbon reputation of a firm? And does carbon disclosure mediate the negative impacts of carbon performance on corporate carbon reputation?
- To what extent is economic performance influenced by corporate carbon performance and carbon disclosure?
- Does carbon reputation improve corporate economic performance? And do both carbon performance and carbon disclosure indirectly improve corporate economic performance by enhancing the carbon reputation of a firm?

1.5 Research Motivation

Three motivations have urged the researcher to conduct this study. The first follows the call by Clarkson et al. (2008) suggesting that legitimacy theory is not robust in predicting the level of disclosure and that future research should go beyond this and focus on the nature of the disclosure. This study investigates not only the relationship between carbon performance and the level of carbon disclosure but also the association between carbon performance and what is being said (i.e. the quality of such disclosure). Likewise, following Hopwood's (2009) concern identifying the area of environmental disclosure and legitimation in urgent need of more research, this study investigates the determinants of corporate carbon reputation to understand whether or not such reputation is based on corporate real performance or created by corporate disclosure, especially the symbolic one.

Secondly, the review of literature revealed a lack of empirical studies in carbon accounting disciplines. Previous studies have mostly focused on the wider area, i.e. environmental accounting, and hence little is known about the potential impacts of corporate carbon behaviour

on a firm's carbon reputation and financial performance. Furthermore, prior research has mostly concentrated on environmentally sensitive industries and less is known about non-sensitive industries. For the first time, this study has focused on both carbon intensive and non-intensive industry sectors not only to add to the limited number of studies in the carbon accounting field, but also to understand corporate carbon behaviour and its consequences in both carbon intensive and non-intensive industries.

Finally, this study is motivated by the argument that the UK government policy is not addressing the heart of the matter of climate change to achieve actual carbon emissions reduction. In other words, it is argued that current voluntary carbon disclosure policy is not sufficient enough in tackling climate change and global warming, and by employing such voluntary mechanisms, companies may manipulate the perception of society to create a positive image of their activities without improving their real carbon performance. Therefore, it is necessary to look at undergoing carbon practices (i.e. carbon performance and carbon disclosure) in FTSE350 companies as the biggest sources of carbon emissions in the UK to further address this argument.

1.6 Research Methodology and Methods

To achieve the aim and objectives of this study, a comparative study based on pooled time series cross sectional data over the period 2009 to 2014 has been employed to investigate similarities and differences between carbon intensive and non-intensive industries. Corporate carbon behaviour and its impact on corporate reputation and economic performance may vary across different industry sectors (i.e. carbon intensive and non-intensive industries). This argument is supported by legitimacy theory that the extent of social and environmental disclosure can be affected by corporate exposure to public and political scrutiny. According to this theory, companies from environmentally sensitive industries may face greater exposure, and hence provide more information to protect their legitimacy and, subsequently, their reputation (Patten, 2002). Cho et al. (2012) also argue that the impact of environmental performance on environmental reputation may vary across industry sectors due to different environmental exposure. Thus, following the important role of industry in this study, the use of legitimacy

theory as socio-political theory⁵ and philosophical assumptions of positivism (quantitative) adopted to test the hypotheses of this study, a comparative study is the best methodology to achieve the aim and objectives of this study⁶. Chodosh (2005) asserts that comparative methodology is an efficient methodology for quantitative studies using statistical methods to compare different things at one time or the same thing over a period of time.

The sample of this study is drawn from FTSE350 companies reported to the Carbon Disclosure Project (CDP) over the period 2009 to 2013 consistently. Content analysis of carbon footprint-related articles published by UK newspapers and obtained from LexisNexis of the sampled companies is undertaken to measure corporate carbon reputation. Likewise, content analysis of sustainability reports or the CSR section of annual reports is undertaken to measure both quantity and quality of carbon disclosure, and carbon emissions and financial data are obtained from FTSE350 reports of the CDP (which is in partnership with the Bloomberg database) and the Bloomberg database itself.

Finally, because of investigating the direct and indirect relationship between carbon performance, carbon disclosure, carbon reputation and firm economic performance, structural equation modelling (SEM) is used to test the hypothesised relationships. SEM is well suited for the aim of this study since one special feature of SEM is the ability to test direct and indirect relationships while controlling for all other relationships (Kim et al., 2007). Since all of the variables within this study are observed variables which are directly measured, overall structural model but not a measurement model is estimated. Thus, the path analysis as a form of structural equation will be employed to test the proposed hypotheses.

1.7 Rationale and Significance of the Study

Over the past decade, climate change and global warming have become more and more important and companies are expected to play an important role in stabilising this issue by reducing their levels of carbon emission. However, there is a growing concern that corporations

⁵ According to Smelser (2013), a comparative study is suitable in explaining and developing theories regarding socio-political and socio-cultural phenomena since they occur in such units as societies, organisations and cultures that are dissimilar to one another.

⁶ Carbon intensive industry sectors classified by the Carbon Disclosure Project are energy, industrial, material and utilities, and non-intensive industry sectors are consumer discretionary, consumer staple, financial, health care and IT & telecommunication.

in pursuit of their legitimacy employ different tools and mechanisms, such as voluntary carbon disclosure, to shape and/or filter their stakeholders' perceptions without real changes in their operations. Thus, this study addresses the research problem (see section 1.3) contributing to an ongoing debate regarding the reliability of voluntarily carbon disclosure. In other words, this study aims to investigate the extent to which corporate carbon disclosure lessens the potential negative impacts of real carbon performance on the perception of society. To the extent that carbon disclosure lessens such negative effects, this disclosure may actually reduce management's incentives to improve their actual performance in the future.

As stated earlier, Al-Tuwaijri et al. (2004) argues that previous studies have ignored the fact that management's overall strategy impacts on each of these corporate responsibilities and future studies have to consider that these corporate functions are jointly determined. Thus, in order to address this limitation, for the first time this study incorporates these four variables within a single inclusive model. Not only does this study attempt to address this gap in the literature to add to the limited number of studies in the carbon accounting discipline, but it also contributes to the ongoing debate about the reliability of voluntary carbon disclosure. In addition, because corporate carbon behaviour may vary across those sectors facing greater social and political scrutiny, this study, for the first time, compares both carbon intensive and non-intensive industries to understand how society reacts differently to different industry sectors.

At the practice level, the current study's findings will benefit corporate management, investors, media and regulatory bodies. On one hand, the findings of this study may be useful for corporate management that only real change in their operation can lead to better reputation and subsequently improved economic performance. On the other hand, the findings may send a signal to investors and the media that their current behaviour is hindering real improvement of corporate carbon performance and also a signal to regulatory bodies that the current policies for voluntary carbon disclosure are not addressing the heart of climate change and global warming issues.

1.8 Structure of the Thesis

This thesis is organised into eight chapters including this introduction. This chapter presents the background of the study, research problem, research objectives and questions, and research methodology and methods. The remainder of this thesis is structured as follows:

Chapter 2 reviews the pertinent literature and provides the foundations for the proposed hypotheses in Chapter 3. In doing so, Chapter 2 reviews previous studies on the pairwise association between the variables of this study and then moves on to illustrating the gap in literature and how this study is going to fill this gap.

Chapter 3 discusses the main theories adopted in this study and the justification for this adoption. It begins with the most adopted theories in social and environmental accounting research and then by referring to the premises of legitimacy and resource-based theories and previous studies on the associations between the variables of the current study. This chapter develops the theoretical model and hypotheses of the current study.

Chapter 4 outlines the main research paradigms employed in accounting research and the rationale of adopting a positivistic approach for the current study. This chapter further discusses different research methodologies and provides the justification for adopting a comparative study in this research. Sampling and data collection methods, including content analysis and archival data, are also illustrated. Finally, SEM as a data analysis method is presented in this chapter, accompanied with the justification for employing this method.

Chapters 5 and 6 summarise the results of the path models related to carbon intensive and non-intensive industry sectors respectively. They also provide missing data analysis, detecting outliers, normal distribution tests and descriptive statistics of the variables. Finally, they present the path models' findings and hypotheses testing.

Chapter 7 discusses the results of hypotheses testing. It presents the findings of path models of both carbon intensive and non-intensive industries. The findings of these two types of industry sectors are compared with previous findings, premises of adopted theories (i.e. legitimacy and resource-based theories) and each other to illustrate how and why different sectors react differently to climate change.

Chapter 8 presents a review of the findings and revisits the research questions. This chapter also highlights the implications and recommendations of this thesis for investors, media, policy makers and corporate management, as well as the contributions of this study. It also discusses the limitations of the current study and offers avenues for future research.

1.9 Conclusion

This chapter presents an overview of the background of this study, the research problem, research methodology, and research questions and objectives. As aforementioned, the major concern driving the current study is whether corporate voluntary carbon disclosure, and specifically symbolic carbon disclosure, mediates the negative impact of real carbon performance on carbon reputation, the factor that may improve the economic performance of the firm. In this case, such disclosure may actually hinder future improvements in corporate carbon performance. Thus, for the first time, this study investigates the interrelationship between carbon performance, carbon disclosure, carbon reputation and economic performance in one model to address this concern and also fill the gap in the literature. The next chapter will review the literature and explain this gap.

CHAPTER 2: Literature Review

2.1 Introduction

As companies are struggling to compete in the global economy, they ought to do so within the societal constraints by considering ever-increasing environmental accountability. Several cases have indicated the causal association between poor corporate environmental performance and abrupt reduction in corporate share price. Both the British Petroleum (BP) oil spill in the Gulf of Mexico in 2010 and the recent cheating emission tests by German car giant Volkswagen (VW) can be deemed as such examples.

In cases such as BP and VW, the loss of corporate reputation and financial harm in the forms of compensation costs, cleanup and/or regulatory breaches plus an abrupt reduction in corporate share prices, are easily observable. However, in the less extreme cases there is no clear evidence of reputational and financial consequences of corporate environmental performance.

Among current environmental issues, carbon footprints, climate change and global warming can be considered the most urgent concerns facing society and key issues of corporate responsibility. According to Rankin et al. (2011), companies can play an important role in tackling climate change and global warming by controlling their greenhouse gas emissions which are vital for sustainable corporate development. However, Luo and Tang (2014) argue that due to an uncertainty about carbon reduction activities and emissions measurements, firms may take advantage of different mechanisms, such as voluntary carbon disclosure, to respond to such ever-increasing concerns. They may do this for the sake of protecting and/or enhancing corporate reputation and consequently a firm's economic performance, without true efforts to reduce their levels of greenhouse gas emissions.

Hence, the major concern addressed in this study is whether corporate carbon disclosure, and specifically symbolic carbon disclosure, mediates the negative impact of real carbon performance on carbon reputation. In this case, such disclosure, by enhancing corporate legitimacy and consequently a firm's reputation (a factor that may improve its economic performance), may actually hinder future improvements in corporate carbon performance. In order to address this concern, firstly the literature on pairwise associations between carbon performance, carbon disclosure, carbon reputation and economic performance will be reviewed.

The rest of this chapter is organised as follows. The next section reviews the relationship between carbon performance and carbon disclosure. This is followed by the review of the literature on associations between carbon performance, carbon disclosure and the corporate carbon reputation in Section 3. Section 4 critically reviews the relationship between carbon reputation and economic performance. The relationship between carbon performance and economic performance, as well as carbon disclosure and economic performance, are reviewed in Sections 5 and 6 respectively. Section 7 presents the gap in the literature which this study seeks to fill in, and the last section is the conclusion of this chapter.

2.2 Carbon Performance and Carbon Disclosure

The association between environmental performance and environmental disclosure is still an unresolved research issue in the environmental accounting domain (Clarkson et al., 2008). Several studies (Al-Tuwaijri et al., 2004; Cho and Patten, 2007; Clarkson et al., 2011, 2008; Freedman and Wasley, 1990; Hughes et al., 2001; Ingram and Frazier, 1980; Luo and Tang, 2014; Patten, 2002, 1992; Wiseman, 1982) have attempted to investigate this association by adopting different theories such as legitimacy theory, voluntary disclosure theory, signalling theory, and so forth. However, results have been inconsistent and mixed.

For the first time, Ingram and Frazier (1980) examine environmental performance-environmental disclosure association. They use 20 pre-defined environmental categories along with four dimensions, including time, evidence, theme and specificity, to score corporate environmental disclosure. They also employ the Council on Economic Priorities (CEP), a non-profit organisation with the main focus on analysing companies' social activities in the US, and a performance index as a proxy for environmental performance. By selecting 40 out of 50 firms monitored by the CEP, their regression results showed, at best, a weak relationship between the quantitative measures of CSR disclosures and environmental performance measures of the CEP. They argue that, because of the voluntary nature of CSR disclosures, management may use its own discretion in choosing such information, and it is possible for poorer performers to bias its information selection in order to appear like better performers.

By using a research design almost identical to Ingram and Frazier, Wiseman (1982) investigates the environmental performance-environmental disclosure relationship. This study concentrates on the 26 largest US companies monitored by the CEP during the period 1972-1976. The

weighted index, designed to score environmental disclosure, covered 18 items divided into four categories including environmental litigation, economic factors, pollution abatement and other environmental issues. This index focuses mainly on quantitative disclosures, and items were given (+3) for quantitative disclosures, (+2) for non-quantitative disclosures, (+1) for general terms and (0) for no disclosure. The CEP ranking was also employed as a proxy for environmental performance. The findings indicated no association between environmental performance and environmental disclosure.

Freedman and Wasley (1990) examine the relationship between corporate pollution performance (as an indicator of environmental performance) and pollution disclosure. Their sample comprises of 50 US companies from environmental sensitive industries including Oil, Steel, Pulp and Paper, and Electric Utilities. Like previous studies, they employ the CEP ranking to measure environmental performance and Wiseman's (1982) indexing procedure to measure environmental disclosure. By comparing corporate pollution performance against pollution disclosure of 10Ks and annual reports of the sample companies, their results indicated no association between environmental performance and environmental disclosure implying such disclosure is not indicative of the real environmental performance.

In (1992), the study carried out by Patten examines the impact of the Exxon Valdez oil spill on the environmental information disclosed in annual reports of petroleum firms other than Exxon. He found a significant increase in the environmental disclosure of sample companies. He further found that the amount of change is related to firm size and ownership in the Alyeska Pipeline Service Company. His results, therefore, support the legitimacy theory arguments and highlight that companies may increase their level of such disclosure irrespective of their real performance in the face of the potential threat of losing legitimacy.

Hughes et al. (2001) also analyses the environmental disclosure of 51 US manufacturing companies within financial statement notes, the management's discussion and analysis, and the president's letter sections of corporate annual reports for the years 1992 and 1993 to determine if corporate environmental disclosure is a good indicator of corporate environmental performance. Like several previous studies, they compare corporate disclosure levels by employing Wiseman's (1982) weighted index against the CEP rankings as a proxy for environmental performance. However, unlike previous studies, they compare environmental disclosure within three separate

sections against CEP environmental performance divided into three categories, namely called good, mixed and poor performers. The reason for focusing on different disclosure sections was that they believed the motivation for disclosing such information can differ between regulated and non-regulated sections. Their results showed that poor performers disclose more information and the majority of such disclosures are in regulated sections. They take the view that since poor performers are required by regulatory bodies to engage more in remedial actions, they provide more environmental information in those sections. However, no differences were found in the environmental disclosures of mixed and good groups implying that such disclosures are not informative enough about actual environmental performance.

Patten (2002) believes that the failure to find a significant association and consistent results can be attributable to such factors as inadequate measures of environmental performance, small sample size and failure to control for industry type as well as corporate size. Therefore, he examines this relationship by using a larger sample size (131 US companies). He employs size-adjusted levels of toxics released into the environment (i.e. toxics released into the environment divided by the company's revenue level) obtained from the Environmental Protection Agency's (EPA) 1988 Toxics Release Inventory (TRI) as a proxy for environmental performance, which is different to the CEP ranking used by previous studies, and controls the potential effects of size and industry on environmental disclosures. Like previous studies, Patten employs Wiseman's (1982) index to measure environmental disclosure, but he excludes litigation related information as he believes that litigation disclosures are less voluntary than other environmental disclosures, and in order to understand the role of environmental disclosure as a tool of legitimacy, concentration should be on voluntary disclosures. The results showed a significant negative relationship between environmental performance and environmental disclosure. It means the worst performers disclose more environmental information to mitigate public and political pressures. This finding, which is consistent with legitimacy theory, supports the argument that environmental disclosure is a function of corporate public scrutiny and exposure to the political and social environment. Also, the results indicate that companies belonging to non-environmental sensitive industries disclose more environmental information for higher levels of toxics released to the environment. Patten takes the view that poorer environmental performance of non-environmental sensitive companies, which are not already facing public and social

pressure, lead to greater environmental exposure resulting in higher levels of environmental disclosure.

Al Tuwaijri et al. (2004) believe that inconsistent and mixed results of previous studies can be attributable to the fact that researchers have ignored management's overall strategy affecting environmental performance, environmental disclosure and economic performance, and hence these corporate functions should be jointly determined within a single inclusive model to give stronger results. Thus, they explore the interrelation between environmental performance, environmental disclosure and economic performance by employing a simultaneous equations approach. Like Patten (2002), they use the TRI database to measure environmental performance and define it as a ratio of total waste generated which is recycled (i.e. hazardous waste recycled to hazardous waste generated). They also measure environmental disclosures by using a weighted index dividing into four categories including oil and chemical spills, potential responsible parties' designation, environmental fines and penalties, and toxic waste. They assign the highest score (+3) to quantitative disclosures related to the four categories described above, (+2) to non-quantitative but specific information regarding these issues, (+1) to general qualitative information and (0) if the information had not been provided (their index was similar to Wiseman's (1982)). The findings showed a positive significant relationship between environmental performance and environmental disclosure implying that better environmental performers disclose more environmental information which is consistent with economic-based voluntary disclosure theory.

Cho and Patten (2007) argue that the lack of conclusive and consistent results for such relationships can be largely due to the failure to consider the motivation of management to disclose environmental information. They state that while some disclosures are for the purpose of legitimacy, others are not. Therefore, failure to consider this issue can lead to problems with the environmental disclosure metrics used. In line with Patten (2002), they also believe that litigation related disclosures are more mandated, and by nature they reflect problems which companies face regarding their environmental issues. Thus, management is less likely to use litigation disclosures as a legitimization tool and they ought to be ignored while examining legitimising tactics. Beyond separating litigation and non-litigation related information, Cho and Patten also distinguish non-litigation disclosure along monetary and non-monetary components. They assert

that, although previous studies have employed weighting schemes and assigned a higher score to quantitative disclosures, the use of a weighted index may be sufficient if monetary environmental information occurs as prevalent as non-monetary information. In other words, they believe that companies disclose voluntary information when it does not outweigh proprietary cost. Disclosing monetary information about operating costs and/or capital expenditures associated with environmental activities can be viewed by a manager as having a higher proprietary value (for instance, they reveal more information to competitors) than non-monetary information, and hence it is likely that monetary information is less preferred as a legitimization tool than non-monetary information. By using size-matched groups based on environmental performance (better performers versus worse performers according to data from KLD Research and Analytics, Inc.) and industry type (environmentally sensitive industries (ESI) versus non-environmentally sensitive industries (non-ESI)), they test differences in the use of non-litigation disclosures and specifically monetary and non-monetary non-litigation related information. Their findings showed that non-litigation environmental disclosure is higher for the worst performers and for those in ESI. Also the worst performers in the non-ESI group disclose more non-monetary information than the worst performers in the same group and no significant difference was found between the worst and the best performers in the ESI group. The results also showed that the worst performers in ESI provide more monetary information than the best performers in ESI and their counterparts in non-ESI. Therefore, in general, their findings supported the notion that companies do appear to use environmental disclosure as a legitimising tool.

Apart from the problems described by Patten (2002) bringing previous findings into question, Clarkson et al. (2008) also argue that the problem with previous studies is that they have mainly concentrated on non-discretionary disclosure channels such as annual reports and 10Ks and employed the Wiseman (1982) disclosure index. They assert that it is evident that by increasing environmental problems and exposure, non-discretionary disclosure in regulated channels such as 10Ks and annual reports will increase. Thus, a negative relationship between environmental performance and disclosures may be due to the nature of non-discretionary information disclosed in annual reports and 10Ks, whereas the economic-based voluntary disclosure theory and socio-political theories, such as legitimacy theory, used to predict this relationship focus on purely discretionary (voluntary) disclosures. They also argue that previous studies have mainly employed the Wiseman index to measure environmental disclosure. This index mainly focuses

on the financial results of corporate environmental practices and assigns more weight to quantitative disclosure. The problem is as poor environmental performers are under more public scrutiny, they may provide and discuss any financial information through regulated channels such as annual reports and 10Ks. Clarkson et al. (2008) revisit this relationship by designing a new environmental index based on Global Reporting Initiatives (GRI) and by concentrating merely on social and environmental responsibility reports or similar disclosures on corporate websites as purely voluntary channels. Using a sample of 191 US firms from the most polluting industries, their results showed a positive relationship between environmental disclosure and environmental performance which is consistent with economic- based voluntary disclosure theory and against legitimacy theory.

Among the limited studies conducted in the carbon accounting discipline, Luo and Tang (2014) investigate the reliability of corporate carbon disclosure. In other words, they examine whether carbon disclosure reflects the true carbon performance of a firm. Based on a sample of 474 UK, US and Australian firms, and by using the content analysis of the CDP reports as a proxy of carbon disclosure and both carbon intensity and carbon mitigation as measures of carbon performance, they document positive and statistically significant associations between carbon disclosure and carbon performance. Therefore, their results, which are consistent with the voluntary disclosure theory and signalling theory, suggest that a firm's voluntary carbon information reported to CDP reflects their undergoing actual carbon performance.

In spite of several researchers' attempts to clarify the environmental performance-environmental disclosure association, this relationship has still remained an unresolved question in the environmental accounting discipline. On one hand, a positive relationship between environmental performance and environmental disclosure is consistent with voluntary disclosure theory. According to this theory, the best environmental performers are willing to disclose their objective environmental performance indicators, which are difficult for the worst performers to mimic. On the other hand, legitimacy theory predicts a negative association between these variables. Legitimacy theory suggests that environmental disclosure is a function of public exposure. Hence, as poor performers are under more social and political pressure, they disclose more information to mitigate those pressures and protect their legitimacy.

Clarkson et al. (2008) provide preliminary evidence that socio-political theories are more robust in predicting the nature of disclosure rather than its level. They suggest that future research should move beyond the level of disclosure and investigate the relationship between environmental performance and what is being disclosed (i.e. quality of such disclosure).

According to legitimacy theory, companies are motivated to employ different legitimization strategies to show that their norms and values are congruent with the norms and values of their respective society. Lindblom asserts (1994 as quoted in Gray, Kouhy, and Laver, (1995)) that whenever companies disclose social and environmental information to legitimise their own existence, they can adopt one of four possible strategies:

- Educate and inform its relevant public about actual changes in the organisation's performance and activities
- Change the perceptions of the relevant public without having to change its actual behaviour
- Manipulate the perception to deflect attention from the issue of concern to other issues
- Change external expectations of its performance

These strategies suggest that if the aim of disclosures is to respond to legitimacy concerns, legitimating tactics may vary across firms. Corporate actions towards legitimacy and maintaining a social contract can be both symbolic and behavioural (Hrasky, 2011). Environmental disclosure towards legitimacy may concentrate on creating a positive image about corporate actions without real change in operations (symbolism) or may convey a message about real changes and how social expectations have affected these operational changes (behavioural management) (Kim et al., 2007).

Following the call by Clarkson et al. (2008) to examine the relationship between environmental performance and what is being disclosed, Clarkson et al. (2011) examine the relationship between corporate environmental performance and both level (i.e. quantity) as well as the nature (i.e. quality) of environmental disclosure of 51 mining and manufacturing Australian firms reporting to the National Pollutant Inventory (NPI) in both 2001–2 and 2005–6. By focusing on annual reports and stand-alone environmental and/or sustainability reports, they measure both the level and nature of environmental disclosures using an index developed by Clarkson et al.

(2008). They also use emission data obtained from the NPI which reflects the level of a firm's toxic emissions as a proxy of corporate environmental performance. The findings indicated a positive relationship between environmental performance and the level of environmental disclosure for their sample companies. This suggests that the worst performers disclose a higher level of environmental information which is in contrast with the findings of Clarkson et al. (2008) and consistent with legitimacy theory, using the same disclosure index and a similar environmental performance proxy. They also found a positive association between the environmental performance and what they called 'hard disclosures'⁷ (i.e. those disclosures that the GRI views as inherently more verifiable), which is in contrast with the predictions of both legitimacy theory and voluntary disclosure theory⁸. Thus, further investigation is required on the relationship between carbon performance and carbon disclosure, not only to address such inconsistency in the environmental accounting discipline, but also to add to the limited number of studies in the carbon accounting area. In addition, following the call by Clarkson et al (2008) arguing legitimacy theory is more robust in predicting the nature of disclosure, more research is required in the area of legitimacy theory and voluntary environmental disclosure.

2.3 Carbon Performance, Voluntary Carbon Disclosure and Carbon Reputation

Fombrun (1996, p. 37) define corporate reputation as "the overall estimation in which a company is held by its constituent". He argues that, in a normative sense, reputation ought to be based on corporate performance. Anecdotal evidence indicates that poor operating performance can harm the reputational stock of affected companies. Within the recent past, Volkswagen, due to the cheating emissions test, Toyota, because of the massive recall of its automobiles in 2009 and 2010, and BP, due to the oil spill in the Gulf of Mexico in 2010, have taken major hits on their reputation. However, while reputation may be based on an organisations' actions, it can also be

⁷ They use hard versus soft disclosures to indicate the nature of environmental disclosures.

⁸ Clarkson et al. (2011) believe that although corporate disclosure strategies toward legitimacy can be both symbolic and/or behavioural (substantive), according to legitimacy theory, since firms with poor environmental performance may face threatened legitimacy, they may tend to make more self-serving disclosures. In other words, their disclosure may be more soft in nature (i.e. symbolic) as they seek to manipulate perceptions regarding their performance instead of revealing the actual performance. In contrast, according to voluntary disclosure theory, better performers are motivated to disclose more hard disclosures (i.e. behavioural) to differentiate themselves from poorer performers. Thus, they may tend to provide more credible information that cannot easily be mimicked by others.

constructed by individuals' perceptions of corporate activities (Bebington et al, 2008). In other words, reputation can be based on individuals' images of an organisation's activities, and since reputation and image are closely related, there is the potential for image manipulation suggesting reputation does not merely depend on performance.

Brady (2005) argues that a firm's perceived image can be manipulated by employing a filtering process. Voluntary disclosure can be considered as one of the filtering tools to manipulate the perceptions for the aim of impacting market. Over the last decade there has been substantial increase in voluntary disclosure narrative provided by firms (Harris, 2010). Voluntary disclosure areas cover *inter alia*, social and environmental responsibility, risk and corporate governance together with "more detailed business review-type narratives in the area of financial reporting" (Harris, 2010, p. 84). Such increase in providing voluntary disclosure by companies has led to growth in research examining disclosure trend, causality of disclosure against business and sector influences, and theoretical development to help understand, explain and predict such disclosures.

Several studies (Balakrishnan et al., 2014; Diamond & Verrecchia, 1991; Graham et al, 2005) have investigated the role of voluntary disclosure in reducing information asymmetry among their investors. Balakrishnan et al. (2014) assert that voluntary disclosure can be considered as an important channel through which managers can actively influence the liquidity of their firms' shares. Diamond and Verrecchia (1991) critically argue that managers may provide more information than mandated by market regulation for the aim of reducing information asymmetry among investors. This supports by Graham et al. (2005) survey evidence that managers disclose voluntary information to reduce the information risk that investors assign to their stock.

In the context of corporate environmental responsibility, voluntarily environmental disclosure can be deemed as a tool for conveying corporate environmental actions and activities and/or filtering and shaping perceptions of environmental reputation (Cho et al, 2012). In respect of this latter theme, Bebbington et al. (2008) take the view that social and environmental reporting can be perceived as a mechanism for perception creation, and hence reputation risk management. Unerman (2008) asserts that social and environmental reporting is a potentially powerful tool which companies can employ in an attempt to influence public perceptions, and hence contribute towards maximising their reputation. Hopwood (2009) also believed that organisations may have

an interest in employing such reporting to construct a good corporate image and increase their legitimacy in the society in which they work. In other words, from the legitimate point of view, information disclosure can be deemed as a tool in order to construct a decent organisational image and consequently guarantee the reputation and existence of an organization by indicating that its activities are legitimate. Any threat to corporate legitimacy can harm corporate reputation, and active management should reduce such risks by employing mechanisms such as voluntary, social and environmental disclosures (Chen and Roberts, 2010).

Literature on the association between environmental disclosure and environmental reputation is scarce. One reason may be the lack of comprehensive and reliable databases associated with corporate environmental reputation. Toms (2002) investigates determinants of the UK's corporate environmental reputation and specifically the role of environmental disclosure in promoting corporate environmental reputation. This is done by employing a resource-based view of the firm, supplemented by quality signalling via the annual report channel. According to the Resource-Based View (RBV), a firm's inimitable qualities can promote a competitive advantage, and reputation as an intangible asset can be regarded as one such inimitable quality. While physical resources can be easily obtained by competitors, intangible reputation-based assets become more valuable for the firms' performance. Toms argues that reputation-based intangible assets can be created by investing in difficult to imitate projects and also by using accounting channels, such as annual reports, as a quality signalling device to disclose such investment and information. Consistent with quality signalling, he focuses mainly on the quality of environmental disclosure by considering the quantified disclosures where he believes that such disclosures are more difficult to imitate by competitors, and represents actual performance in comparison with rhetoric type disclosures. Therefore, he gives more weight to quantitative disclosures and less weight to rhetoric statements. He also uses Management Today's Britain's Most Admired Companies (BMAC) 1996 and 1997 survey in terms of community and environmental responsibility (CER) to measure environmental reputation. He incorporates some determinants of reputation into the model including governance structure, firm size, type of industry, low systematic risk and high financial performance, which may mediate the effect of disclosure on reputation. The results provided strong support for the association between environmental disclosure and environmental reputation. Also, the results indicated that institutional shareholder power and low risk are related to high environmental reputation.

Hasseldine et al. (2005) re-test the Toms (2002) model to great extent and complement his model in order to examine the differential impacts of both quality and quantity (volume) of environmental disclosure on corporate environmental reputation. They also add investments in research and development (R&D) as well as diversification to investigate their relative effect on environmental reputation. Therefore, like Toms, they use a weighted scoring system to measure the quality of disclosure and normal content analysis procedure (by counting statements) to measure the quantity of disclosures. They also use Britain's MAC 2000 survey as a proxy for environmental reputation. Their findings suggested that the quality of environmental disclosure has a stronger impact on environmental reputation than mere quantity of disclosure, and investments in research and development as well as diversification, under certain situations, enhance corporate environmental reputation. They believe that research and development may provide an opportunity to invest in modern and more environmentally friendly technology, which can improve corporate environmental performance and consequently environmental reputation.

Among the few studies investigating the impact of US sustainability reports on perception of corporate reputation, Brown et al. (2010) examined this relationship based on a sample of 59 US companies issuing their sustainability reports for the first time over the period 2001 to 2007. After controlling for the financial halo effect reported by Brown and Perry (1994)⁹, they found that perception of reputation did not improve after the sustainability reports were released. However, they documented that the quality of such disclosure (measured by employing a 55-point content scheme obtained from the G3 version of GRI reporting guidelines) is positively associated with the changes in reputation scores. They also found that companies with more social exposure experience had decreased reputational scores relative to other firms. Their positive relationship between report quality and reputation is consistent with Godfrey's (2005) argument that since "acts perceived as ingratiating attempts to garner favor tend to be viewed as morally negative, they can actually lead to an erosion of reputation capital" (Godfrey, (2005) as quoted in Brown et al., (2010, p. 86)).

⁹ Brown and Perry (1994) documented that Fortune magazine's most admired reputation scores suffer from the "financial halo effect". In other words, these reputation scores are mainly influenced by the financial performance of the firms. Therefore, they suggested regressing reputation scores against five financial performance variables including size, ROE, market-to-book, growth (percentage change in sales) and risk (debt/equity) in order to eliminate such a financial halo effect.

Cho et al (2012) also investigated the determinants of corporate environmental reputation of 92 US firms from ESI. Their sample was drawn from the Newsweek magazine survey released in September 2009. This survey ranked 500 large US companies in terms of their actual environmental performance, policies and reputation. Therefore, contrary to prior studies that mostly employed Americans, British and/or the World's Most Admired Companies indices¹⁰, they use Newsweek rankings¹¹ as a proxy for corporate environmental reputation, and measure the extent of environmental disclosure by reviewing the annual reports and stand-alone sustainability reports (if published) based on Clarkson et al.'s (2008) comprehensive environmental disclosure scale. Their findings supported a significant positive association between environmental disclosure and environmental reputation asserting that more extensive environmental disclosure can improve corporate environmental reputation.

Hence, previous results suggest that environmental disclosure can improve corporate environmental reputation. These findings are consistent with Unerman's (2008) argument where he believes that the prime motive for organisations to engage with the disclosure of social and environmental issues is to minimise their reputation risk. He contends that corporate reputation is a valuable asset which needs to be protected, and to the extent that CSR policies and outcomes can meet public, social and environmental expectations and values, this valuable asset can be improved. Hence, CSR reporting can be used by companies to influence public perception with the aim of protecting and/or improving corporate reputation.

Although previous studies have attempted to investigate the impact of environmental disclosure on environmental reputation, none of them have investigated the extent to which environmental reputation is influenced by corporate symbolic disclosure. As stated earlier, in an area of environmental reporting dominated by voluntarism, corporate environmental disclosure towards

¹⁰ Studies on the relationship between CSR disclosure and environmental reputation have mainly employed the Fortunes survey of America's and/or the World's Most Admired Companies (in partnership with the Financial Times) and Britain's Most Admired Companies surveyed by Management Today in partnership with Birmingham City University as proxies of corporate environmental reputation. Respondents of these surveys consist of directors, executives and analysts, and they are asked to rank firms (other than their own) on such attributes as community and environmental responsibility employing a scale from 0 to 10. The average number constitutes corporate overall reputation. These surveys only include the largest firms.

¹¹ They believe that the Newsweek ranking captures a firm's environmental reputation better than previous indices since the respondents are only asked to state their opinions about environmental reputation and not other aspects of corporate performance. Thus, they suffer less from the "financial halo effect" documented by Brown and Perry (1994).

legitimacy can be both symbolic and behavioural, and there is an associated risk that companies, in pursuit of legitimation, enhance their reputation by disclosing more symbolic and rhetoric information. This is consistent with Hopwood's (2009) concern and more research is required in this area to address this. In addition, no empirical study has been carried out to investigate the impact of corporate carbon disclosure on carbon reputation. Thus, for the first time this study examines not only the relationship between carbon performance as well as the level of carbon disclosure and carbon reputation, but also the relationship between quality of carbon disclosure (i.e. the ratio of behavioural disclosure to carbon disclosure) and a firm's carbon reputation. In addition, this study, for the first time, investigates the extent to which carbon disclosure (both quantity and quality) mediates the negative impact of carbon performance on a firm's carbon reputation.

2.4 Carbon Reputation and Economic Performance

Prior research (Deephouse, 2000; Hussainey and Salama, 2010; Inglis et al., 2006; Kim et al., 2007; Kim, 2001; Roberts and Dowling, 2002; Shamsie, 2003; Vergin and Qoronfleh, 1998) on the association between a firm's reputation and economic performance has mostly found a positive link in the business world. They have mainly adopted resource-based theory to support the idea that reputation is a source of competitive advantage which can enhance corporate economic performance. Vergin and Qoronfleh (1998) use descriptive methodology to show how corporate reputation increases the capital gain of companies. They analyse Fortune's corporate reputation rankings against security prices in the following years of rankings from 1984 to 1996. They measure the stock performance of the top ten and bottom ten companies each year on Fortune's list and compare the average with Standard and Poor's 500 Stock Index for the same time period. Their results show that the ten top corporations appear to have an average increase of 20.1 percent in their share price over that period (between 1984 and 1996) which is 7 percent higher than the S&P 500 average (the average increase in the S&P was 13.1). But, the bottom ten companies show an average decrease of 1.9 in their share price. They also compare the dividends of ten companies at the top with the ten bottom companies. They found that many of the ten companies at the bottom suffer from financial problems and pay no dividends, whereas highly reputed companies have an average of 2.1 percent dividends. They conclude that reputation is a

valuable intangible asset which can ease attracting and retaining good customers and employees as well as obtain capital more easily.

Deephouse (2000) investigates the effect of reputation on the economic performance of US commercial banks. Unlike previous studies that mainly use Fortune ratings to measure corporate environmental reputation, he integrates mass communication theory into a resource-based theory to develop a new concept called media reputation which is the overall evaluation of a company presented in the media. For Deephouse, the conclusions obtained from Fortune ratings have some limitations. Firstly, this survey is highly correlated with financial performance. Secondly, it chooses directors, executives and analysts to rank firms and ignores other important stakeholders such as customers, employees, government agencies and so forth. Finally, this survey has concentrated on large US firms and there is no evidence that reputation is a valuable asset increasing the performance of small and medium (SMEs) companies. Hence, he measures media reputation by a content analysis of newspapers' archives, and uses relative ROA as an economic performance measurement since he believes that ROA indicates how well a firm has utilised its assets and controls for differences in capital structure and size. By having a total number of 526 observations, his result, which is consistent with the resource-based theory, indicated that favourable media reputation enhances corporate economic performance.

Roberts and Dowling (2002) also conduct research to examine the extent to which good reputation can sustain superior profit outcomes over time. Like several previous studies, they measure corporate reputation and profitability by using Fortune rankings and ROA respectively. They also employ market-to-book value and corporate size as control variables. They critically argue that the reason for employing market-to-book ratio as a control variable is that if a good reputation as an intangible asset allows superior financial performance to persist over time, other intangible assets may improve financial performance as well. The ratio of the market to book value can be deemed as one indicator of intangible asset where its inclusion can accommodate this concern. Likewise, as the Fortune survey is based on the perception of executives, directors and analysts, one may assume that future corporate profitability may affect the respondents' perceptions to rank corporate reputation. Since the market ratio captures the expectations of the market regarding future economic returns, the inclusion of this variable can ease this concern. They also use firm size as another control variable as it is thought that size enhances the ability

of a firm to sustain competitive advantage and profitability. By having a total number of 3141 observations, employing both proportional hazards regression models and autoregressive profit models and by designing a study with a time sequence (i.e. the impact of reputation at the t_{-1} time point on profitability at t_0), they conclude that firms with a better reputation are better able to have sustained superior economic performance.

Inglis et al. (2006) also test the relationship between corporate reputation and financial performance, using Australian data. They use the reputation ratings index to measure the reputation of sample companies. This index is produced annually by an Australian private company (RepuTex) based on ratings from a range of business and community groups on four key dimensions including workplace practices, corporate governance, and social and environmental impact. Each dimension encompasses a range of items considering past and future risk relating to social responsibility which is consistent with the Fombrun (1996) definition of reputation. By referring to Hall's (1992) argument that reputation as an intangible asset is reflected in the excess of the market valuation of a publicly listed company over its balance sheet value of ordinary capital and reserves, they use the market-to-book ratio to measure a firm's financial performance. They also employ ROE, ROA and return on invested capital (ROIC) to conduct a sensitivity analysis to ensure that the results are not functions of a specific economic performance measure. By running an econometric model on 77 Australian companies listed on the Australian Stock Exchange (ASX) in both the years 2003 and 2004, they found no causal relationship between corporate reputation and corporate financial performance. They conclude that reputation may not have a significant impact on financial performance in Australia, there may be weaknesses in the current measure of reputation, or there may be an "unobserved variability in the intervening variable of managerial exploitation of the reputation" (Inglis et al., 2006, p. 934). With regard to possible weaknesses in the link between corporate reputation and corporate financial performance, Inglis et al. (2006, p. 944) argue that "the link is not, in corporate practice, direct, but proceeds via strategy and competitive advantage. The resource that is reputation needs to be exploited if it is to yield financial results. Having the resource is not enough; it needs to be managed well. The level of use and management of reputation is, from this perspective, a key intervening factor".

Kim et al. (2007) also examine the effectiveness of the corporate reputation of 132 companies from Chemicals, Paper products, Primary metals, Petroleum and coal, and Transportation equipment industries in improving corporate profitability. They divide the reputation into two categories, namely symbolic and performance reputation. They use media reputation (the articles produced by The Wall Street Journal) as a proxy for symbolic reputation and the asset-based market-to-book ratio as a proxy for performance reputation as they believe that reputation regarding environmental decisions and actions potentially influences the overall reputational capital of the companies by representing “a factor of strategic importance to management and future earnings valuation by the investment community” (Kim et al., 2007, p. 87). They employ ROA and earnings-per-share ratios (EPS) as proxies of financial performance and control for prior profitability to isolate the impact of reputation on financial performance¹². Following Roberts and Dowling (2002) designing a study with a time sequence to enhance the interpretability of causal relationships with variables, they conclude that symbolic reputation does not contribute to corporate financial performance, whereas performance reputation does.

Hussainey and Salama (2010) carry out research to investigate specifically the association between environmental reputation as one dimension of a firm’s reputation and economic performance, by examining the importance of such reputation to investors. In other words, they examine the relationship between CER and share price anticipation of earnings. They employ the community and environmental responsibility of the BMAC survey over the period 1996 to 2002 as a proxy of corporate environmental reputation and use the Future Earnings Response Coefficient (FERC) as a proxy for the stock market’s ability to predict a firm’s future earnings. To investigate this association, they use the econometrics model of Collins et al. (1994) and regress current returns against current and future earnings changes which have been interacted with a firm’s environmental reputation.¹³ By running the regression model on 889 usable observations, they found that higher levels of corporate environmental reputation are associated with higher levels of FERC. Thus, their results suggest that environmental reputation can provide value-relevant information for investors to predict future earnings.

¹² Some previous studies suggest that profitability improves corporate reputation, as companies with better economic performance have more resources to spend on corporate reputation.

¹³ They interact all independent variables with a dummy variable (1 denotes companies with high environmental reputation scores and 0 denotes otherwise). They define companies in the top (bottom) of BMAC survey (i.e. 50% of the distribution of environmental reputation scores) as high (low) environmental reputation firms.

Although several studies have attempted to investigate the association between a firm's reputation and economic performance, none of them have investigated the impact of corporate carbon reputation on a firm's financial performance. As noted earlier, climate change is an important issue and good image in this area may lead to an enhanced competitive advantage and consequently improved economic performance. For the first time, this study will address this association.

2.5 Carbon Performance and Economic Performance

The association between environmental performance and economic performance has been the centre of attention for scholars from finance and economics disciplines. Prior empirical research on this association has delivered inconclusive and mixed results. According to Griffin and Mahon (1997) and Ullmann (1985), the main reasons for such inconsistency have been the use of different measures for environmental performance in the absence of a theoretical framework to investigate the interrelations between environmental performance, environmental disclosure and a firm's environmental reputation plus their joint contribution to economic performance, the use of different measures as a proxy of economic performance, and the use of different industry types.

The relationship between environmental performance and economic performance is complex. A positive relationship may suggest that only profitable companies can afford to deliver better environmental performance, or that the effective management, leading a company towards better economic performance, also considers the demands of different external stakeholders. Negative association, which is consistent with the traditional economic view, states that activities committed to achieve a high level of environmental performance are in conflict with the interests of investors, and resources required for such activities come out of shareholders' pockets. Another proposition for this relationship takes a middle position, suggesting a U-shaped correlation between these variables. In other words, it suggests that there is an optimal level between environmental performance and related resource allocations, and economic performance can suffer when too many or too few resources are allocated to environmental performance.

Bragdon and Marlin's (1972) study was among the first to examine the association between environmental performance and economic performance by employing pollution abatement data compiled by the CEP as an environmental performance measure, and return on equity (ROE) as

well as EPS as proxies of economic performance. Based on the US pulp and paper firms (monitored by the CEP between 1965 and 1970), they argue that pollution abatement and financial performance are compatible and found a positive relationship between environmental performance and economic performance.

Like Bragdon and Marlin (1972), Bowman and Haire (1975) examine the CEP pollution performance index against median return on equity (ROE) over the period from 1969 to 1973. They focus on 15 US firms from the paper and pulp industries included in the CEP survey. Their finding showed a U-shaped correlation between these two variables. They critically argue that although CSR is a good sign of informed and negotiating management, it is good for management to neither over respond nor under respond to them.

Spicer (1978) investigates the association between limited numbers of accounting and market-based variables used by investors in evaluating the worth of securities for their investment portfolios such as price/earnings ratio, total risk, size, systematic risk and profitability against a pollution control measured by CEP's pollution performance ratings. Based on the 18 US companies ranked by CEP from the pulp and paper industries, the results showed that companies with better pollution control records have a larger size, lower systematic risk, lower total risk, higher price/earnings ratio and higher profitability than poorer performers. Thus, the findings support a positive relationship between environmental performance and economic performance. Chen and Metcalf (1980) also replicate Spicer's study by controlling for the firm size. They found that the key variable is size, i.e. the largest firms reduce pollution more and have a better economic performance.

Hart and Ahuja (1996) also test this relationship using emissions reduction derived from the Investor Responsibility Research Center's (IRRC) 1993 Corporate Environmental Profile as a proxy of environmental performance against three operating and financial performance including return on sales (ROS), return on assets (ROA), and return on equity (ROE). The sample was obtained from Standard and Poor's 500 list of corporations. By refining their sample to 127 firms from manufacturing and mining industries and by sequencing research design variables, they conclude emissions reduction improved ROS and ROA in the following year and ROE for the two years later. Thus, they document the positive and significant association between environmental performance and a firm's economic performance.

Ullmann (1985) argues that the main reason for the mixed and inconclusive results is that studies have failed to consider the management's overall strategy, and assert that environmental disclosure, environmental performance and economic performance are jointly determined by this omitted element. Following Ullmann's (1985) comment regarding this common omitted variable, Al-Tuwaijri et al. (2004) argue that the problem described by Ullmann's meta-analysis, nevertheless, persists. They assert that the literature may have produced inconsistent results as it fails "to recognize the potential for endogenous relations among these three constructs" (Al-Tuwaijri et al., 2004, p. 452). Although it is not possible to represent a firm's unobservable strategy, they accommodate the joint determination process by estimating the relationships among these variables employing "a system of simultaneous equation approach" to capture an overall management (unobservable) strategy (Al-Tuwaijri et al., 2004, p. 452). By defining environmental performance as a ratio of total waste generated, which is recycled and annual stock return (adjusted for dividends), as a proxy for economic performance, they found a significant positive association between environmental and economic performance.

Nishitani et al. (2011) also examine the association between reduction of pollution emissions and corporate economic performance. They use 426 Japanese manufacturing firms belonging to pharmaceutical, chemical, electrical appliance, metal and other manufacturing industries listed on the Tokyo Stock Exchange. A logarithm of net sales over raw materials expense was employed to measure economic performance, and environmental performance was calculated from both the pollution management score derived from the Nikkei Environmental Management Survey and the Pollution Reduction Score. They found that the reduction of pollution emissions improves economic performance through both an improvement in productivity and an increase in demand, and document positive and statistically significant relationships between these variables.

Adherents to the positive association believe that the worst environmental performances represent resources utilised inefficiently by the firm, and reducing such inefficiencies benefit both economic and environmental performance. Likewise, as world demand is shifting rapidly towards valuing energy-efficient and low-pollution products, better environmental performers can gain a superior competitive advantage and reduce risk to which capital markets are increasingly sensitive. Thus, there is not a tradeoff between environmental goals and

profitability, and even well-designed environmental goals and regulations may improve economic performance (Porter and van der Linde, 1995).

Although the largest number of studies have found a positive relationship between environmental performance and economic performance (Margolis and Walsh, 2001; Nishitani et al., 2011; Roman et al., 1999) , several studies (Cordeiro and Sarkis, 1997; Freedman and Jaggi, 1992; Horváthová, 2012; Rockness et al., 1986; Sarumpaet, 2006) have produced a negative or non-significant association. Rockness et al. (1986) investigate this relationship by using hazardous waste disposal from a survey submitted to the US congress in 1979 as an environmental performance measure against 12 financial indicators as proxies of economic performance. By focusing on firms from the chemical industry, Rockness et al. failed to support a significant relationship between environmental and financial performance.

Freedman and Jaggi (1992) examine the long-running relationship between water pollution performance and economic performance of US pulp and paper firms. Like several previous studies, they focus on US firms whose products were pulp and paper during 1978-1983. They evaluate the percentage change in three water pollution measures and percentage change in accounting ratios including return on equity, return on assets and debt to equity. Out of 15 correlations, only two of them were significant. Thus, their findings reject the correlation between pollution performance and economic performance.

Cordeiro and Sarkis (1997) examine the impact of pro-environment activities and strategies of 523 US firms on short-term (one to five years) corporate financial performance. Unlike previous studies, they use security analysts' earnings forecasts to measure economic performance and use several environmental performance measures such as total toxic chemicals released to the air, direct discharges to bodies of water from the facility and so forth, obtained from the TRI database. Their results showed a negative association between environmental performance and economic performance. In other words, their findings indicated that security analysts predict lower earnings-per-share over the short term (one to five years) for more environmentally proactive companies.

Among those studies conducted in developing countries, Sarumpaet (2006) carries out an investigation to examine this relationship among Indonesian companies. He measures

environmental performance using corporate environmental ratings provided by Bapedal (the Ministry of Environment RI) through a program called PROPER, and economic performance by ROA as he believes that the financial performance of a firm is ultimately reflected in its profits, and return on equity and return on assets are the most commonly used measures of profitability. By controlling for total sales, stock exchange listing, industry sector and ISO 14001 certification, his results showed that economic performance is not associated with environmental performance.

Proponents of an inverse relation between environmental and economic performance, which is consistent with the traditional economic thought, believe that there is a tradeoff between environmental and economic performance. Acting in a socially and environmentally responsible way imposes costs that a company may not recover and this situation leads to higher prices and reduced competitiveness and causes financial diversions from vital productive investments.

Apart from those studies documenting positive, negative or non-significant associations between environmental performance and economic performance, some studies (Horváthová, 2012; Rassier and Earnhart, 2011) documented that the impact of the environmental performance on economic performance may vary in the short term and long term. Horváthová (2012) investigates the effect of environmental performance on the financial performance of Czech Republic companies by proposing a method to evaluate the environmental performance in a more comprehensive manner based on the weighting of various pollutants according to their dangerousness to human health and the environment. By having 1176 yearly observations over the period 2004 to 2008, their results suggest that while the impact of environmental performance on financial performance is negative in the short term (i.e. for environmental performance lagged by one year), it becomes positive in the long run (i.e. for environmental performance lagged by two years). They (p. 96) document that “it is clear that it may take time until firms adjust to new environmental regulations, as they often have to carry out a sizeable investment in order to comply with these regulations”.

Prior empirical research on the association between environmental performance and economic performance have mainly focused on the direct relationship between these two constructs. However, apart from the direct impact of environmental performance on economic performance, better environmental performance may also improve economic performance via enhanced reputation (Russo and Fouts, 1997). As noted earlier, both environmental performance and

environmental disclosure can affect corporate environmental reputation, and corporate reputation among its economically powerful stakeholders is a valuable asset (Unerman, 2008) which may improve corporate financial performance (Kim et al., 2007). Therefore, further investigation is required to understand the indirect impact that good environmental performance may have on economic performance via corporate reputation. To the best of the researcher's knowledge, this study, for the first time, examines not only the direct relationship between carbon performance and economic performance, but also the indirect relationship between these two via corporate carbon reputation.

2.6 Carbon Disclosure and Economic Performance

Unlike the studies exploring the relationship between environmental performance and financial performance, studies investigating the relationship between environmental disclosure and financial performance are scarce. The absence of comprehensive and consistent data sets related to environmental disclosure can be deemed as one of the main reasons for such scarcity (Murray et al., 2006).

Research related to environmental disclosures concentrates mainly on either how environmental disclosure can discharge the responsibilities and subsequent accountabilities of firms or on how such disclosure might be used by managers to manage stakeholders and hence secure the legitimacy of an organisation. However, environmental accounting research has not entirely ignored the financial consequence of such disclosure. Some studies (Anderson and Frankle, 1980; Belkaoui, 1980; Carnevale et al., 2012; Chan and Milne, 1999; Jaggi and Freedman, 1992; Murray et al., 2006) have attempted to examine the financial market's response to environmental disclosure.

Previous results, which are predominantly from the US studies, have been mixed and inconclusive. Anderson and Frankle (1980) assess the impact of the social disclosure of large US firms on the financial market. They compare the returns to portfolios including the securities of those firms disclosing social information and those not disclosing such information. Their results indicated that the market positively values social disclosure. By focusing on US pulp and paper firms over the period 1978 to 1983, Jaggi and Freedman (1992) also found that environmental disclosure by heavily polluting companies has information content and hence conclude a positive association between environmental disclosure and economic performance.

Chan and Milne (1999) also examine this relationship by focusing on how investors allocate their investment funds according to narrative disclosure of corporate environmental performance. Using an experimental design, they examine investors' reactions to two companies, namely called Company A and Company B. Company A discloses information that its activities have a negative impact on the environment and Company B discloses information that it is a leader in environmental management. Their results indicate that investors react strongly and negatively to a poor environmental performer while there is no significant reaction to a better environmental performer. Their further sub-analysis results showed that for the poor environmental performer, investors who specifically mention that environmental performance matters to them react even more strongly and negatively than those making no mention of environmental performance. On the other hand, their sub-analysis results, in the case of the better environmental performer, were more complex. For those investors who specifically mention the importance of a firm's environmental performance, they documented two opposite reactions. While one group of investors positively invests in the firm for its environmental leadership, the other group avoids investing in such a firm for what it seems to consider unnecessary and excessive costs.

For the first time, Murrar et al. (2006) investigate this association systematically in the UK context. They regress the association between total social and environmental disclosure, voluntary social and environmental disclosure as well as environmental disclosures against share price returns. They found that these relationships vary from year to year, across different forms of disclosure and swing between negative and positive over time. Although their longitudinal data showed a convincing relationship between consistently high returns and high disclosure, they could not conclude a direct relationship between social and environmental disclosure and share price returns of the UK's top 100 companies.

Carnevale et al. (2012) also examine the relationship between social reporting and economic performance by investigating the value relevance of social disclosure of 130 European banks over the period 2002 to 2008. To this end, firstly they investigate the direct influence of social reporting on stock price, then they further investigate the indirect influence of such reporting on the stock price "due to their capacity to modify the relevance of the other explanatory accounting variables (BPS and EPS)" (Carnevale et al., 2012, p. 171). To answer the questions of the study, they use value relevance analysis, and account for social reporting in their models by including a

dummy variable equal to 0 if the bank does not publish social reporting and 1 if it does. They also allow the dummy variable to interact with the variables earning per share (EPS) and book value per share (BPS) to determine whether social reporting can impact the effect of accounting information (BPS and EPS) on the stock price. Their descriptive statistics of both the stock price and accounting values (BPS and EPS) showed that they are higher for banks that publish social reporting. Therefore, their initial results demonstrated that, all other factors being equal, social reporting is more common among the banks producing more profit and with more equity and lower stock price variability. To estimate the effect of social reporting on stock price, they conduct one regression analysis for the sample as a whole and another one for a cross-country analysis. The results of the first regression analysis indicated a non-significant association between social reporting and stock price. Thus, they conclude that, all other factors being equal, the market does not value a bank's commitment to publishing social reporting. Their results regarding the potential indirect effect of social reporting on stock price (the interaction between the social reporting and BPS and EPS, respectively) did not show the higher effect of accounting information (BPS and EPS) on the stock price of the banks disclosing social information in comparison to banks that do not disclose such information. Thus, overall, their results did not support the relationship between social report and stock price. Their further findings from the cross-country analysis demonstrated that in some countries (Germany, Ireland, Italy and Spain) the social report positively affects the stock price while in others (Portugal, Austria and France) it negatively impacts the stock price.

Like the indirect relationship between environmental performance and economic performance, corporate environmental disclosure may indirectly improve a firm's economic performance via corporate reputation. As aforementioned, environmental disclosure as a reputation risk management tool has the potential for perception creation and/or manipulation for the sake of enhancing corporate reputation. This study, for the first time, examines not only the direct relationship between carbon disclosure and economic performance, but also the indirect relationship between these two via corporate carbon reputation.

2.7 The Gap in the Literature

The above review of the literature illustrated that prior results on the pairwise association between environmental performance, environmental disclosure, environmental reputation and

economic performance have been mixed and inconclusive. Al-Tuwaijri et al. (2004) argue that previous studies have ignored that management's overall strategy affects each of these corporate functions and future researchers should consider these functions to be jointly determined. Thus, for the first time, this study aims to investigate the interrelationship between these four constructs within a single inclusive model to fill this gap in environmental accounting discipline.

Furthermore, despite the fact that climate change and global warming pose a big threat to humankind, very few studies have concentrated on carbon and carbon related issues in the environmental accounting area. Thus, this study adds to the limited number of studies in the carbon accounting discipline. To the best of the researcher's knowledge, this is the first time that this study examines the extent to which corporate carbon reputation is influenced by carbon performance and related disclosure (both quality and quantity) and whether carbon disclosure lessens the impact of poorer carbon performance on carbon reputation. In addition, this study, for the first time, investigates the extent to which corporate carbon performance and carbon disclosure directly and indirectly (via corporate carbon reputation) improve the economic performance of a firm.

Finally, since corporate carbon behaviour may vary across those sectors facing greater carbon exposure, for the first time this study compares carbon intensive and non-intensive industry sectors to understand how different sectors react to carbon-related issues and how various stakeholders, such as the media and investors, respond to carbon behaviour of different industry sectors.

2.8 Conclusion

The review of literature in this chapter indicates that in spite of the importance of climate change and global warming, corporate carbon practices and their consequences have not been comprehensively explored in the environmental accounting area. The number of studies investigating the relationship between carbon performance and carbon disclosure is too limited to understand the real efforts of firms trying to reduce their harm to the environment. In addition, few studies have examined the impact of corporate carbon performance on economic performance to show whether it pays to be green, and finally, no studies have examined the determinants of corporate carbon reputation and its effect on the economic performance of a firm.

Reviewing the literature also reveals a number of theories that can be employed to address the research problem of this study, such as the legitimacy theory, to justify the use of voluntary carbon disclosure as a reputation risk management tool, and resource-based theory to support the corporate reputation-performance link. Therefore, these two theories will be used in this study as a foundation of the theoretical model and hypotheses which will be developed in the next chapter.

CHAPTER 3: Theoretical Framework

3.1 Introduction

The review of literature in the previous chapter revealed that corporate carbon behaviour (i.e. carbon performance and carbon disclosure) can play an important role in generating broader organisational advantages (i.e. carbon reputation) enabling firms to capture a better economic performance. Both carbon performance and carbon disclosure can contribute to a better carbon reputation, and such a reputation may allow firms to enjoy better economic performance.

This chapter develops a theoretical framework which is based on both legitimacy and resource-based theories. Legitimacy theory can help to better understand the mechanisms through which corporate carbon performance and carbon disclosure are reflected in the carbon reputation of a firm, and resource-based theory can help to deal with carbon reputation as an intangible asset, which in turn, may contribute to a better economic performance by enhancing the competitive advantage of a firm.

The remainder of this chapter is organised into six sections. Section 2 highlights the main theories adopted by previous studies in social and environmental accounting. Section 3 discusses the basic concepts and assumptions of resource-based theory followed by its contribution to social and environmental accounting. Section 4 discusses the main concepts of legitimacy theory. In addition, it discusses the role of accounting reports to implement legitimisation strategies employed by firms to avoid a legitimacy gap for the aim of protecting their legitimacy, and hence their reputation. Section 5 presents the theoretical model developed in this study, which is based on legitimacy and resource-based theories. Section 6 develops the hypotheses of the current study and the last section is the conclusion of this chapter.

3.2 Theories in Social and Environmental Accounting

In conventional understandings, the accounting's role is reduced to a process of collecting, measuring and reporting financial information to assist external and internal parties in making various decisions. This traditional role mainly ignores the social and environmental effects of corporate actions. Traditionally, corporate reports tend to disclose financial information to meet the information needs of different decision makers. However, over the last few decades, many organisations have been providing voluntary social and environmental information within their

reports. In contrast to financial accounting, which is heavily regulated in most countries, there is a lack of regulation related to public disclosure of social and environmental performance of an organisation (there are just a limited number of mandatory social and environmental disclosures required by few countries). Hence, several theories have been adopted to explain why managers make certain social and environmental disclosures within annual reports or other types of reports.

Legitimacy theory, stakeholder theory and institutional theory are three theories which have been mainly adopted by researchers to explain social and environmental disclosure. These three theories, which are referred to as system-oriented theories, are defined by Gray et al (1996 as cited in Deegan, (2002), p. 292) as follows:

... a systems-oriented view of the organization and society... permits us to focus on the role of information and disclosure in the relationship(s) between organizations, the state, individuals, and groups.

System-oriented theories consider the organisation as part of a larger social system. It assumes that the organisation is influenced by and influences upon the society in which it operates. Within these three theories, accounting disclosures are used to implement different strategies to influence the organisation's relationships with other parties. This is depicted in Figure 3.1.

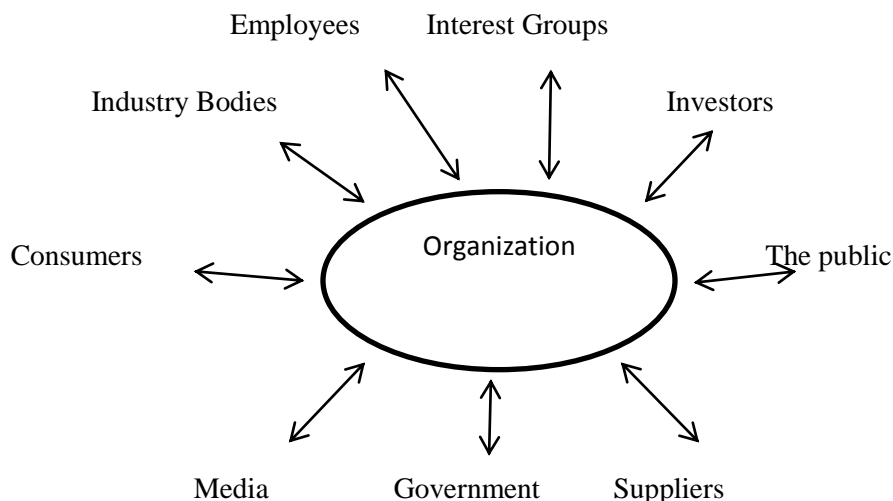


Figure 3.1 The organisation viewed as part of a wider social system

Source: (Deegan and Unerman, 2011, p.321)

The insights provided by legitimacy theory and stakeholder theory are based on those coming from the broader theory called political economy theory. Institutional theory can also be linked to political economy theory. Gray et al. (1996) define political economy theory as a political, social and economic framework in which human life takes place. The notion embraced by political economy theory is that social, political and economic activities are inseparable and economic activities cannot be meaningfully investigated without considering the social and political framework within which economic issue occurs. It is argued that political economy can provide a good lens to consider broader issues in order to understand how the company operates and what type of information it discloses (Deegan, 2002). Guthrie and Parker (1990, p. 166) assert that the political economy perspective considers accounting reports as social, political and economic documents which serve as a tool for “constructing, sustaining, and legitimising economic and political arrangements, institutions, and ideological themes which contribute to the corporation’s private interest”. They further (p. 166) take a view that accounting reports cannot be considered unbiased and neutral documents since they are “a product of the interchange between the corporation and its environment and attempt to mediate and accommodate a variety of sectional interest”.

Political economy theory is divided into two broad branches which Gray et al. (1996) label as classical and bourgeois political economy. Unlike the classical political economy, bourgeois political economy considers the world as essentially pluralistic. It means it does not accept that a particular class dominates and controls another, and hence ignores differences in power and wealth between different groups within society. Under this stream of political economy theory, there are interactions between different groups, regardless of their power and wealth, in an essentially pluralistic world (for instance, the negotiation between a company and an environmental pressure group). In contrast to the classical political economy theory perceiving accounting reports as a tool of maintaining the support of those controlling scarce resources, bourgeois political economy theory considers accounting reports as a means which should meet the information needs of different groups regardless of their power and wealth. Both legitimacy and stakeholder theories are derived from bourgeois political economy theory.

Legitimacy theory argues that organisations continually seek to ensure that their norms and values are congruent with the norms and values of the society in which they work. In other

words, this theory concentrates on whether the corporate activities are perceived by external parties as being legitimate. According to this theory, there is one social contract between a company and its respective society at large, and any breach of this social contract can damage corporate legitimacy and consequently the reputation of the firm (Deegan, 2002)¹⁴. Thus, legitimacy is a valuable source for corporate survival, and companies employ various mechanisms such as voluntary social and environmental disclosure to gain, maintain and/or repair legitimacy for the aim of maintaining and/or building reputation in their respective society at large.

Legitimacy theory has been employed by several researchers (Cho et al., 2012; Cho and Patten, 2007; Deegan, 2002; Deegan et al., 2002; Deegan and Rankin, 1996; Islam and Deegan, 2008; O'Donovan, 2002; O'Dwyer, 2005, 2002; Patten, 2002) to explore why managers elect to disclose voluntary social and environmental information. The findings mainly support the basis that such disclosures are part of a corporate strategy to bring, maintain and/or repair the legitimacy of their respective organisations. For instance, Patten (1992) concentrates on the extent of environmental information disclosed by North America Oil companies, other than the Exxon Oil Company, before and after the Exxon Valdez incident in Alaska in 1989. His results indicated an increased level of environmental disclosure made by these companies after the incident, which is consistent with legitimacy theory. Deegan et al. (2002) undertake a longitudinal study to examine social and environmental disclosure made by BHP Billiton over the period 1983 to 1997. Their result, which is in line with legitimacy theory, showed a positive association between media attention to specific social and environmental issues and the level of disclosure related to those issues. Islam and Deegan (2008) also review social and environmental information disclosed by two leading multinational clothing and sportswear companies (Nike and Hennes & Mauritz). They found a direct relationship between the media coverage of critical social issues (for instance the use of child labour) and the extent of social disclosure related to those issues.

Like legitimacy theory, stakeholder theory considers organisations as part of the broader social system wherein the organisations impact upon and are impacted by other groups within society.

¹⁴According to Deegan and Unerman (2011), the gaining and maintaining of legitimacy is often now expressed in terms of its role in building and maintaining an organisation's reputation.

O'Donovan (2002) argues that legitimacy and stakeholder theories are largely overlapping theories providing consistent, but slightly different, insights into factors affecting managerial behaviour. Stakeholder theory recognises that different stakeholder groups have a dissimilar impact on the organisation and their expectations are not only different, but also conflicting. Therefore, the ability of a corporation to manage these diverse expectations is a key factor in receiving support from different stakeholder groups. Unlike legitimacy theory, stakeholder theory assumes there is more than one social contract between the organisation and different stakeholder groups, and companies disclose social and environmental information to gain the support of those stakeholders whose existence is important for corporate survival. Thus, this theory does not merely assume that companies disclose social and environmental information for the sake of building and/or maintaining corporate reputation at large, and does not consider such disclosure as a reputation risk management tool to inform and/or manipulate the perception of society about corporate activities.

Several studies (Islam and Deegan, 2008; Neu et al., 1998; Roberts, 1992) have also employed the stakeholder theory to test the ability of stakeholders to impact on social and environmental disclosures of the organisations. Both Roberts (1992) and Neu et al. (1998) found that companies are more responsive to concerns of more powerful stakeholders, such as shareholders and government regulators. Neu et al. (1998) also found where there is a conflict of interests or expectations from different stakeholder groups, organisations elect to disclose information to those stakeholders who are more important for corporate survival. Islam and Deegan (2008) interviewed senior executives of Bangladesh Garments and Manufacturing Enterprise Association (BGMEA) to get an understanding of their operating and disclosure policies. They found that these executives are more responsive to the expectations of multinational buying companies, such as Reebok, Gap and Nike, as main powerful stakeholders. The executives note that once western media begins to cover stories about poor working conditions or the use of child labour in their factories, western consumers start to boycott the product of multinational buying companies, and hence these companies impose operating and reporting requirements on their suppliers.

While legitimacy and stakeholder theories argue how a particular strategy (i.e. social and environmental disclosure) is employed by organisations to gain and/or maintain legitimacy at

large, and between different stakeholder groups respectively, institutional theory explores how changing social and institutional pressures and expectations are understood by organisations for adopting particular organisational forms in order to bring them legitimacy. For this reason, this theory is considered as a complementary perspective to both legitimacy theory and stakeholder theory since, not only does this theory include those mechanisms proposed by legitimacy and stakeholder theories, but it also encompasses a broader range of legitimating mechanisms. However, unlike legitimacy theory, institutional theory does not merely concentrate on the role of such disclosure in gaining and/or maintaining legitimacy and reputation at large, but it explains how mechanisms through which organisations may seek to indicate that their practices and activities are congruent with social and cultural values have become institutionalised within their organisations (Deegan and Unerman, 2011). In addition, like stakeholder theory, this theory does not consider voluntary social and environmental disclosure as a reputation risk management tool to inform and/or manipulate the perception of society about corporate activities.

Apart from system-oriented theories mainly used to provide insights into why organisations might elect to disclose such voluntary information, several theories such as signalling theory, resource-based theory, etc., have been employed to examine the financial consequences of corporate environmental practice (i.e. environmental performance and environmental disclosure). Both environmental performance and environmental disclosure may not only directly improve the economic performance of a firm (by sending a signal to the market about its activities), but also contribute to better corporate environmental reputation, a factor that may improve the economic performance of a firm. According to resource-based theory, corporate reputation is an important intangible asset, not only because of its value creation, but also because of its intangible nature making it difficult to be replicated by rivals. Consistent with this theory, this intangible resource may improve corporate financial performance by enhancing the competitive advantage of the firm (Barney, 1991).

Following the aim and objectives of this study, and to address the research problem presented in Chapter 1, legitimacy theory and resource-based theory have been employed to develop the theoretical framework of this study. Legitimacy theory can help to better understand mechanisms through which corporate carbon disclosure is reflected in the carbon reputation of a firm, and resource-based theory can help to deal with carbon reputation as an intangible asset, which in

turn, may contribute to a better economic performance. Although legitimacy theory, stakeholder theory and institutional theory should be seen as overlapping and complementary theories discussing the role of voluntary social and environmental disclosure in gaining and/or maintaining corporate legitimacy in different levels (Deegan and Unerman, 2011), none of them, except legitimacy theory, concentrates on the role of such disclosure to gain and/or maintain legitimacy in the respective society at large for the sake of building and/or maintaining reputation, and considers such disclosure as a tool of reputation risk management. Likewise, among those theories adopted by prior studies to investigate financial consequences of CSR practices, none of them, other than resource-based theory, discusses reputation as an intangible asset which may improve the financial performance of a firm.

The following sections will discuss the premises of both resource-based theory and legitimacy theory in detail.

3.3 Resource-Based Theory

3.3.1 Basic Concept

Resource-based theory (RBT) emerged as an important concept in the area of strategic management. Its footprint can be seen in management's early work. The relationship between a firm's special capacities and its performance can be found in some classic management studies. For instance, the notion of a "firm's distinctive competence", "structure follows strategy", and "an internal assessment of weaknesses and strengths, led to recognition of distinctive competencies" are related to RBT (Wernerfelt, 1984).

Since the early 1980s, researchers have been attempting to develop and define resource-based concepts, and relate how corporate resources can give rise to the competitive advantage of a firm. RBT developed as a complementary view to the industrial organisation (IO). The IO view asserts that a firm's success is completely determined by what happens outside it. In other words, IO suggests that firm performance is determined by the external environment and its industrial structure. The resource-based view was developed by Wernerfelt (1984), Dierickx and Cool (1989) and Prahalad and Hamel (2006) around the internal capabilities of firms to counter the IO view. This theory shifts the emphasis from the competitive environment of companies to resources that companies have developed to compete in that environment. It aims to explain why

companies in the same industry might be different in their performance and how they gain and sustain a competitive advantage (Hoskisson et al., 1999).

Wernerfelt (1984) suggests that analysing organisations from the resource side can lead to insights that are different from the traditional perspective (i.e. product side). He defines resources as tangible and intangible assets (e.g. brand names, employment of skilled personnel, efficient producers, and so forth) that are tied semi-permanently to a firm, and investigates the association between resources and profitability in terms of resource position barriers (i.e. those resources difficult for others to catch up with). Wernerfelt (1984) argues that the first mover advantage is an attractive resource which ought to produce higher returns in markets where the resource in question dominates.

Following Wernerfelt's (1984) works, one group of researchers (Barney, 1986; Dierickx and Cool, 1989) investigated and explained more specifically how differences in companies' resources cause superior firm performance. Another group of researchers concentrated on examining special resources giving rise to a sustainable competitive advantage. Examples of such resources are: organisational culture (Fiol, 1991), reputation (Hall, 1992), human resources (Bresser, 1998) and organisational learning (Teece, 2009)

Barney (1991) presents a more comprehensive and concrete framework to identify the criteria required by resources to sustain competitive advantage. He asserts that in order for resources to become sources of competitive advantage, the underlying assumption is that firms' resources can be heterogeneous and immobile. It means that not all firms within the same industry have exactly the same resources. Although it is logical to accept that most industries are characterised by, at least some degree, mobility and homogeneity (Barney and Hoskisson, 1990), competitive advantage cannot exist if the firm resources within the same industry are perfectly mobile and homogeneous. Barney further argues that for the resources to have the potential of competitive advantage, resources must have four characteristics including value, rareness, inimitability and non-substitutability. Value refers to the extent to which resources exploit opportunities and/or neutralise threats in a firm's competitive environment. Rareness refers to the point that resources should be rare among an organisation's current or potential competition. Inimitability asserts that resources should not be obtained or recreated by other rivals without cost advantage, and finally there should not be strategically equivalent substitutes for the resources (i.e. non-substitutability).

Figure 1 indicates the relationship between resource immobility and heterogeneity; value, rareness, imperfect immutability and substitutability; and sustained competitive advantage.

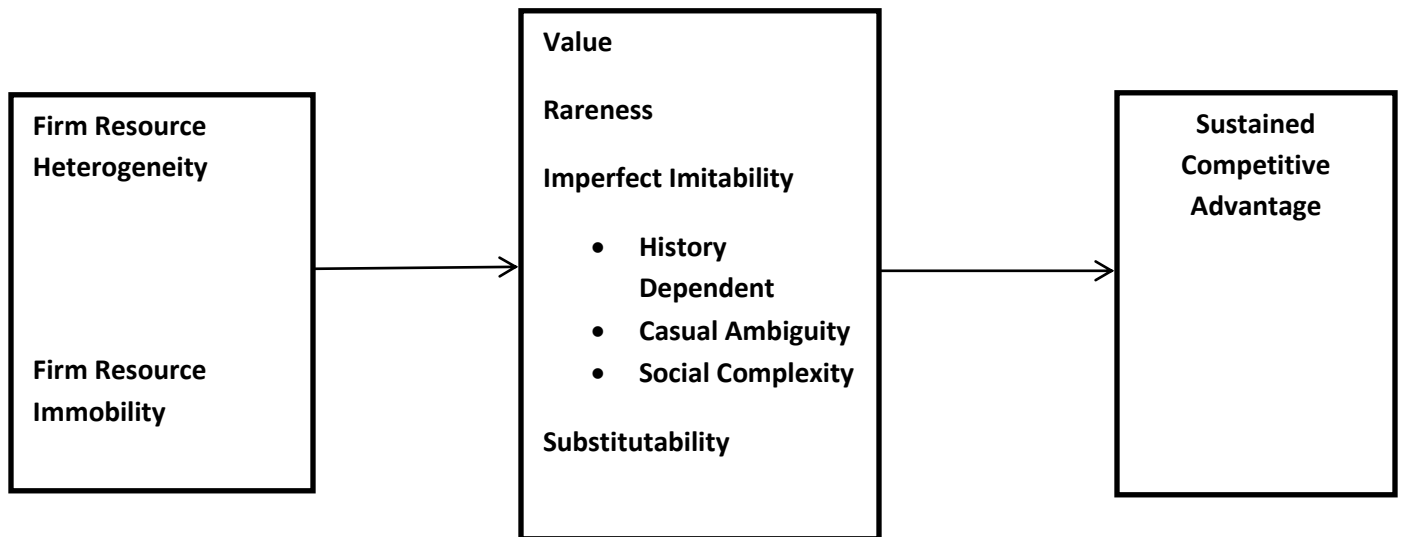


Figure 3.2 The relationship between resource immobility and heterogeneity; value, rareness, imperfect imitability and substitutability; and sustained competitive advantage

Source: Barney (1991a, p. 112)

Resources can become sources of competitive advantage when they exploit opportunities or neutralise threats (i.e. they should be valuable) in the companies' environment. Without this characteristic, resources are not able to improve firms' performance even if they possess other characteristics qualifying them as sources of competitive advantage (e.g. rareness, inimitability, non-substitutability). However, valuable resources owned by large numbers of competitors cannot be considered as sources of competitive advantage as firms can enjoy a competitive advantage when their value-creating strategies are not implemented by rivals simultaneously. This does not mean that valuable, but common, resources are not important, but such resources can ensure that firms increase their probability of economic survival instead of obtaining a competitive advantage (Barney, 1991).

Therefore, valuable and rare resources may be sources of competitive advantage, and firms possessing these resources can often be strategic innovators as they are able to conceive and engage in strategies that other firms cannot. But, valuable and rare resources can only be sources of competitive advantage when firms which do not have these resources cannot obtain them

easily. Hence, the firm resources must also be imperfectly imitable in order to enhance competitive advantage (Hoskisson et al., 1999).

In order for resources to be imperfectly inimitable, they need to have one or a combination of three reasons, including unique historical condition, casually ambiguity and/or social complex. Unique historical conditions refer to the point that the ability of the firms to acquire and employ some resources depends on their place in time and space, and those firms which do not have access to this time and space cannot obtain these resources. Hence, these resources are then imperfectly imitable. Casual ambiguity exists when the relationship between resources and competitive advantage cannot be understood clearly, thus it can be difficult for other firms to duplicate a successful firm's strategies as they do not clearly know which resources they should imitate. A final reason for nominating resources as imperfectly imitable is that they may be complex social phenomena. Examples include corporate culture, reputation and interpersonal relationships among managers in a firm and so forth. In this situation, such resources cannot be easily duplicated by others.

3.3.2 Resource-Based Theory and Social and Environmental Accounting

Recent years have witnessed the substantial attention of researchers to the managerial involvement of corporate social responsibility (CSR). Studies have mainly concentrated on management incentives to engage with CSR (especially CSR disclosure) or the relationship between CSR and firm performance which may help to understand whether companies benefit financially from CSR activities. However, there is a paucity of empirical studies to investigate the strategic aspects and benefits of CSR activities of a firm.

Over the last two decades, several studies (Bangoli and Watts, 2003; Baron, 2001; Hart, 1995; Hart and Dowell, 2011; McWilliams and Siegel, 2001, 2011; Russo and Fouts, 1997) have investigated strategic aspects and benefits of engaging with CSR activities based on resource-based theory (RBT). Russo and Fouts (1997) assert that RBT offers researchers a tool to refine the analysis of how corporate social and environmental policy impacts the bottom line for two reasons. They note (p. 535) "first, the resource-based view has a strong focus on performance as the key outcome variable. And second, like the social responsibility literature, work adopting the resource-based view explicitly recognizes the importance of intangible concepts, such as know-how, corporate culture, and reputation".

Hart (1995) expands models of sustainable competitive advantage by including constraints imposed by natural environment and proposed a natural resource-based view (NRBV). He argues how resources rooted in a firm's relationship with its natural environment may lead to competitive advantage. He outlines product stewardship, pollution prevention and sustainable development as the three stages of the proactive environmental strategy. Hart and Dowell (2011) revisit Hart's approach based on a number of important developments emerging over the past few years in both RBT and social and environmental accounting discipline to expand the NRBV. Firstly, they consider the NRBV of a firm in the light of dynamic capabilities. Teece (2009) proposes the dynamic capabilities perspective as a compliment to RBT to explain how organisations adjust capabilities in a rapidly changing world. Secondly, they examine the role of NRBV to understand how companies incorporate clean technologies in their pursuit for competitive advantage. Finally, they discuss the capabilities and resources needed to enter and succeed in the base-of-the-pyramid (BoP)¹⁵.

McWilliams and Siegel (2011) analyse the creation and capture of both private and social value by companies employing strategic CSR. Strategic CSR was first introduced by Baron (2001) as the use of CSR to capture the value of a firm. He asserts that if the corporate motivation to engage with CSR is to serve society at the cost of benefits, it is socially responsible. Otherwise, if the CSR activity is for serving the bottom-line, this action is privately responsible. Following Baron's definition of strategic CSR, McWilliams and Siegel (2001) define strategic CSR as any responsible activities allowing a firm to capture competitive advantage regardless of motive. To help managers to achieve this objective, they integrate a RBT framework with concepts and tools of economics, such as hedonic pricing, contingent valuation and the new literature on the economics of industrial organisation. By linking CSR, RBT and economic models of private provision of public goods and pricing models, they argue how RBT can provide a structure for determining the strategic value of CSR, and discuss conditions under which CSR may contribute to strategic competitive advantage.

Regarding environmentally responsible actions and attributes such as recycling, reducing pollution, and so forth, McWilliams and Siegel (2011) argue that such actions can create a social

¹⁵ Since Hart's article (1995) the area of corporate sustainable development of the NRBV has been separated into two distinct areas: clean technology and BoP. Heightened attention of the role of firms in reducing poverty for the poorest of the world's citizens has resulted in emerging new literature around what has come to be known as BoP.

good (e.g. cleaner air) which is available to all and not just those customers who buy the product from socially and environmentally responsible producers. Consumers who purchase private services or goods cannot prevent others from consuming the social good, and the amount of social good is not reduced by others' consumption. Unlike private services and goods, there is no market for social goods, and hence no observable market prices. Thus, no one pays for this CSR action, and hence the question is how can a firm capture value of such an action?

3.3.2.1 Resource-Based Theory and Social and Environmental Reputation

McWilliams and Siegel (2011) argue that since there is a societal value for being socially and environmentally responsible, firms can capture the value of providing social goods through good reputation. A growing body of research argues that good reputation holds strategic value for the firms (Barney, 1991; Dierickx and Cool, 1989; Hall, 1992; Weigelt and Camerer, 1988). Roberts and Dowling (2002) argue that consistent with RBT, intangible assets such as good reputation are critical not only because of their potential for creating value, but also because of their intangible nature making it difficult for others to replicate. Several studies (Deephouse, 2000; Kim, 2001; Kim et al, 2007; Roberts and Dowling, 2002; Shamsie, 2003; Vergin and Qoronfleh, 1998) have also demonstrated that a good reputation can improve corporate performance by allowing firms to charge higher prices, attract investors, enhance access to capital markets, and so forth.

Figure 3.2 suggests the conditions under which good reputation can be considered as a source of competitive advantage. Good reputation is rare since not all firms within the industry and the market have a good reputation. Reputation may also be imperfectly imitable since the development of good reputation usually depends upon time and specific difficult-to-copy historical settings. Likewise, since reputation is based on stakeholders' perceptions about corporate activities and such perception is an outcome of informal social relations between the firm and its key stakeholders, these informal relations can be considered as socially complex phenomena and thus imperfectly imitable. A good reputation is also a non-substitutable resource. Although some believe that firms can reassure their suppliers and customers by using some types of guarantees and other long-term contracts instead of developing a good reputation, it is not clear whether guarantees and long-term contracts have the same psychological impact on

stakeholders as a good reputation has (Barney, 1991). Barney (1991) critically argues that if the guarantees and reputation are substitutes, why do some firms invest in both?

Hall (1992) asserts that reputation can be an important factor in achieving competitive advantage through differentiation. His national survey of 847 chief executives in the UK indicates that UK executives ranked reputation as the most important intangible assets among another thirteen intangible resources such as intellectual property rights and patents, copyright, trademarks, know-how, and so forth. For them, reputation is a valuable intangible asset which is a product of demonstrated superior competence over several years and the most important contributor to the overall success of the firm. They also identify reputation as a fragile resource which can take time to create, can be easily damaged, cannot be bought, and can take the longest to be repaired if it is damaged.

Traditionally, profitability was considered as the only criteria of good reputation. However, due to heightened public attention to social and environmental issues over the last few decades, profitability is not the only criteria of good reputation. Companies also need to create a good social and environmental reputation to guarantee their existence. Unerman (2008, p. 362) takes the view that corporate reputation is a valuable asset which needs to be protected and developed and “the key aspect of this reputation is the stakeholders’ perception of the corporations’ CSR practices and policies”. Therefore, consistent with RBT, environmental reputation can be considered a valuable strategic resource which may improve a firm’s economic performance and, consistent with legitimacy theory, social and environmental disclosure has an important role in creating a good reputation for corporate social and environmental activities. The next section will explain legitimacy theory and its premises in details.

3.4 Legitimacy Theory

3.4.1 Basic Concepts

Lindblom (1994 as quoted in Gray, Kouhy, and Laver, (1995)) asserts that legitimacy is a status or condition existing when a company’s norms and values are congruent with the norms and values of a broader social system of which the company is a part. Suchman (1995) also defines legitimacy as a generalised perception or assumption that corporate actions are appropriate and desirable within some socially constructed values, norms, and beliefs.

Legitimacy theory asserts that organisations continually attempt to be perceived as operating within the norms and values of their respective societies. In other words, they seek to be perceived by external parties as being legitimate. This theory relies on the notion that there is a social contract between an organisation and its respective society. The term ‘social contract’ is not easy to define, but it represents a multitude of public expectations about how a company should carry out its activities and operations. Traditionally, profit maximisation was viewed as an all-inclusive measure of corporate legitimacy. However, since public expectations have undergone significant change, profit maximisation is not considered as the only criterion of organisation legitimacy. Heard and Bolce (1981) noted that during the 1960s and 1970s in the US, there was a significant increase in legislation related to social and environmental issues. Thus, it is anticipated that successful organisations consider the social and environmental consequences of their activities (Heard and Bolce, 1981).

Within legitimacy theory, it is assumed that society allows organisations to continue their operations to the extent that they generally meet public expectations (i.e. to the extent that they comply with the social contract). Thus, corporations ought to consider the rights of society at large, and not merely its shareholders. Consistent with legitimacy theory, corporations do not have any inherent right to resources, and legitimacy and the right to operate go hand in hand. If a company cannot maintain its social contract with the public, then the community may revoke its contract and disallow the continuation of its operation (Deegan and Rankin, 1996b). In other words, such corporations can be discouraged by negative sanction or punishment in the form of consumer decreasing, limited labour and the financial capital resources provided by society.

As society’s expectations change over time, organisations should also change their operations in order to maintain their legitimacy. It means that if public expectations about performance change, organisations need to show that their operations have changed in accordance with society’s expectations or explicitly communicate why their operations have not changed. Hence, due to the dynamic nature of legitimacy, there is a need to identify society’s expectations for the aim of meeting these changing expectations and avoiding a legitimacy gap.

The term ‘legitimacy gap’ has been used by many researchers to describe a situation where there is a gap between how the society believes an organisation must act and how it is perceived that the organisation has acted. There are two sources of an arising legitimacy gap. Firstly, societal

expectations may change, and this can lead to a legitimacy gap even though the organisation operates in the same way as it has always operated. The organisation may even change its operations towards community expectations, but if the pace of change is slower than the community's changing expectation, the legitimacy gap can also arise. Legitimacy might be threatened even when the actual performance of an organisation is congruent with public expectation. This might be because of an organisation's failure to disclose information to inform the respective society (Deegan et al., 2002).

Given the potential costs associated with breaking the social contract and legitimacy gap, companies tend to take serious actions to ensure that their activities are perceived by society as being legitimate (Dowling and Pfeffer, 1975). Lindblom (1994 as quoted in Gray, Kouhy, and Laver, (1995)) distinguishes between legitimacy, which is considered as a status, and legitimization which she considers as the process leading to organisation legitimacy. Woodward et al. (1996) argue that, unlike many other resources, legitimacy can be manipulated by employing different strategies such as voluntary social and environmental disclosure. For companies to be perceived as legitimate, it is not just the actual operations which are important, but also how the society collectively knows or perceives those operations (Deegan and Unerman, 2011). Thus, under legitimacy theory, companies employ voluntary social and environmental disclosure to inform the society about their real changes and/or manipulate the perceptions to avoid a legitimacy gap.

3.4.2 Accounting Reports, Symbolism and Behavioural Management, and Social and Environmental Reputation

Dowling and Pfeffer (1975) state that organisations can employ one of the following means to legitimise their activities:

- By identifying goals, methods and outputs in line with prevailing definitions of legitimacy in a respective society
- By changing the definition of social legitimacy, through communication, in accordance with present goals, activities and values of the organisation
- By becoming identified, through communication, with symbols or values having a strong base of legitimacy

Consistent with Dowling and Pfeffer's communication strategy, Lindblom (1994 as quoted in Gray, Kouhy, and Laver, (1995)) asserts that whenever companies disclose social and environmental information to legitimise their own existence, they can adopt one of four possible strategies:

- Educate and inform its relevant public about actual changes in the organisation's performance and activities
- Change the perceptions of the relevant public without having to change its actual behaviour
- Manipulate the perception to deflect attention from the issue of concern to other issues
- Change external expectations of its performance

As noted earlier, information disclosure can have a vital role in establishing and shaping corporate legitimacy. In the context of social and environmental responsibility, voluntary social and environmental information within annual reports and/or sustainability reports may be employed by companies to implement the above strategies to convince stakeholder audiences that their operations are legitimate. According to the above strategies, companies may disclose information to mediate the negative consequences of real performance and/or inform interested parties about the corporate real actions which were previously unknown and/or draw attention to strengths or down-play information regarding the negative implications of their activities. Hence, corporate disclosures towards legitimacy and maintaining a social contract can be varied, i.e. it may convey a message about real changes taken by a company and how social expectations have affected these operational changes (behavioural management) or may concentrate on creating a positive image about corporate actions without real changes in operations (symbolism) (Gotsi and Wilson, 2001).

Ashforth and Gibbs (1990) assert that the use of behavioural (substantive) management techniques of legitimation involve material, real change in corporate goals, process, and structures consistent with social norms and values. In contrast to the behavioural (substantive) management techniques, symbolic management techniques of legitimation are employed to indicate corporate image in a manner to appear consistent with public norms and expectations without changing the actual operating policies of a company (Ashforth and Gibbs, 1990).

Such variation in the nature and range of disclosure (i.e. symbolic and behavioural disclosure) has been supported by several studies. Marshal and Brown (2003) argue that corporations disclose little information about their efforts to improve environmental performance in the future. Kolk (2003) argues that while companies have increased their level of social information, they mainly tend to express their intentions and concerns instead of actually measuring their real performance and its impact. O'Dwyer (2002) interviewed managers of a small sample of Irish firms and found out that companies are interested in providing more symbolic and self-serving information. For instance, companies may disclose some statements to show their commitment to social and environmental issues without mentioning specific action or outcomes, or they may set some targets or objectives to be achieved in the future without specifying associated actions.

Ashforth and Gibbs (1990) and Hrasky (2011) argue that both symbolic and behavioural disclosure approaches can be useful towards corporate legitimacy and enhancing corporate reputation. However, the problem arises when companies, in the pursuit of legitimation, disclose information to create a positive image about corporate activities with no associated change in operation. It seems that it is these two different approaches (symbolism and behavioural management) towards legitimacy underpinning Hopwood's (2009) concern that, although environmental disclosure can increase corporate accountability by enhancing transparency of corporate environmental activities and consequences (behavioural approach), such disclosure can construct a new and different image of an organisation. In this case, less is known about corporate real actions despite an apparent openness of reporting, and companies are subject to less scrutiny in future. Thus, in the urgent need for more research, he identified an area of legitimation and corporate voluntary disclosure.

3.5 Theoretical Framework

Following the above discussion, and as noted earlier, companies are motivated to employ accounting reports to implement different legitimation strategies in order to gain and maintain and/or repair corporate legitimacy. In recent years, the implementation of different legitimation strategies within social and environmental disclosure has been more focused on building and maintaining corporate reputation. According to Deegan and Unerman (2011, p.336) "...the gaining and maintaining of legitimacy is often now expressed in terms of its role in building and maintaining an organization's reputation".

Bebbington et al. (2008) assert that CSR reporting can be considered as both an outcome of and part of a reputation risk management process. Unerman (2008), in comment on Bebbington et al., notes that corporate CSR reputation is a valuable asset which needs to be protected and developed. He contends (p. 362):

The key aspect of this reputation is stakeholders' perceptions of the corporations' CSR or, more precisely, perceptions of how well the corporations' CSR policies, practices and outcomes meet stakeholders' social and environmental values and expectations. Within this context, CSR reporting is a potentially powerful medium which corporations can use to try to influence perception, thereby contributing toward maximizing the earning potential to their reputation.

The use of the term 'reputation' makes clearer the financial consequences and importance of legitimacy. Managers are aware of the significance of a company's reputation as a source of considerable value in generating future profit, and any damage to this reputation can therefore affect its future financial performance. The reputation risk management perspective within social and environmental disclosure practice assumes that any threats to a company's legitimacy can lead to damage to its reputation, and active management needs to minimise such risks to reputation (Deegan and Unerman, 2011).

Within the carbon accounting discipline, voluntary carbon disclosure can be employed by firms as a mechanism to mitigate threats to corporate carbon reputation. This is a factor consistent with RBT, which can improve corporate economic performance due to its capability to enhance corporate competitive advantage because of its intangible nature, making it difficult for rivals to replicate (Roberts and Dowling, 2002). Thus, the problem arises when, consistent with legitimacy theory, voluntary carbon disclosure, and specifically symbolic disclosure, can mediate the negative impact of carbon performance on carbon reputation and improve corporate carbon reputation. This factor, which is consistent with RBT, can enhance corporate economic performance by improving the competitive advantage of a firm (i.e. by attracting more investors). In this case, such disclosure may actually reduce the incentives of corporate management to improve their real carbon performance and reduce their impact on climate change and global warming.

Based on the above discussion and to address the research problem of this study, the following theoretical model is developed:

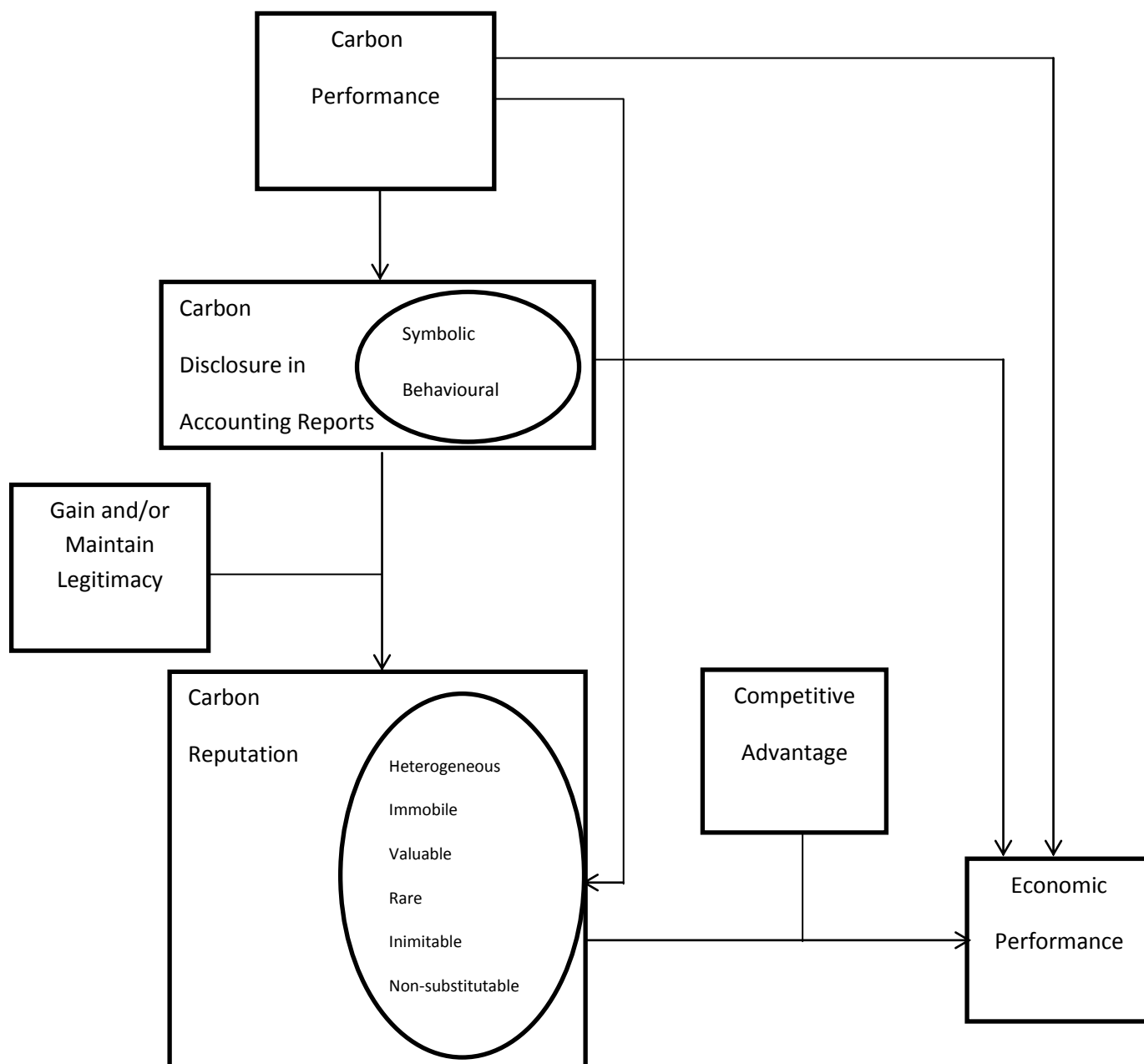


Figure 3.3 Theoretical Framework

3.6 Hypotheses Development

After the development of the theoretical framework to address the research problem of this study, fill the gap in the literature and in line with the premises of legitimacy, RBTs and previous studies, the number of hypotheses are developed as follows:

3.6.1 Carbon Performance and Carbon Disclosure

Prior studies (Al-Tuwaijri et al., 2004; Cho et al., 2012; Cho and Patten, 2007; Clarkson et al., 2008; Clarkson et al., 2011; Hughes et al., 2001; Patten, 2002) on the relationship between environmental performance and environmental disclosure have failed to present consistent results. These studies have approached this association from two competing theoretical perspectives, namely voluntary disclosure theory and legitimacy theory. However, concerns related to methods and measures bring the findings into question (Patten, 2002).

Voluntary disclosure theory, mainly applied by financial disclosure studies, asserts that firms with better environmental performance have incentives to disclose their objective environmental performance indicators which are difficult to be imitated by poor performers. Thus, this theory predicts a positive association between environmental performance and the quantity of environmental disclosure. In contrast, social-political theories such as legitimacy theory argue that companies employ social and environmental reporting as an impression management tool to reduce social and political pressures. In other words, legitimacy theory proposes that companies are willing to use such disclosure as a legitimation tool to reduce the negative potential impacts of real performance information for the aim of mitigating social and political pressures (Cho and Patten, 2007) and protecting corporate reputation (Bebbington et al., 2008; Cho et al., 2012). According to this theory, companies with a poorer environmental performance would be expected to provide more environmental disclosures in their reports to mitigate public pressure or deflect attention from the issue of concern. Thus, this theory predicts a negative association between environmental performance and the level of environmental disclosure.

Hopwood (2009) argued that, while an increased level of voluntary disclosure can have a constructive outcome, there is a risk that such disclosures, in the pursuit of legitimation, aim at creating a positive impression of corporate activities without changing the real actions (symbolism). Although corporate disclosure strategies towards legitimacy can be both symbolic and/or behavioural (substantive), Clarkson et al. (2011) argue that consistent with legitimacy theory, since firms with poor environmental performance may face threatened legitimacy, they are motivated to make more self-serving disclosures. Hence, their disclosures tend to be softer in nature (i.e. symbolic) as they seek to manipulate perceptions, regardless of their real performance (Clarkson et al., 2011).

Following previous studies (Cho et al., 2012; Cho and Patten, 2007; Clarkson et al., 2011; Hughes et al., 2001; Patten, 2002) documenting a negative relationship between environmental performance and quantity of environmental disclosure which is consistent with legitimacy theory, and in line with Clarkson et al.'s (2008, 2011) argument that legitimacy theory can also be useful to predict the relationship between environmental performance and what is being disclosed (i.e. nature of disclosure), the following hypotheses were developed:

H1a: Ceteris paribus, for firms from carbon intensive industries, the quantity of carbon disclosure is negatively associated with carbon performance.

H1b: Ceteris paribus, for firms from carbon non-intensive industries, the quantity of carbon disclosure is negatively associated with carbon performance.

H2a: Ceteris paribus, for firms from carbon intensive industries, the quality of carbon disclosure (i.e. ratio of behavioural disclosure to symbolic disclosure) is positively associated with carbon performance.

H2b: Ceteris paribus, for firms from carbon non-intensive industries, the quality of carbon disclosure (i.e. ratio of behavioural disclosure to symbolic disclosure) is positively associated with carbon performance.

3.6.2 Carbon Performance, Carbon Disclosure and Corporate Carbon Reputation

Fombrun and Van Riel (1997, p. 10) define corporate reputation as “.... A collective representation of a firm's past actions and results that describes the firm's ability to deliver valued outcomes to multiple stakeholders. It gauges a firm's relative standing both internally with employees and externally with its stakeholders, in both its competitive and institutional environments”.

In other words, they argue that reputation can be defined and measured based on an overall estimation and assessment in which a firm is held by its constituents. In a normative sense, reputation should be based on corporate real performance. Anecdotal evidence such as the BP oil spill in 2010 and the recent cheating emission tests by German car giant Volkswagen (VW) have indicated the association between poor corporate environmental performance and damage to corporate reputation. Thus, it is expected that companies with a better environmental

performance enjoy a more positive environmental reputation. Accordingly, based on the above discussion, the following hypotheses were developed:

H3a: Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with carbon performance.

H3b: Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with carbon performance.

However, Brady (2005) states that reputation is based on the individuals' perceptions of the firm. Since there is a potential to manipulate these perceptions, corporate reputation may not always be based on real actions (Brady, 2005). Bebbington et al. (2008, p. 339) argue that "reputations are viewed as having some basis in organizations' actions (providing a quality good/service, for example) as well as being constructed by others via their perception of those activities". Cho et al. (2012) assert that within the CSR context, voluntary CSR disclosure can serve as a tool to shape and filter individuals' images and perceptions of perceived performance. This is in line with Bebbington et al.'s (2008) argument that considers CSR disclosure as a mechanism for perception creation and as a tool for reputation risk management. Unerman (2008) also takes the view that CSR reporting is a potentially powerful tool employed by firms to influence individuals' perceptions.

Literature on the links between environmental disclosure and reputation is scarce. One possible explanation can be due to the difficulty in measuring corporate reputation. Toms (2002) and Cho et al. (2012) found a positive association between quantity of environmental disclosure and a firm's environmental reputation. Hasseldine et al. (2005) complement Toms' (2002) model to test the impacts of both quantity and quality of environmental disclosure on corporate environmental reputation. Their findings suggest that quality of environmental disclosure has a stronger impact on environmental reputation than merely quantity of disclosure. Brown et al. (2010) also document that, while quantity of environmental disclosure does not improve the perception of reputation, the quality of such disclosure is positively associated with the changes in reputation scores. Hence, based on the above discussion, the following hypotheses were developed:

H4a: Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with quantity of carbon disclosure.

H4b: Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with quantity of carbon disclosure.

H5a: Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with quality of carbon disclosure.

H5b: Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with quality of carbon disclosure.

3.6.3 Carbon Reputation and Economic Performance

Consistent with RBT, corporate reputation possesses the characteristics of intangible assets which may provide firms with a competitive advantage resulting in greater profitability (Hall, 1992). To illustrate the value of reputation, for instance, when an acquirer buys a company with a good reputation, not only does it pay for tangible assets in place, but it also pays for reputation in the form of goodwill. Also, in a situation where customers are not able to know about the quality of goods before purchasing, strong reputation can serve as a signal about the quality of goods (Shamsie, 2003).

Several studies (Deephouse, 2000; Kim, 2001; Kim et al, 2007; Roberts and Dowling, 2002; Shamsie, 2003; Vergin and Qoronfleh, 1998) have found a positive relationship between corporate reputation and financial performance. With a good corporate reputation, companies not only appear as a stronger rival, but also experience greater financial performance (Shamsie, 2003). Good reputation can also improve corporate economic performance by allowing firms to charge higher prices, attract more customers and/or investors, enhance access to capital markets, reduce firm risk, and so forth (Herremans et al., 1993). Thus, based on the above discussion, the following hypotheses were developed:

H6a: Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with carbon reputation.

H6b: Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with carbon reputation.

3.6.4 Carbon Performance and Economic Performance

The financial consequences of environmental performance have remained unresolved in the environmental accounting discipline. Managers commonly assume that engaging with social and environmental practices incurs significant costs beyond profit maximisation. If the maximisation of profit and environmental activities coincide, there would be no controversy over pursuing environmental issues. Prior investigation (Al-Tuwaijri et al., 2004; Bowman and Haire, 1975; Chen and Metcalf, 1980; Cordeiro and Sarkis, 1997; Freedman and Jaggi, 1992; Hart and Ahuja, 1996; Jacobs et al., 2010; López-Gamero et al., 2009; Nishitani et al., 2011; Rockness et al., 1986; Russo and Fouts, 1997; Spicer, 1978) on the relationship between environmental performance and economic performance have produced mixed results. Al-Tuwaijri et al. (2004) argue that different and questionable measures of environmental performance and economic performance, relatively low power of measurement error, small sample size, and failure to control for industry type as well as corporate size can be considered as the reasons for such inconsistency.

Proponents of the win-win scenario (e.g. Hart, 1995; Porter and Van der Linde, 1995) believe that improving environmental performance can be in the interest of both society and firm, and assert that firms, through environmental improvement, can enjoy more productivity and profitability, and meanwhile protect environmental resources. They argue that strict environmental regulations may lead to more innovation, efficiency and competition. Cairncross (1994) suggests that it would be beneficial for firms to make environmental regulations stricter in order to defend themselves from international competition or enhance competitive advantages. Thus, the win-win scenario proposes a positive relationship between environmental performance and economic performance.

On the other hand, opponents of this scenario (e.g. Gillespie, 2007; Palmer et al., 1995) believe that it is likely to be limited in reality and argue that, given the costs of environmental initiatives, firms encounter a trade-off (at least in the short-term) between environmental performance and financial performance. Thus, this perspective suggests a negative association between these constructs. Another approach proposes a neutral relationship between environmental and financial performance. McWilliams and Siegel (2001) argue that firms which do not invest in social and environmental responsibility have a lower cost and lower price for their products,

whereas those firms concentrating on social and environmental characteristics of their products incur a higher cost, but their customers are willing to pay higher prices.

Since the largest number of studies have found a positive relationship between environmental performance and economic performance (Nishitani et al., 2011), the following hypotheses were developed:

H7a: Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with carbon performance.

H7b: Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with carbon performance.

3.6.5 Carbon Disclosure and Economic Performance

Unlike the studies exploring the relationship between environmental performance and financial performance, studies investigating the relationship between social and environmental disclosure and financial performance are scarce. Absence of data sets related to social and environmental disclosure can be deemed as one of the main reasons for such scarcity.

Anderson and Frankle (1980) assess the impact of social disclosure on the financial market. They compare the returns to portfolios including the securities of those firms disclosing social information and those not disclosing such information. Their results indicate that the market values social disclosure positively. Jaggi and Freedman (1992) also found that environmental disclosure by heavily polluting companies has informative content, and hence concludes a positive association between environmental disclosure and economic performance. Chan and Milne (1999) examine this relationship by focusing on how investors allocate their investment funds according to narrative disclosure of corporate environmental performance. Using an experimental design, they found that investors react strongly and negatively to the poor environmental performer. Murrar et al. (2006) also explore the social and environmental relationships and share price returns of the UK's top 100 companies. Although their year on year results did not show a significant and stable relationship, the longitudinal data indicated a positive and significant association between environmental disclosure and a company's market performance. Finally, Carnevale et al. (2012) examine the relationship between social reporting and economic performance by investigating the value relevance of social disclosure of 130

European banks over the period 2002 to 2008. Overall, their results did not support the relationship between social report and stock price.

Accordingly, following the prior studies that mostly documented a positive relationship between these two constructs, and given a growing social and environmental concern amongst investors (Murray et al., 2006), the following hypotheses were developed:

H8a: Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with quantity of carbon disclosure.

H8b: Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with quantity of carbon disclosure.

H9a: Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with quality of carbon disclosure.

H9b: Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with quality of carbon disclosure.

Figure 3.4 depicts the relationship among the variables of this study.

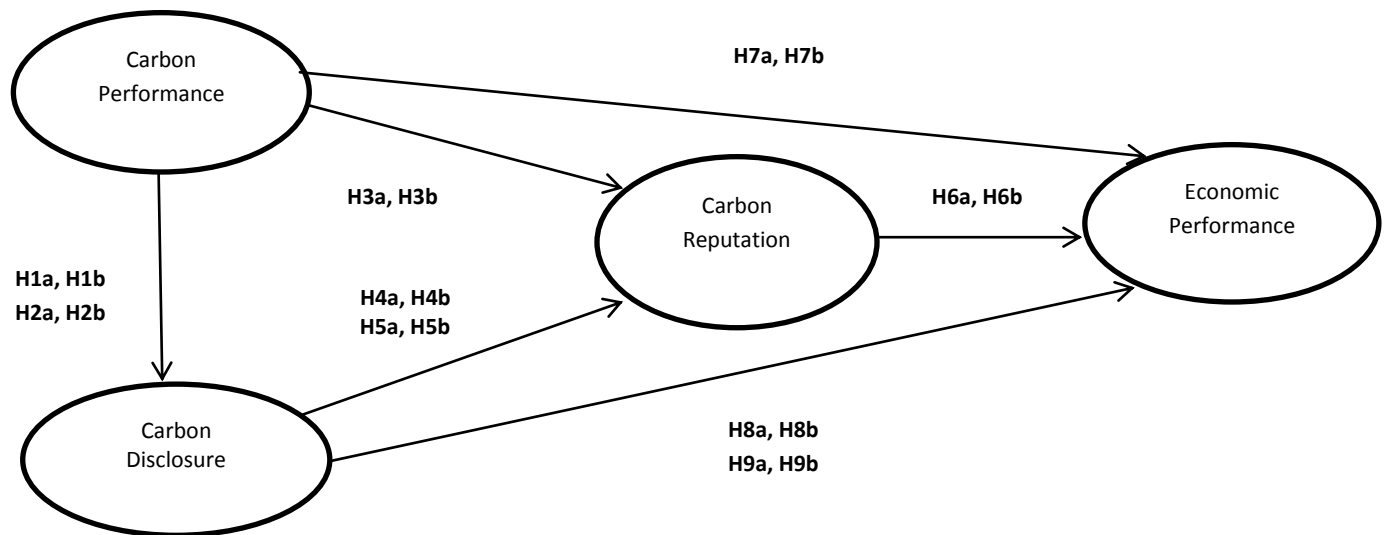


Figure 3.4 The relationship between carbon performance, carbon disclosure, carbon reputation and corporate economic performance.

3.7 Conclusion

Drawing upon legitimacy theory and resource-based theory, this chapter developed the theoretical framework and hypotheses of the current study to address the research problem of this study. As discussed earlier, in a normative sense, reputation should be based on real corporate performance. However, according to legitimacy theory, firms may employ voluntary disclosure to manipulate and/or manage the perception of the society for the aim of gaining and/or maintaining legitimacy and subsequently building a reputation. According to resource-based theory, such reputation may enhance the competitive advantage of the firm leading to improved economic performance. Thus, there is an associated risk that firms improve their corporate carbon reputation and subsequently their economic performance without improving their real carbon performance. The next chapter will discuss and present the research design required to test the hypothesised relationship proposed in this chapter.

CHAPTER 4: Research Design

4.1 Introduction

Following the theoretical framework and research hypotheses developed in the previous chapter, this chapter will explain and justify the holistic approach taken by the research process, from the philosophical foundation to research methodology, data collection and data analysis.

The rest of this chapter is structured into eleven sections. Section 2 explains the research paradigms and the rationale for adopting a positivistic approach for this study. Section 3 provides a research methodology including a comparative study adopted for the current study. Section 4 examines the context of the study and the reason for selecting the UK for conducting the empirical study. Likewise, this section explains the research population and sampling procedure. Sections 5 and 6 present the theoretical model and the variable measurements of this study respectively. Section 7 explains the data collection methods including content analysis and archival data. Sections 8 and 9 explain the content analysis procedure employed to collect data regarding carbon disclosure and carbon reputation. Section 10 explains Structural Equation Modeling (SEM) and path analysis as the statistical techniques employed in this study. Section 11 discusses the reliability and validity of the current study and the last section provides a conclusion of the chapter.

4.2 Philosophy and Paradigm

Research paradigm is a philosophical framework guiding the implementation of a scientific research (Collis and Hussey, 2009). The research paradigm embeds important philosophical assumptions reflecting basic beliefs about the world. The importance of these philosophical foundations has been reflected in detailed discussions by philosophers, researchers and social theorists over a long period of time since they underpin the perspective adopted on the research topic, specify the qualifying of worthwhile evidence, shape the nature of the investigation and its methods, as well as the questions that are asked. Finally, they point to what type of conclusions can be drawn based on the investigation (Denscombe, 2014).

According to Smith (1983), until the late nineteenth century, positivism was considered as the only paradigm, since the research had focused on inanimate objects in the physical world. With the emergence of capitalism and industrialisation, social phenomena became the centre of

attention for many researchers and the suitability of traditional scientific methods was challenged by a number of theorists. This led to the advent of an alternative paradigm to positivism named interpretivism (Collis and Hussey, 2009).

Due to the dynamic nature of research over the years, many new paradigms have emerged to respond to researchers' needs. Positivism and interpretivism can be regarded as two extremes of a continuous line of paradigms and as we move along the continuum, the philosophical foundations of one paradigm gradually relaxed and were replaced by the next one (Morgan and Smircich, 1980). Table 4.1 summarises the philosophical assumptions of positivism and interpretivism.

Table 4.1 Assumptions of the main paradigms

Philosophical assumption	Positivism	Interpretivism
Ontological assumption (the nature of reality)	Reality is objective and singular, separate from the researcher	Reality is subjective and multiple, as seen by the participants
Epistemological assumption (What constitutes valid knowledge)	Researcher independent of that being researched	Researcher interacts with that being researched
Axiological assumption (the role of values)	Research is value-free and unbiased	Researcher acknowledges that research is value-laden and biases are present
Rhetorical assumption (the language of research)	Researcher writes in a formal style and uses the passive voice, accepted quantitative words and set definitions	Researcher writes in an informal style and uses the personal voice, accepted qualitative terms and limited definitions
Methodological assumption (the process of research)	Process is deductive Study of cause and effect with static design (categories are isolated beforehand) Research is context free Generalisations lead to prediction, explanation and understanding Results are accurate and reliable through validity and reliability	Process is inductive Study of mutual simultaneous shaping of factors with an emerging design (categories are identified during the process) Research is context bound Patterns and/or theories are developed for understanding Findings are accurate and reliable through verification

Source: Collis and Hussey (2009, p.58)

4.2.1 Positivism

According to Flick (2011), positivism as an epistemological program goes back to Auguste Comte who emphasised that the sciences should concentrate on studying and investigating the observable facts instead of speculative approaches. In other words, researchers have to underpin their approach by ideals of objectivity and measurement rather than subjectivity, reconstruction and interpretation (Creswell, 1994).

Since the positivistic approach has been successful in explaining the relationships of things in the natural world, this approach is still widely used in social sciences to understand social phenomena (Denscombe, 2014). The positivistic approach in social science is underpinned by the belief that social facts are outside individual awareness and independent of us (Bryman, 2012). It involves a deductive process whereby theories and hypotheses are developed first and data are collected to test hypotheses (Saunders et al., 2009). Under positivism, theories provide the basis for explanations, specify relationships between variables, and hence generate hypotheses which can be tested. This means that social phenomena have to be accessible by the senses and be capable of being observed and/or measured (Denscombe, 2014).

4.2.2 Interpretivism

Interpretivism was developed as a result of the advent of social research where the positivistic approach was not able to meet the needs of social scientists (Collis and Hussey, 2009). Unlike positivism, interpretivism underpins the belief that social reality is subjective and it is impossible to assume that what exists in the social world is independent of our mind. In other words, whereas positivism stresses the way that social reality is external to people, interpretivist approaches focus on the way that people shape society and therefore social reality is constructed and interpreted by people (Creswell, 1994).

From the interpretivists' point of view, social phenomena are not tangible and hence they are not capable of being measured, touched and/or observed (Denscombe, 2014). Whereas positivism concentrates on the measuring of social phenomena, interpretivism focuses on "Complexity of social phenomena with a view to gaining interpretive understanding" (Collis and Hussey, 2009, p. 57). Hence, the findings of interpretive research are those which are not derived from the statistical analysis of quantitative data (Corbin and Strauss, 2008).

4.2.3 Rationale of Adopting Different Paradigms

It is worth noting that there is no right or wrong paradigm. As stated earlier, each paradigm embeds important philosophical assumptions reflecting basic beliefs about the world. The particular paradigm adopted for each study is partly determined by these assumptions, influenced by the dominant paradigm in the research's area and the nature of the research problem investigated (Collis and Hussey, 2009). Hence, it is important to know the philosophical assumptions of the current study in order to understand the reasons for adopting a “positivistic approach” by the researcher.

4.2.3.1 Ontological Assumptions of this Study

The ontological assumption is related to the truth and the nature of reality (O'Shaughnessy, 2009). Positivism regards the real world as something existing “out there” and believes social reality is objective and singular (i.e. there is only one reality) and separate from the researcher whereas interpretivism considers social reality subjective since it is socially constructed. Therefore, interpretivists believe that reality is multiple because each person has their own perception of reality (Flick, 2011).

In this study, the researcher takes a position of ontological objectivism and singular reality since this study focuses on direct and indirect relationships between carbon performance, carbon disclosure, carbon reputation and economic performance. Likewise, the researcher acknowledges that social phenomena under investigation are external to the researcher since this research concentrates on such phenomena as voluntary carbon performance, carbon-related disclosure, corporate carbon reputation and economic performance that exist in a social world regardless of the researcher's sense of reality and perceptions.

4.2.3.2 Epistemological and Axiological Assumption of this Study

The epistemological assumption is concerned with the ways that people create their knowledge about the social world and involves philosophical debates that what we accept as valid knowledge (Denscombe, 2014). This assumption is related to the relationship between researcher and what is being researched (Collis and Hussey, 2009). Positivists believe that scientific methods can be employed to gain knowledge and are therefore only observable and measurable, and phenomena can be validly considered as knowledge. On the other hand, interpretivists take a view that valid social knowledge is something produced instead of being discovered and only

through interpreting the world can we acquire any knowledge about it (Saunders et al., 2009). Therefore, interpretivists attempt to minimise “the distance between the researcher and what is being researched”(Collis and Hussey, 2009, p. 59).

Closely linked to the relationship between the researcher and that which is researched is the role of value in the process of research. This assumption is called axiological assumption. In respect of this latter assumption, positivists believe that the research process is value-free. They believe that it is independent from what is researched and they investigate the interrelationship between phenomena considered as objects. Under axiological positivism, it is argued that these objects were present before researchers took an interest in them and are unaffected by their activities and will still be present after the study. These are the assumptions mainly found in natural science studies. In contrast, interpretivists take the view that researchers have values and they are involved in what is being researched (Collis and Hussey, 2009).

Like taking the positivism position in ontological assumption, this position is also adopted by the researcher in epistemological and axiological assumptions since the variables of the current study as characteristics of phenomena under investigation can be observed and measured. Furthermore, the researcher takes an independent and objective stance and is independent from what is being researched because this study uses methods to investigate the relationships between the variables which are similar to those in the natural sciences. These variables were present before starting the study, remain unaffected by the research activities and will still be present after completing the research.

4.2.3.3 Rhetorical Assumption of this Study

Rhetorical assumption refers to the language of research. In a positivist study, the writing style used by researchers is formal using passive tone, since researchers attempt to convey the impression that their research is objective and results are not distorted by any personal perceptions and opinions. On the other hand, the preferred style used in an interpretivist study is in the first person and tends to reflect researchers' involvement (Johnson and Onwuegbuzie, 2004). Since the researcher adopts positivist ontological, epistemological and axiological assumptions in the current study, a formal writing style using a passive tone is employed by the researcher.

4.2.3.4 Other Rationales of Adopting a Positivist Approach

Apart from philosophical assumptions, there are other features which can determine the paradigm of the study (Collis and Hussey, 2009). These features include sample size, theories, hypotheses, and quantitative and qualitative data.

Since the aim of this study is to investigate the impact of corporate carbon behaviour on carbon reputation and subsequently the economic performance of FTSE350 companies, a sample of 95 firms (those companies that reported their greenhouse gas emissions to the Carbon Disclosure Project between 2009 and 2013) is selected to represent the whole population (FTSE350 companies). This is consistent with the positivist approach which tends to use a large sample and generalise the research findings to the population (Bryman, 2012).

Another feature of this study which is consistent with the positivist approach is applying legitimacy theory and resource-based theory to construct the theoretical model and the study's hypotheses. Under positivism, the theory is identified from the literature to construct and propose the research's hypotheses. Then, quantitative data (data in a numerical form) are collected to ensure that all key variables have been quantified before conducting a statistical analysis and testing research hypotheses. Like positivism studies, in this study all variables have been quantified in order to test the proposed research hypotheses.

Finally, to the best of the researcher's knowledge, previous studies (Al-Tuwaijri et al., 2004; Cho et al., 2012; Cho and Patten, 2007a, 2007b; Clarkson et al., 2011; Patten, 2002) investigating the pairwise association between environmental performance, environmental disclosure, environmental reputation and corporate economic performance have used the positivism paradigm to support their proposed hypotheses and address their research problem. Hence, in line with these studies, the researcher has employed the positivism paradigm to address the research problem and test the research hypotheses of this study.

4.3 Research Methodology

Methodology "is an approach to the process of the research, encompassing a body of methods" (Collis and Hussey, 2009, p. 73). A method is a technique to collect and/or analyse data. As aforementioned, the paradigm provides a philosophical framework guiding how research ought to be conducted. Hence, it is important to choose those methodologies and methods that meet the

philosophical assumptions of the selected paradigm. According to Saunders et al. (2009), experiments, surveys, and cross-sectional and longitudinal studies are common and appropriate research methodologies used within a positivism paradigm. A comparative study is another research methodology employed within both positivism and interpretivism paradigms to compare different societies, industry sectors, and so forth, to shed light on their similarities and differences. Following the aims and objectives of the current study which investigates corporate carbon behaviour and its impact on carbon reputation and economic performance in both carbon intensive and non-intensive industries, a comparative study is employed to understand the similarities and differences in these different industry sectors. The next section will discuss the comparative study and the rationale for adopting this methodology for this study in detail.

4.3.1 Comparative Study

The importance of industry type and its impact on corporate environmental practice has been magnified by several studies (Al-Tuwaijri et al., 2004; Brammer and Pavelin, 2006; Cho et al., 2012; Cho and Patten, 2007; Clarkson et al., 2011; Patten, 2002, 1991). Legitimacy theory suggests that the extent of social and environmental disclosure can be affected by corporate exposure to public and political scrutiny. In other words, according to this theory, companies from environmentally sensitive industries and companies with the worst records of environmental performance may face greater exposure and hence provide more information to protect their legitimacy and subsequently their reputation (Patten, 2002). In addition, by referring to Brammer and Pavelin's (2006, p.438) argument that "since industry environments are correlated with significant pressure from institutional, and other, stakeholders", Cho et al. (2012) take a view that the impact of environmental performance on environmental reputation may vary across industry sectors (i.e. environmental sensitive vs. non-sensitive industries). Hence, several studies (Cho et al., 2010; Cho and Patten, 2007; Patten, 2002) have divided their samples into environmentally sensitive and non-sensitive industries and employed comparative methodologies to shed light on the similarities and differences between these different industry sectors.

A comparative study is a research methodology in social science that aims to compare different cultures, countries, industries and so forth. This methodology entails studying two contrasting cases which employ more or less identical methods (Bryman, 2012). The comparative method dates back to the nineteenth century in Ancient Greece when philosophers, sociologists and

political scientists used this method to compare cross-cultural similarities and differences to achieve their objectives (Collier, 1993).

Smelser (2013) argues, unlike natural science, the comparative approach has always existed in social science. The popularity of comparative studies has increased over the past few decades due to globalisation and the advent of information technology, enabling greater production of quantitative data which can be spread to different nations. According to Podestà (2002, p. 8) the comparative approach is an appropriate method “concerning the political and institutional determinants of macroeconomic policies and performances”. Smelser (2013) asserts that this method is suitable in explaining and developing theories regarding socio-political and socio-cultural phenomena since they occur in such units as societies, organisations and cultures that are dissimilar to one another.

Collier (1993) believes that the comparative method enhances our power of description and plays an important role in concept-formation by bringing into attention the similarities and contrasts between cases. Comparisons can lead to a deeper understanding of issues that are of central concern in different disciplines. They can lead to the identification of gaps in knowledge and may provide possible directions of which the researcher may not have been previously aware. They may also sharpen the concentration of the analysis of the study by suggesting new perspectives (Chodosh, 2005).

Following the important role of industry in corporate carbon behaviour, and in line with the use of legitimacy theory as socio-political theory and philosophical assumptions of positivism (quantitative) adopted to test the hypotheses of this study, the comparative study can be an appropriate methodology to investigate similarities and differences between carbon intensive and non-intensive industries. Chodosh (2005) asserts that comparative methodology is an efficient methodology for quantitative studies using statistical methods to compare different things at one time or the same thing over a period of time. Thus, a comparative study is the next level up from a cross-sectional study in attempts to show differences between dissimilar cases (e.g. carbon intensive and non-intensive industries in this study).

4.4 Research Context, Population and Sampling Procedure

4.4.1 Research Context and Population

Careful country selection is critical for successful theory testing in a quantitative study (Chapman et al., 2011). Therefore, researchers engaged in a quantitative research must consider various issues when selecting an appropriate context including the appropriateness of companies for the study, data availability, appropriateness of the unit of analysis and so forth (Chapman et al., 2011). The UK has been selected to test the hypotheses of the current study and although it can be considered as one of the leading countries in tackling climate change and global warming, it is thought that UK companies have not addressed the heart of the issue, or the government policy about carbon disclosure and carbon practice (Luo and Tang, 2014).

A population is a “precisely defined body of people or objects under consideration for statistical purposes” (Collis and Hussey, 2009, p. 62). In other words, the universe of units from which the sample is drawn is called the population (Bryman, 2012). The population of this study is the companies listed in the FTSE350. Although these companies, as the biggest polluters in the UK, are showing their commitment towards carbon transparency and carbon reduction by participating in the CDP survey every year, they are still far from achieving a real reduction in their carbon emissions (Luo and Tang, 2014). Furthermore, these quoted companies are required to disclose social and environmental information. However, since the majority of such disclosure is voluntary, there is a threat that they use such disclosure as a tool for protecting and/or enhancing reputation with no associated change in practice (Hopwood, 2009).

4.4.2 Sampling

A sample is a subset of the population from which it is drawn (Collis and Hussey, 2009). Sampling is needed when the population is quite large and there is not enough time and resources to gather data for whole units of the population. In order to generalise findings from the sample to the whole population, it is necessary to have an unbiased sample (Bryman, 2012). Unbiased samples are those where every unit of population has an equal chance of being selected. There are two distinct sampling techniques, namely called probability and non-probability sampling (Flick, 2011). Probability sampling is the technique using random selection so that every unit of population has the same chance of being selected. It is generally accepted that an unbiased sample is more likely to have an outcome when this sampling technique is employed. On the

other hand, non-probability sampling does not use the random selection method and some units in the population have a higher chance of being selected (Creswell, 1994).

Probability sampling includes simple random sampling, systematic sampling, stratified random sampling, and so forth (Collis and Hussey, 2009). Simple random sampling is a technique where each unit of population is allocated a number and a sample is selected based on the numbers given in a random number table. Systematic sampling is a technique where the whole population is divided by sample size (n) and units are selected by every 'nth' until the sample is drawn. The problem with simple random sampling is that some members of the population may be under-represented or over-represented. In order to overcome the problem of simple random sampling, stratified sampling is used. Stratification is the process of dividing members of the population into homogeneous subgroups before sampling (Denscombe, 2014).

On the other hand, non-probability or non-random sampling includes snowball sampling, judgmental sampling, natural sampling and so forth (Collis and Hussey, 2009). Snowball sampling, which is related to interpretivism studies, is the technique that includes the study of people with experience of the phenomena. During the course of the study, participants may be asked to introduce anyone else who has had the same experience about the phenomena. Judgmental sampling is similar to snowball sampling but the researcher makes the decision before starting the data collection process and does not pursue other contacts who may be put in touch with the researcher during the course of the study (Bryman, 2012).

4.4.2.1 Natural Sampling

Natural sampling as a non-probability sampling method is a common technique in business research when the researcher has little influence on the selection of the population's units (Collis and Hussey, 2009). For instance, data availability concerning the variables of the study in the secondary data study may restrict the influence of the researcher in selecting the units of the population. Hence, in this case, the researcher ought to select those units whose data are available.

Natural sampling is a sampling method which has been employed for this study since the researcher has little influence on the units of population due to data availability. The sample of this study is drawn from those FTSE350 companies that reported their greenhouse gas emission

to the CDP over the period 2009 to 2013. The CDP is an independent non-profit organisation with a large database of voluntarily-reported carbon emissions data by the largest companies around the world including FTSE350 companies. Each year, the CDP surveys the world's largest companies to evaluate the opportunities and risks concerned with climate change, and companies report their carbon emissions using 'GHG protocol' to the CDP (Dragomir, 2012).

Although the initial sample of the current study contains all 350 companies listed in the FTSE350, 95 companies, including 40 companies from carbon intensive industries (i.e. energy, industrial, material, and utilities), and 55 companies from non-intensive industries (i.e. consumer discretionary, consumer staple, financial, health care and IT & telecommunication) have been selected since only these companies have consistently reported their CO₂e emissions over the period 2009 to 2013 (Appendix I indicates the list of companies included in this study). Therefore, the final sample has 475 companies-years of data where 200 companies-years are related to carbon intensive and 275 companies-years are related to non-intensive industries.

The year 2009 has been selected as the starting point because the challenge of climate change was brought into sharp attention during 2009 at the United Nations Climate Change Conference in Copenhagen, Denmark. During the summer of 2009, many NGOs and politicians were busy preparing for this conference (Rahman et al., 2014). Meanwhile the year 2014 is selected since it presents the most recent available data.

4.4.2.2 Sample Size

Selecting a sufficiently large sample is vital to generalise research findings to the whole population (Corbin and Strauss, 2008). A reasonable sample size for structural equation modelling (SEM) has remained a highly debated issue in literature (Kline, 2011). Although attempts have been made to adopt SEM techniques to accommodate smaller sample sizes, SEM is still considered as a large-sample technique (Kline, 2011). Kline (2011) argues that some kinds of statistical estimates in SEM, such as standard errors, may not be accurate when the sample size is not large enough. According to Kline, a typical sample size in studies where SEM is employed is about 200 cases.

A useful technique suggested by Jackson (2003) to determine the sample size of SEM is where researchers think about the minimum sample size in terms of the ratio of cases (N) to the number

of model parameters that require statistical estimates (q). An ideal sample size-to-parameters ratio would be 20:1. Thus, based on a total of $q=7$ model parameters requiring statistical estimates in this study, an ideal minimum sample size for the models of the current study would be 20×7 , or $N=140$. The sample sizes of both carbon intensive and non-intensive models are 200 and 275 respectively, which are higher than the minimum requirement of 140 obtained from Jackson (2003) rule.

A large enough sample is also important for comparative studies since a small sample may “preclude some important statistical tests among the subsets in the sample (For example looking for differences between industry sectors) (Collis and Hussey, 2009, p. 210). One of the most common methods, which has been used in this study, to overcome the small sample size in a comparative study is pooled time series cross-sectional data. This method is characterised by having repeated observations on fixed objects or units.

Pooled data eliminates the small sample size problem suffered by both the time series and cross-sectional analysis. Basic assumption of standard statistical analysis is violated by both cross-sectional and time series techniques because of the limited number of units and the limited number of available data over time. Within the context of the small sample, the total number of the potential explanatory variables exceeds the degree of freedom required to model the relationship between the dependent and independent variables. In contrast, thanks to pooled time series cross-sectional designs, this restriction can be greatly relaxed. This is because, within the pooled time series cross-sectional research, the case is company-year (NT observations) starting from the company (i) in the year (t), then the company (i) in the year ($t+1$) through to the company (z) in the last year of the period under investigation (Schmidt, 1997). This allows “us to test the impact of a large number of predictors of the level and change in the dependent variable within the framework of a multivariate analysis” (Podestà, 2002, p.7).

Apart from eliminating the small sample size problem, pooled time series cross-sectional designs “permit to inquiry into variables that elude study in simple cross-sectional or time series” (Podestà, 2002, p. 7). This is because their variability is negligible across either units or time. In practice, many characteristics of organisations tend to be temporally invariant. Hence, a regression analysis of pooled data combining units and time may rely on a higher variability of data in respect to a simple cross-section or time series models (Janoski and Hicks, 1994).

Finally, pooled data allows the possibility of capturing not only the variation of what emerges through units and time, but the variation of these two dimensions at the same time. This is because, instead of testing a cross-sectional model for all companies at one point in time, or testing a time series model for one company using time series data, a pooled model is tested for all companies through time (Pennings et al., 2005). Given these advantages, in the last decade pooled data has become central to quantitative studies of comparative research (Western, 1998).

4.5 Theoretical Model

Consistent with previous studies (Aerts and Cormier, 2009; Kim et al., 2007), in which they sequenced design variables, a time sequence design has been used for this study to enhance the interpretability of casual relationships with variables. Thus, the measures for carbon performance and carbon disclosures at the t_0 time point, and for carbon reputation and economic performance at t_1 , have been used. Likewise, it is necessary to control the influence of prior economic performance on the current one to isolate the effect of carbon performance, carbon disclosure and carbon reputation on economic performance. Figure 4.1 depicts a theoretical model and variables of this study.

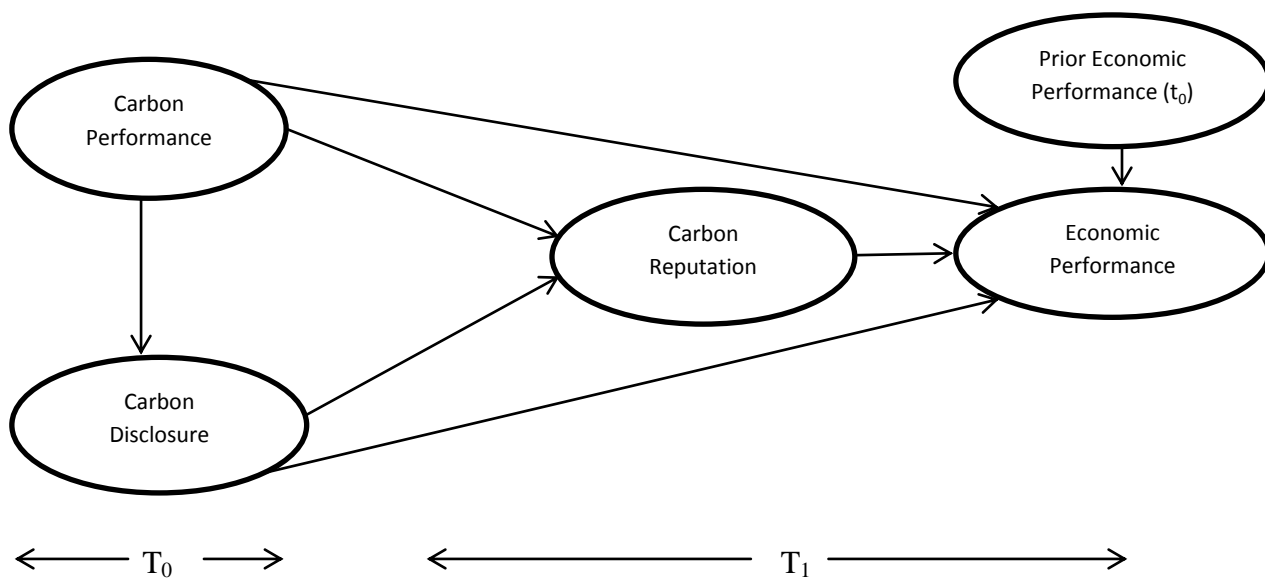


Figure 4.1 Theoretical Model

Before collecting data, it is important to have a clear understanding of the variables relating to the phenomena under investigation. According to Collis and Hussey (2009, p. 188), a variable is “characteristics of a phenomenon that can be observed or measured”. A precise variable measurement is vital for the reliability and validity of the research (Saunders et al., 2009). The following sections will explain the variable measurements of this study and the rationale for adopting them.

4.6.1 Carbon Performance

A review of the literature revealed that several environmental performance measurements have been used by different researchers. Several studies (Hughes et al., 2001; Ingram and Frazier, 1980; Wiseman, 1982) focusing on the US firms have used the CEP company rating charts as a proxy for environmental performance. The CEP provides an impartial and accurate analysis of social and environmental records of the US companies (Al-Tuwaijri et al., 2004). Other frequently used databases have been Toxic Release Inventory (TRI) and Kinder, Lydenberg, Domini & Co. Inc., (KLD), which is now part of RiskMetrics Group (Al-Tuwaijri et al., 2004; Cho and Patten, 2007; Clarkson et al., 2008). TRI is a comprehensive database containing data about toxic chemical release and other waste management activities in the US and KLD's Global Socrates platform provides comprehensive detail about the environmental and social factors, and governance of 4000 companies. More recent databases including Asset4 ESG, EIRIS, Trucost, Bloomberg and Innovest have a larger scope covering European and Asian markets as well (Dragomir, 2012).

According to Dragomir (2012), unlike North American researchers benefiting commercially and publicly available databases since the 1970s, European researchers are apparently in a process of ‘trial and error’ in respect of data collection and analysis. Several researchers in the UK have attempted to duplicate US research using local data sources including the Financial Times, articles in The Times and press releases from the Environment Agency (EA) as proxies for environmental performance (Dragomir, 2012). Toms (2002), criticises the limitations of data availability on environmental performance in the UK against US and asserts that Britain's Most Admired Companies (BMAC) obtained from the Management Today Survey is the only UK source offering continuous environmental performance information about UK companies. However, thanks to the Carbon Disclosure Project (CDP), carbon emissions data for more than

1550 of the world's largest companies including FTSE350 companies is available for those researchers working on environmental accounting.

The CDP is a non-profit organisation based in the UK working with companies and shareholders to provide greenhouse gas emission information on large companies using GHG protocol as the framework of reference (Luo and Tang, 2014). According to Dragomir (2012, p. 225), the Greenhouse Gas (GHG) protocol is considered “as the most relevant international accounting tool for businesses to understand, quantify, and manage GHG emissions”. The GHG protocol, which is the result of a long-term partnership between the World Business Council for Sustainable Development and World Resource Institute, is an international standard for GHG accounting and reporting and the calculation tools from this protocol are believed to represent the current best practice thanks to an in-depth review by many individual experts and organisations (Luo and Tang, 2014). According to GHG protocol, companies are required to disclose direct and indirect emissions categorised into three scopes: Scope 1 includes all direct emissions from the sources owned or control by organisations; Scope 2 covers indirect emissions from the consumption of purchased heat and electricity and/or steam; and finally, Scope 3 contains all other indirect emissions including transportation, waste disposal, outsources activities and so forth.

Following the aims and objectives of this study that focus merely on corporate carbon behaviour and its impact on carbon reputation and economic performance, the level of carbon emissions is the best candidate to measure the carbon performance of this study. Among those measurements employed in environmental accounting literature, none of them, except corporate carbon emission, captures merely the phenomenon of carbon performance. Thus, carbon emission intensity (emissions relative to economic output) is used as the ratio of total direct (Scope 1) and indirect (Scope 2)¹⁶ emissions obtained from the CDP to total sales (Clarkson et al., 2008; Luo and Tang, 2014; Patten, 2002) to measure the carbon performance of the firms. This ratio is more comparable across different reporting periods and between firms than the absolute level of carbon emissions since it considers the variation in the output of services and products (Hoffmann and Busch, 2008). Furthermore, according to Patten (2002), such an adjustment for

¹⁶ Scope 3 has been excluded since different corporations report different areas.

company size is made because larger firms would be expected to have higher environmental impacts than smaller firms. In order to allow consistency with the proposed hypotheses, the scores are inverted by multiplying them by a negative one. Thus, higher scores used in the analysis indicate better carbon performance.

4.6.2 Carbon Disclosure

Techniques of the environmental disclosure measurement can be classified into two main groups. The first technique concentrates on quantity of disclosure, such as number of pages (Patten, 1991; Gray et al., 1995), sentences and words (Deegan and Gordon, 1996; Ingram and Frazier, 1980). The second technique, which focuses mainly on quality of disclosure, uses the content analysis method. Several studies (Al-Tuwaijri et al., 2004; Cho et al., 2012; Clarkson et al., 2011, 2008; Wiseman, 1982) have used the disclosure-scoring method based on content analysis to capture the quality of social and environmental disclosure.

Following the aims and objectives of this study, both the quantity and quality of corporate carbon disclosures have been employed to test hypotheses of the study. Because of adopting legitimacy theory which is related to managers' incentives of voluntary disclosure, stand-alone sustainability reports as a voluntary disclosure channels have been used. In the absence of such reports, voluntary CSR sections of the annual reports are employed.

In order to measure the quantity of carbon information, density ratio is used to avoid unnecessary information. Under G3.1 of the GRI guidelines, reports ought to provide the level of information required by stakeholders but avoid unnecessary and excessive information. Cho and Roberts (2010) take a view that, from a managerial point of view, diluting social and environmental information in a long document such as stand-alone sustainability report may serve to provide relevant information, but in a way that is hard for the user to find the relevant information which may divert attention. Hence, following Michelin et al. (2014), density of carbon-related information is captured as the ratio between the number of carbon-related sentences over the total number of sentences of the stand-alone sustainability report or the voluntary CSR section of the annual report. Sentences are more reliable than pages and words since they overcome "the problems of allocations of portions of pages remove the need to account for, or standardize, the number of words and are a more natural unit of written English to count than words" (Hasseldine et al., 2005, p.236)

To address the research problem of this study (see Section 1.3), quality of carbon disclosure is calculated by using content analysis and based on the symbolic and behavioural disclosure scale obtained from Hrasky (2011). To the best of the researcher's knowledge, this disclosure scale is the only one in the literature capturing the notion of symbolism about which this study aims to investigate its impact on carbon reputation and its role in mediating the negative effect of carbon performance on carbon reputation. Hrasky used six categories to capture differences in the nature of disclosure, i.e. symbolic or behavioural (content analysis procedure will be explained in detail in Section 4.7 of this chapter). A relative ratio is used to capture the quality of carbon disclosure as the ratio between the numbers of behavioural sentences over the number of symbolic sentences.

4.6.3 Carbon Reputation

The carbon reputation measurement has been criticised for a long time due to the subjectivity in the assessment criteria (Riahi-Belkaoui, 2003). Scholars have found defining and measuring corporate reputation problematic, largely because of the uni-dimensional nature of this corporate asset (Chun, 2005). In addition, measuring corporate reputation has been more complex because of capturing broad stakeholders' perception, since reputation can be defined as a collective representation of a firm's past actions and results describing the firm's ability to deliver valued outcomes to multiple groups of stakeholders (Fombrun, 1996).

There are limited available databases related to corporate environmental reputation. Empirically, prior research has used three well-known environmental reputation ratings called America's and World's Most Admired Companies (AMAC and WMAC respectively) published by Fortune Magazine, and Britain's Most Admired Companies (BMAC) published by Management Today. Nonetheless, environmental reputation has yet to be comprehensively investigated, partially due to no general agreement on how this can be measured.

Fortune started publishing the first annual surveys from AMAC and WMAC in 1983 and 1997 respectively. Subsequently, a similar reputation measure, BMAC) by Management Today became available for use in empirical research. BMAC, which was first published in 1994 by Management Today, is commonly used in the empirical analysis of UK firms. The method that they use is very similar to that employed by Fortune's surveys. Each year the BMAC survey asks senior executives of 260 of the UK's largest companies, by market capitalisation, and their senior

specialist business analysts to rank the performance of other companies in their own industrial sector. They provide a score of 0 (poor) to 10 (excellent) for nine performance criteria: financial soundness, quality of management, developing and retaining top talent, ability to attract, quality of product/services, capacity to innovate, value as a long-term investment, quality of marketing, use of corporate assets and community and environmental responsibility. Several studies (Hasseldine et al., 2005; Hussainey and Salama, 2010; Toms, 2002) have employed the “community and environmental responsibility” score as a proxy for environmental reputation.

Another method to measure corporate environmental reputation relies on the content analysis of newspaper articles for corporate environmental issues. According to Palmgreen et al. (2001), newspapers have a strong effect on the public’s perceptions. Baum and Powell (1995) argue that the content analysis of press media is useful in studying legitimization and reputation processes, since detailed archives of press media exist for many years and for many industries, and they offer powerful techniques for operationalising legitimization and reputation.

In light of the above discussion suggesting the usefulness of press media in the study of legitimization processes, and in line with the theoretical framework of the current study considering legitimization processes as mechanisms to build and/or maintain corporate reputation, the content analysis of press media is the best candidate for measuring corporate carbon reputation. Details of measurement processes will be explained in Section 4.8 of this chapter.

4.6.4 Economic Performance

Economic performance measures can be classified into market-based and accounting-based measures and previous environmental studies have used both measures (Al-Tuwaijri et al., 2004). Return on assets (ROA), return on equity (ROE), and earning per share (EPS) are among the most frequently used accounting-based measures by prior studies and annual share returns has mostly been candidate of market-based measure.

In line with the adoption of the resource-based theory, predicting that good reputation can increase corporate annual return by achieving competitive advantages over other competitors, annual share returns can be the best candidate for representing economic performance for this study. However, accounting-based measures are used as a sensitivity test to ensure that the results are not a function of the particular economic performance measure.

Annual share returns are calculated as the natural logarithms of share prices at the end of the year divided by the price at the beginning of the year¹⁷. According to Al-Tuwaijri et al., (2004, p.456) “annual stock returns represent a more objective and comprehensive measure of economic performance. The latter is due to the proposition that stock price should impound information about the firm’s future prospects from a vast array of both financial and non-financial measure, such as net income, ROA, operational data, etc.”.

4.6.5 Control Variables

Two control variables have been used in the current study. Several researchers (Al-Tuwaijri et al., 2004; Kim et al., 2007; Roberts and Dowling, 2002) have indicated that the current economic performance can be influenced by the previous one. In other words, those firms with a better economic performance for the current year may enjoy a better performance for the next year as well. Likewise, following Patten (1992), Tom (2002), Cho and Patten (2007), Clarkson et al. (2011) and Cho et al.'s (2012) suggestions that corporate environmental disclosure and environmental reputation might be influenced by corporate size, potential firm size effects are controlled by using the log of total assets.

4.7 Data Collection Method

For researchers to contribute to knowledge and data collections about the phenomena under study can be considered an important stage. Creswell (1994) asserts that data collection represents the key point of any study, and knowledge is created by organising data into a useful form.

Depending on the research’s objectives, philosophical assumptions and adopted methodology, on one hand data can be classified into quantitative or qualitative data. Quantitative data can be found in numerical form, whereas qualitative data are non-numerical such as images or text. On the other hand, data can also be classified by the source including primary or secondary data (Collis and Hussey, 2009). Primary data are those collected from original resources such as surveys and experiments. Secondary data are those gathered from existing resources including articles, published books, databases, corporate annual reports and so forth (Bryman, 2012).

¹⁷ $R_{i,t} = \ln(P_{i,t}/P_{i,t-1})$

Under the positivist approach, questionnaires and interviews are frequently-used methods to collect primary data, and secondary data can be obtained from available sources and archives such as texts, historical documents, journal articles, corporate annual reports, commercial databases, and so forth (Smith, 2011). Because of the nature of the variables employed in this study, and in line with the research paradigm and methodology, this study relies on secondary data to test the hypotheses, and hence presents the research findings.

4.7.1 Archival Data

Secondary data or Archival data analysis is “the analysis of data by researchers who will probably not have been involved in the collection of those data” (Bryman and Bell, 2011, p. 330). Secondary data include both published summaries and raw data collected by third parties such as commercial databases, corporations, government departments, daily newspapers, and so on (Saunders et al., 2009).

In certain types of studies, such as those including international or national firms, secondary data are mainly used as the main source to answer research questions (Saunders et al., 2009). Secondary data offer high quality data at low cost and less time for data collection (Smith, 1983). However, some problems that researchers may face while using secondary data are control over data quality, data complexity and lack of familiarity (Bryman and Bell, 2011). On the other hand, according to Smith (2011), archival study normally has more external validity than simulation or experimental approaches due to “its reference to empirical data”.

Commercial databases can be deemed as some of the most important and frequently used sources of archival data. However, there is a need to assess the suitability of these databases, for instance, are they up to date? Have the data been collected using reliable methods? Are they collecting data from reputable and authoritative sources? (Smith, 2011). The current study uses Bloomberg, the CDP (which is in partnership with Bloomberg), and the LexisNexis databases to gather data.

The Bloomberg database is the most flexible and powerful database for professionals who need up to date and reliable data. This database provides historical and current financial data, news, corporate reports, research and statistics on over 52,000 companies around the world. Lord Ashcroft International Business School at Anglia Ruskin University houses the Bloomberg Financial Market Lab with 16 terminals. Data related to carbon performance, economic

performance and size have been collected from this lab. Likewise, Bloomberg provides a comprehensive archive of corporate annual and sustainability reports (if published by the firm). The sustainability reports and annual reports of the sample companies have been gathered to measure the quality and quantity of carbon disclosure (in total 475 corporate annual or sustainability reports have been downloaded from Bloomberg) (Details will be explained in the Content Analysis section).

The CDP is another database employed in the current study. The CDP, a non-profit organisation based in the UK, surveys the largest organisations around the world with the aim of reducing greenhouse gas emissions and mitigating climate change risk. Each year, companies report their greenhouse gas emissions to the CDP using the GHG protocol. The CDP works with Bloomberg to integrate its data on the Bloomberg platform. The CDP emissions data obtained from the Bloomberg platform are used for corporate carbon performance. Finally, the last database used to collect carbon-related newspaper articles is LexisNexis. LexisNexis provides full-text documents from over 15,000 credible resources, such as national as well as local newspapers and so forth. In total, out of over 10,000 newspaper articles related to companies under investigation in this study, 1,424 carbon-related articles have been collected to measure corporate carbon reputation (Details will be explained in Content Analysis section).

4.7.2 Content Analysis

Content analysis is a method that allows analysing archival data, including texts and documents, in order to quantify the content based on predetermined categories, and in a systematic manner (Smith, 2011). In other words, this method allows valid inferences from any text of any form or media such as television, radio, pictures and so on (Bryman and Bell, 2011). This method is mainly applied to count the frequency of phenomena under study (Walliman, 2005).

Content analysis is a flexible method that can be applied to different media. However, careful sampling and rigorous categorisation and coding are important stages in order to achieve “a level of objectivity, reliability and generalizability as well as the development of theories” (Walliman, 2005, p. 180). According to Smith (2011), there are five basic stages to the content analysis method including: specifying the research problem and research questions precisely, i.e. what is to be counted and why, using sampling methods related to the choice of publications or other media to produce representative findings, coding, coding schedules and retrieving the code

fragments (the last can be done both manually or by using available software such as Nvivo, etc.). Doing quality checks to ensure that selected themes can be divided from the rest of text, the units counted are similar enough to be counted together, and also how the units should be weighted to capture precise results. Finally, the last stage is analysing data based on selected interpretation methods.

In this study, content analysis has been employed to collect data related to the quality, as well as quantity, of carbon disclosure and corporate carbon reputation. The following sections will document the procedures used to this end.

4.8 Content Analysis of Carbon Disclosure

According to Smith (2011), the availability of suitable narrative sources such as corporate annual reports has led to the popularity of content analysis and several studies in CSR have widely used this method. Hence, following previous studies (Cho et al., 2012; Clarkson et al., 2011; Deegan and Rankin, 1996; Hrasky, 2011; Patten, 1992), content analysis is employed for capturing the quality and quantity of carbon disclosure. As noted earlier, density and relative ratios are employed to measure the quantity and quality of carbon disclosure respectively.

4.8.1 Sampling

Sampling in content analysis is the process of selecting the relevant media on which the researcher is conducting the analysis. Samples used to measure the quality and quantity of carbon disclosure consist of 475 annual or sustainability reports related to companies of the current study over the period 2009 to 2013. Due to adopting legitimacy theory focusing on managers' incentives to disclose voluntary information, stand-alone sustainability reports as a voluntary disclosure channel have been used. In the absence of such reports, voluntary CSR sections of the annual reports are employed. Out of 475 reports, 200 reports are associated with carbon intensive industries and 275 are related to non-intensive industries.

4.8.2 Coding, Coding Schedule and Coding Manual

Coding is a crucial stage in the content analysis process. Two main elements of the content analysis coding scheme are the coding schedule and coding manual (Bryman, 2012). The coding schedule is a form containing all the data relevant to an item being coded. However, the coding schedule does not provide detailed information about what is to be done and where. Thus, the

coding manual is provided to give all the possible categories for each dimension being coded. According to Bryman (2012), the coding manual can act as a statement of instructions to coders. Table 4.2 indicates the coding schedule related to each item (i.e. sustainability or the CSR section of an annual report) which contains four dimensions including total number of sentences related to carbon-related information, total number of sentences in the stand-alone sustainability report or CSR section of the annual report, and total number of symbolic and behavioural sentences.

Table 4.2 Carbon Disclosure Coding Schedule

	Number of carbon-related sentences	Number of sentences in sustainability report or CSR section of annual report	Number of symbolic sentences	Number of behavioural sentences
Sustainability report or CSR section of annual report related to year X of company Y				

However, as aforementioned, the coding schedule does not provide detailed information and the coding manual is required to provide possible categories for each dimension being coded. In line with the aims and objectives of this study, the coding manual has been obtained from Hraskey (2011). She used three categories to capture symbolic disclosures. The first category is normative statements related to concern or intentions about the relevant issues, but not specific action. The second category records statements containing aspirational objectives or targets, but again without specific actions. The third disclosure category is for statements reporting on any external awards or recognition that the company has received related to carbon footprints, climate change or global warming. The aggregation of these three categories is used to obtain the total number of symbolic disclosures made in each year by each company.

There are also three categories to capture behavioural disclosures. The first category relates to internal corporate initiatives to improve the corporate carbon footprint, while the second relates to involvement in external initiatives to reduce the carbon footprint. The third is statements indicating actions taken to help others to lighten their carbon footprints. In total, the statements in these three categories reflect the total number of behavioural sentences made in each year by

each company. Table 4.3 depicts the coding manual adopted to capture the nature of sentences in order to measure the quality of carbon disclosure.

Table 4.3 Carbon Disclosure Coding Manual

Symbolic Disclosure	Description	Exemplifying disclosure
Normative statement	Statements espousing commitment to and recognition of the importance of carbon footprints, global warming and climate change but not indicative of specific action or outcome	We believe it is important for Australia to establish a long-term greenhouse gas emissions reduction goal and to map a path to achieve it. Climate change and resource scarcity are issues that require us to evolve our business model to meet our responsibilities.
Aspirational target	Articulation of targets or objectives to be achieved in the future without associated action	Our ultimate goal is to have no carbon emissions released to the atmosphere. We have set targets for paper use, recycling facilities and greenhouse gas emissions.
Awards/recognition	Statements indicating external recognition of positive efforts pertinent to carbon footprints, global warming and climate change	We were included in the 2004 Climate Leadership Index comprising the 50 “best in-class” responses.
Behavioural Disclosure	Description	Exemplifying disclosure
Internal activities	Statements about specific internal corporate actions taken relevant to carbon footprints, global warming and climate change	Where possible we install electricity generators that use the waste gas as fuel, electricity produced in this way actually reduces greenhouse gas emissions. The \$A30 million plant that we opened in September will generate approximately six megawatts of electricity per hour and reduce greenhouse gas emission by 250,000 tons of carbon dioxide equivalent per year.
External activities	Statements about involvement in activities relevant to carbon footprints, global warming and climate change that are initiatives developed with partners or projects external to the organisation	Since becoming a member of the Greenhouse Challenge Program one division has completed a range of efficiency improvement projects resulting in reduced greenhouse gas emissions of more than one million tons per annum. To support efforts to research the impacts of climate change we have partnered with the Earthwatch Institute to offer an opportunity for our co-workers to join an international conservation research project.
Assisting others	Statements about actions taken to help others to reduce their carbon footprint	We have developed a range of products so customers have a choice about their contribution to greenhouse gas emissions reduction. All colleagues who are allocated a car space for non-company vehicles are required to offset their annual greenhouse gas emissions through a subscription to Green Fleet.

Source: Hrasky (2011, p. 184)

In order to facilitate the coding process, Nvivo 10 was used to classify sentences into symbolic and behavioural categories in order to reach a frequency related to each category. Figure 4.2 shows an example of the coding process extracted from Nvivo 10.

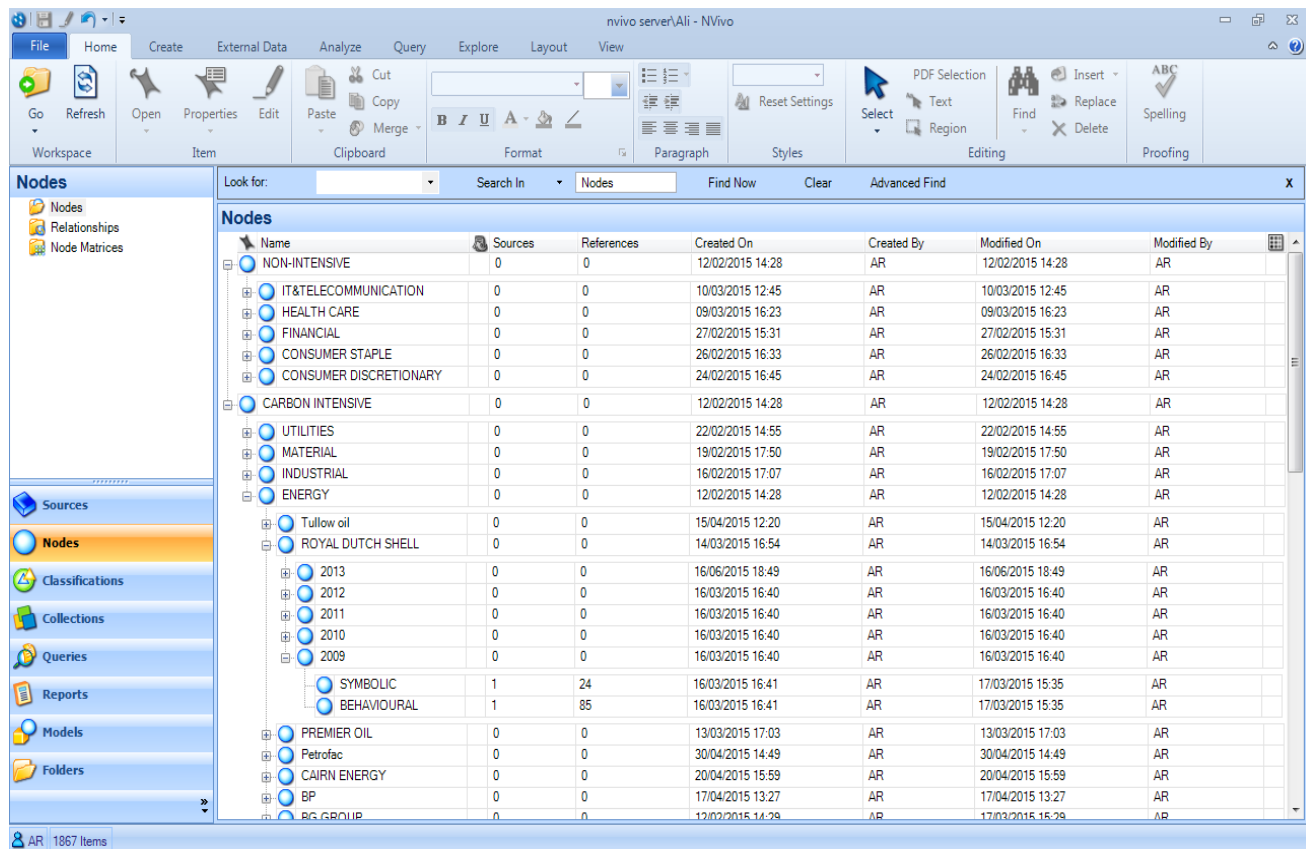


Figure 4.2 An example of the coding process extracted from Nvivo 10

4.9 Content Analysis of Carbon Reputation

In the absence of a specific database related to corporate carbon reputation, and in line with previous studies (Aerts and Cormier, 2009; Cho et al., 2012; Deephouse, 2000), this study has used media legitimacy related to corporate carbon issues as a proxy of carbon reputation. Media can be considered as a powerful medium to shape the perception of companies' stakeholders, and hence shape a positive or negative image about corporate activities. As stated earlier, "...gaining and maintaining of legitimacy is often now expressed in terms of its role in building and maintaining an organization's reputation". (Deegan and Unerman, 2011, p. 336).

4.9.1 Sampling

In this study all UK newspapers (including both national and local newspapers) have been selected as representatives of mass media. Deephouse (2000) showed that newspapers have a stronger impact than other mass media in setting the public agenda. Robinson and Levy (1996) argue that newspapers can be deemed as the best media source of public knowledge and opinions

about corporate activities. Thus, this study relies on the content analysis of newspapers' articles covering corporate carbon and climate change issues.

4.9.2 Coding and Coding Schedule

The coding schedule used for the sample companies is comprised of eight dimensions related to each year of each company. In total, 1,424 articles have been extracted using a company's name and the following keywords: "carbon", "co2", "greenhouse gas emissions", "air pollution", "climate change", and "global warming". Out of these 1,424 articles, 965 are related to carbon intensive industries and 459 are related to carbon non-intensive industries. Each article has been coded based on its impact on a firm's carbon footprint or climate change legitimacy (856 articles have provided good news, 521 have provided bad news and 45 articles have provided neutral news) (Appendix II indicates a sample of collected carbon-related newspapers' articles)¹⁸, whether it comes from national or local newspapers, or whether the whole article or just part of it reports on a company's carbon-related issues (they have been named focused and unfocused articles by the researcher). Table 4.4 provides the carbon reputation coding schedule.

Table 4.4 Carbon Reputation Coding Schedule

	Number of favourable national and focused articles	Number of favourable national and unfocused articles	Number of favourable local and focused articles	Number of favourable local and unfocused articles	Neutral articles	Number of unfavourable national and focused articles	Number of unfavourable national and unfocused articles	Number of unfavourable local and focused articles	Number of unfavourable local and unfocused articles
Year X of Company Y									

Unlike previous studies adopting a weighting method using three cardinal scales (i.e. favourable (+1), neutral (0), and unfavourable (-1)), this study adopts nine scales to weight articles as

¹⁸ The researcher asked one of his colleagues to code 100 randomly allocated newspapers' articles. Out of 100 articles, the two coders agreed on 83% good news, 84% bad news and 93% neutral news. The variance between the two coders' scores is quite systematically based on Cronbach's alpha (measure of internal consistency) (alpha = 0.891 for good news, 0.915 for bad news and 0.852 for neutral news) showing a high level of intercoder reliability (Weber, 1990).

follows (to the best of the researcher's knowledge, no previous studies have used this scaling system so far):

- Favourable national and focused articles: +4
- Favourable national and unfocused articles: +2
- Favourable local and focused articles: +2
- Favourable local and unfocused articles: +1
- Neutral articles: 0
- Unfavourable local and unfocused articles: -1
- Unfavourable local and focused articles: -2
- Unfavourable national and unfocused articles: -2
- Unfavourable national and focused articles: -4

Consistent with previous studies (Aerts and Cormier, 2009; Cho et al., 2012; Clarkson et al., 2008; Deephouse, 2000), Janis-Fadner's coefficient is used to measure corporate carbon reputation ¹⁹. Given the adoption of a new weighting system, Janis-Fadner's coefficient ranges from -16 to +16.

The formula is as follows:

$$\text{Janis-Fadner coefficient} = \begin{cases} \frac{f^2 - fu}{total^2} & \text{if } f > u \\ 0 & \text{if } f = u \\ \frac{fu - u^2}{total^2} & \text{if } u > f \end{cases}$$

4.10 Data Analysis Method

Based on the objectives of the research, several statistical techniques including correlation coefficient, simple and multiple regression, structural equation modelling (SEM) and so forth can be used in quantitative studies. Due to investigating the direct and indirect relationship between variables of this study, structural equation modelling is well suited to test the hypothesised

¹⁹ Following Clarkson et al. (2008), for those firms with no environmental articles, the Janis-Fadner coefficient is set to zero. Hence, silence in the media is interpreted as neutrality of perceptions about corporate environmental legitimacy.

relationships of the current study since it tests direct and indirect relationships while controlling for all other relationships (Byrne, 2013).

4.10.1 Structural Equation Modelling

Management accounting studies use different multivariate data analysis methods to test the model fit and research hypotheses including partial correlations, linear regression, ordinary least square regressions (OLS), structural equation modelling (SEM) and partial least square (PLS). SEM is one of the least employed methods in management accounting research (Smith and Langfield-Smith, 2004). Henri (2007, p. 76) defines structural equation modelling as follows:

... a set of multivariate techniques that allow for the simultaneous study of the relationship between directly observable and/or unmeasured latent variables, while incorporating potential measurement errors.

SEM is useful in testing and developing theories containing multiple equations, comprising dependence relationships where a hypothesised dependent variable becomes an independent variable in a subsequent dependence relationship (Hair Jr et al., 2009). Although the use of this technique is increasing in the accounting literature, it is still at lower levels than that of other behavioural disciplines (Smith, 2011)

One of the main features of SEM is that it includes both measurement and structural models. While the measurement model determines relationships between observed and latent variables, the structural model tests relationships between latent variables and incorporated identified measurement error variances (Smith, 2011). The measurement model uses the confirmatory factor analysis in identifying the loading of each observed variable on the latent variable and the reliability of the measurement of each latent variable. The structural model utilises regression analysis to test the relationships between latent variables with explicit recognition of the error associated with measuring the observed variables (Smith and Langfield-Smith, 2004).

According to Bollen and Long (1993), depending on the nature of the research variables, structural equation modelling can be considered as an umbrella classification covering partial least square, path analysis, and latent variable SEM. Since the variables of the current study are all observed variables, an overall structural model, but not a measurement model, is estimated.

Thus, path analysis²⁰ is employed to validate the proposed hypotheses. For the aim of this study, path analysis has an advantage over multiple regression analysis as the hypothesised relationships of this study are interconnected so that the direct and indirect relationships between all variables of interest can be tested (Schumacker and Lomax, 2010).

4.10.2 Path Analysis

Path analysis is an extension of the regression model to test “the fit of the correlation matrix against two or more causal models which are being compared by the researcher” (Garson, 2012, p. 21). The path model can be considered as the combination of two or more regression equations where a dependent variable in one model can be an independent variable in another. Hence, path analysis requires the underlying and usual assumptions of regression, including the normality of variables, absence of multicollinearity between independent variables, and so forth (Hair Jr et al., 2009). Like conventional regression, path analysis says nothing about the causal effects between two variables or mutual dependence on other variables, and the theory remains paramount in predicting and dictating the causal relationship (Smith, 2011).

In path analysis, the overall model fit indices and path coefficients are among the most important and frequently reported measures representing the extent to which the model fits a set of observations and the direct effect of an independent variable on a dependent variable respectively. The following sections will explain the goodness of fit tests and path coefficients.

4.10.2.1 Goodness of Fit

Model evaluation is one of the most unsettled and difficult issues related to SEM (Hooper et al., 2008). The goodness of fit indices are the most commonly employed ones to evaluate the model and determine how well it fits a set of observations and whether the model should be accepted or rejected (Kline, 2011). According to Hooper et al. (2008), the most commonly reported model fit indices can be classified into two main categories, namely called absolute fit indices including the chi-square test, RMSEA, GFI, etc. and incremental fit indices including NFI, CFI and so forth.

Absolute fit indices demonstrate how well the model fits the data and indicate which proposed model has the best fit (Hooper et al., 2008). These indices “provide the most fundamental

²⁰ We Utilised AMOS 20 to estimate paths.

indication of how well the proposed theory fits the data. Unlike incremental fit indices, their calculation does not rely on comparisons with a baseline model, but is instead a measure of how well the model fits in comparison to no model at all” (Hooper et al., 2008, p. 53).

The chi-square is the traditional measure for assessing model fit (Crawshaw and Chambers, 2001) and evaluating “the magnitude of discrepancy between the sample and fitted covariance’s matrices” (Hu and Bentler, 1999, p.2). An insignificant chi-square value demonstrates that there is a good model fit, while a significant chi-square presents a lack of satisfactory model fit (if the chi-square p-value $< .05$, the model is rejected) (Schumacker and Lomax, 2010). In the presence of normally distributed data, the maximum likelihood-based p-value is used to assess the model fit, whereas Bollen-Stine’s p-value is employed to assess the model fit when the data are not normally distributed (like the current study).

The Root Mean Square Error of Approximation (RMSEA) is a discrepancy per degree of freedom. The RMSEA is among the measures least affected by sample size (Hooper et al., 2008). A RMSEA that is less than or equal to 0.05 shows a well-fitting model. However, the fit of model can still be considered acceptable if the RMSEA is less than or equal to 0.08 (Garson, 2012). Garson (2012) takes the view that a value of about 0.08 or less for the RMSEA would indicate a reasonable error of approximation.

The Goodness-of-Fit statistic (GFI) is an alternative to the chi-square test and “calculates the proportion of variance that is accounted for by the estimated population covariance” (Hooper et al., 2008, p. 54) and by “looking at the variances and covariances accounted for by the model, it shows how closely the model comes to replicating the observed covariance matrix” (Hooper et al., 2008, p. 54). This measure ranges from 0 to 1 and larger samples increase its value. The values of 0.90 or greater indicate the acceptable model fit.

Incremental, comparative or relative fit indices are those indices that do not use the raw form of chi-square. These indices compare the chi-square value to the baseline model to assess the model fit (Hooper et al., 2008). The normed-fit index (NFI) is among the most reported incremental fit indices assessing the model by comparing the chi-square value of the model to the chi-square of the null model. According to Hooper et al. (2008, p. 55), “the null/independence model is the

worst case scenario as it specifies that all measured variables are uncorrelated”. NFI values range between 0 and 1, and values greater than 0.90 indicate a good fit (Kline, 2011).

The Comparative Fit Index (CFI) is a revised form of the NFI considering sample size. In other words, this measure provides a reliable model fit even in the presence of a small sample size. Hence, like RMSEA, the CFI is least affected by sample size (Kline, 2011). Like NFI, CFI compares the existing model fit with a null model. The CFI varies from 0.00 to 1.00. A CFI close to one indicates a very good model fit. According to Hair Jr et al. (2009), the CFI should be equal to or greater than 0.90 to accept the model.

4.10.2.2 Path Coefficient

A path coefficient is a standardised regression coefficient (b) indicating the direct effect of an exogenous (independent) variable on an endogenous (dependent) variable in the path model. The regression coefficient or beta (b) is “the change in the outcome resulting from a unit change in the predictor” (Field, 2013, p. 303). The sign of the estimated regression coefficient (b) indicates whether the relationship between the two variables is negative or positive and its value provides the degree to which the exogenous variable is associated with the endogenous variable. To assess the significance of path coefficients (b), the t -test and the calculated p -value for each path coefficient can be used (Field, 2013).

Although a series of ordinary least square (OLS) regression can be employed to implement path analysis, SEM software such as AMOS and Lisrel are frequently used to obtain path coefficients and probability value (p -value) to test the relationships between variables in a path model. As aforementioned in this study, due to the multivariate non-normality, a bootstrap method is used to gain standardised path coefficients and the significance of the individual path coefficient. Nevitt and Hancock (2004) recommend 250 bootstrap samples since they found little improvement in the quality of bootstrap estimates as a result of larger numbers of bootstrap samples. However, they suggest in order to interpret p values more accurately, a larger number of bootstrap samples (e.g. 2,000) is recommended to ensure stable probability estimates.

4.11 Reliability and Validity

Reliability and validity are two aspects of the credibility of research findings and key points for assessing the quality of any study. Reliability is concerned with the extent to which research

results are similar if the research is repeated. Validity refers to the extent to which the results accurately represent the phenomena under study (Collis and Hussey, 2009)

According to Smith (2011), explicit and comprehensive documentation of the research procedure by providing detailed definitions and measurements of variables, data collection and analysis methods can greatly improve the duplicability and reliability of the study. Thus, this thesis has provided comprehensive documentation of variables' definition and measurement, data collection methods, and data analysis procedure to improve the duplicability and reliability of this study.

Denscombe (2014) argues that the validity of the quantitative research can be assured in the accuracy of causal relationships and interpretations between variables. Hence, this study has assured the validity in three ways. Firstly, the relationships between the variables of this study are based on well-explained literature and a theoretical framework. Secondly, a time sequence design has been used for this study to enhance the interpretability of casual relationships with variables to assure the validity of this study. Thirdly, the path analysis employed to assess the structural relationships between the variables of this study allows the researcher to estimate the structural path, which reduces measurement error and improves the validity of the study.

4.12 Conclusion

This chapter has discussed the research paradigm, methodology and methods employed in this study. A comparative study is used to compare carbon intensive and non-intensive industries' results. In order to enhance the interpretability of causal relationships between variables and improve the validity of the study, the sequence research design has been used and for the research findings to be reliable, a detailed explanation of the variables' definitions and measurements, as well as data collection and data analysis methods, has been documented. Natural sampling is the sampling technique that the researcher has used due to the small influence on the composition of the sample (because of data availability), and finally because of investigating direct and indirect relationships between carbon performance, carbon disclosure, corporate reputation and economic performance, the researcher has used path analysis, which is a special case of structural equation modelling to reach the final results. The next two chapters will present the results of the hypothesised relationships in this study.

CHAPTER 5: Path Analysis and Findings in Carbon Intensive Industries

5.1 Introduction

This chapter will present the process of data analysis of carbon intensive companies to assess the structural relationships between the variables of this study, as a part of the hypotheses testing procedures. The remainder of this chapter is organised as follows. Section 2 discusses the results of data screening including missing value analysis, detecting outliers and assessing data normality. Section 3 explains the descriptive statistics of the variables. Section 4 presents correlation matrixes of two models. Section 5 provides the results of path models and hypotheses testing, and the last section is a conclusion of this chapter.

5.2 Data Screening

Data screening can be considered as a necessary initial step in data analysis to achieve a better understanding of the data (Hair Jr et al., 2009). According to Schumacker and Lomax (2010), the purpose of data screening is to check and deal with missing values, outliers and the normality of the data. The next sub-sections will explain these issues in detail.

5.2.1 Missing Data

Since the beginning of field research, missing data have challenged researchers (Graham, 2009). According to Graham (2009, p. 550), the challenge has been particularly severe for longitudinal research with “research involving multiple waves of measurement on the same individuals”. The main issue of missing data was that the analytical procedures mostly developed in the early 20th century were designed to have complete data.

Missing data can lead to some serious problems. First/y, most statistical procedures automatically remove cases with missing data, and hence, there may not be enough data to implement the analysis. Secondly, the analysis may run, but due to the small amount of data, the results might not be statistically significant. Thirdly, the results can be misleading if the cases do not represent a random sample of all cases.

There are two types of missing data. The first type of missing data is ignorable missing data that do not need specific remedies and occur as a part of the research design and are inherited in the

employed technique. The second type is non-ignorable missing data that occurs as a result of some procedural factors and requires some remedies (Hair Jr et al., 2009).

Checking the extent and pattern of the missing data are important in selecting the correct method to deal with it (Garson, 2012). The extent of missing data can help to understand whether they are ignorable. According to Hair Jr et al. (2009), missing data under 10% can be ignored. In addition, understanding the pattern of missing data is also important, particularly in establishing whether the data are missing at random (MAR), completely at random (MCAR), or non-random. Little's MCAR test is one method in assessing the patterns of missing data in all variables (Hair Jr et al., 2009).

Removing missing data from the analysis is one method to tackle it. Apart from deletion, other methods such as data imputation including mean, regression or maximum likelihood can be employed as well. In this study, as all the data are secondary data collected from various databases and corporate annual reports, there are no missing data regarding the variables of the study. Therefore, there is no requirement to conduct missing value analysis.

5.2.2 Outliers

Outliers are extreme scores that are different from the rest (Kline, 2011). There are two types of outlier, namely called univariate and multivariate outliers. A univariate outlier refers to the case that is extreme on a single variable. There is no consensus about “extreme”, but according to Kline (2011) the common rule is that values more than three standard deviations beyond the mean can be considered as outliers. One of the most frequently used methods to test the univariate outliers is standard scores (z scores). A Z score indicates whether the score is above or below the mean and by how many standard deviations. After transforming all data into standardised scores by SPSS, results showed a few numbers of univariate outliers were based on a threshold value of 3 (i.e. $|z| > 3$). However, according to Hair Jr et al. (2009) for a larger sample size (over 80), it can be extended up to 4 (the sample size in this chapter is 200). Table 5.1 reports cases with univariate outliers.

Table 5.1 Univariate Outliers

Variable	Case Number	Z Score
Carbon performance/Sales	151	3.80
Carbon Reputation	18	-3
Carbon Reputation	64	3.28
Carbon Reputation	135	-3.58
Carbon Reputation	139	-3.60
Quantity of Disclosure	62	3.46
Quantity of Disclosure	101	3
Quantity of Disclosure	104	3.22
Quality of Disclosure	11	3.22
Quality of Disclosure	146	3.14
Economic Performance	35	-3.82
Economic Performance	185	-3.22

Multivariate outliers are extreme values of two or more variables. According to Kline (2011), the case can be deemed as a multivariate outlier if it has an unusual pattern in the sample, although no individual value may be considered as extreme. For instance, a case can be considered as a multivariate outlier if it has values between two and three standard deviations above the mean of all variables (Kline, 2011).

There are several methods to detect multivariate outliers. One of the most frequently used methods is the Mahalanobis distance (D). According to Kline (2011, p. 54), this method “indicates the distance in standard deviation units between a set of scores (vector) for an individual case and the sample means for all variables (centroid), correcting for inter-correlations”. AMOS is a software performing Mahalanobis distance analysis. This analysis assesses the position of each of the 200 observations in this study relative to the centre of all observations of a set of variables. The Mahalanobis distance reveals 19 and 22 potential multivariate outlying cases at $p=0.05$ (according to Hair Jr et al. (2009)) for Model I and Model II respectively²¹. Table 5.2 and 5.3 depict multivariate outliers of the two models analysed in this chapter.

²¹ Model 1 employs quantity of carbon disclosure and in Model 2 this variable is replaced by quality of carbon disclosure.

Table 5.2 Multivariate Outliers of Model I

Observation number	Mahalanobis d-squared	p	Observation number	Mahalanobis d-squared	p
16	26.942	.000	156	13.305	.021
101	21.461	.001	164	13.106	.022
151	20.950	.001	155	12.853	.025
121	16.831	.005	186	12.323	.031
35	15.541	.008	18	12.075	.034
62	15.465	.009	17	11.374	.044
131	15.452	.009	61	11.292	.046
189	15.174	.010			
135	14.936	.011			
139	14.732	.012			
130	14.401	.013			
185	13.973	.016			
156	13.305	.021			

Table 5.3 Multivariate Outliers of Model II

Observation number	Mahalanobis d-squared	p	Observation number	Mahalanobis d-squared	p
16	27.129	.000	146	11.875	.037
151	21.016	.001	18	11.854	.037
121	16.503	.006	11	11.791	.038
131	16.080	.007	129	11.744	.038
101	15.980	.007	136	11.304	.046
156	15.737	.008			
35	15.656	.008			
130	14.915	.011			
135	14.153	.015			
139	13.885	.016			
155	13.815	.017			
7	13.460	.019			
164	12.906	.024			
185	12.329	.031			
186	12.281	.031			
81	12.130	.033			
189	12.038	.034			

There are different methods to handling the outliers. Some researchers suggest removing the outliers or transforming the raw data (Little and Rubin, 2014). However, these procedures may lead to loss of generalisability and lack of validity of the findings (loss of observations and subsequently model power). According to Gao et al. (2008), removing the outliers in the SEM

may lead to new outliers and does not improve the overall model fit, but significantly influences the parameter estimates. One of the methods handling multivariate outliers and non-normality is bootstrapping. The bootstrapping function in AMOS can be employed to assess the stability of parameter estimates when there is multivariate non-normality. According to Roth (1994) and Nevitt and Hancock (1998), there are some cautionary points that should be kept in mind before using bootstrapping with AMOS. The first one is solving the missing data problem before using AMOS non-normality bootstrapping features, and the second one is having a sufficiently large sample size to ensure trustworthiness and accuracy of parameter estimates. Since there is no missing data in this study and the sample size of 200 is sufficient enough to employ bootstrapping, this method is utilised to handle multivariate outliers and non-normality. Therefore, in this study the outliers are not removed or transformed to ensure the results are generalisable to the whole population, and hence bootstrapped direct, indirect and total effects, as well as Bollen-Stine's p value (to assess the overall model fit), are reported.

5.2.3 Assessing Data Normality

Normal distribution is an underlying assumption of multivariate analysis (Field, 2013). Non-normal distribution can lead to inaccurate and invalid parameter estimates, confidence intervals, null hypotheses significance testing and errors.

Skewness and kurtosis are the most frequently used tests of normality. These tests compare the distributions of the scores with the normal distribution (Bollen and Long, 1993). Kurtosis represents the flatness of data distribution relative to the normal distribution (Hair Jr et al., 2009). For a normal distribution, the value of the kurtosis is equal to zero. Positive kurtosis indicates a peaked distribution and negative kurtosis presents a flatter distribution (Hair Jr et al., 2009). Skewness is a measure of the balance and asymmetry of distribution. Normal distribution is balanced, symmetric and has a skewness of zero. If a distribution is unbalanced, it is skewed. Positive skewness indicates a distribution shifted to the left, whereas negative skewness denotes a shift to the right. Skewness and kurtosis critical values can be obtained from the Z distribution, based on the required significance level (Hair Jr et al., 2009). This study employs the most commonly used range values of (-2.58,+2.58) at the significance level of 0.01 (Gao et al., 2008) to assess the normality of variables. Skewness and kurtosis of each variable are reported in the Descriptive Statistics section.

In order to assess the multivariate normality of both carbon intensive industries' models, Mardia's multivariate kurtosis is used. As discussed in the next section, the assessment of the skewness and kurtosis values for the main variables of this study reveal that univariate normality has been achieved, but Mardia's multivariate kurtosis of the two models indicates that there are substantial departures from multivariate normality as follows: Model I (MN=9.3, CR=7.8) and Model II (MN=8.64, CR=7.3). According to Kline (2011), critical ratio values (CR) of higher than 1.96 mean that there is a significant kurtosis. Thus, the CR of 7.8 and 7.3 indicates a significant non-normality in both models. Therefore, due to the non-normality problem, in the current study, the bootstrapping method (with a sample of 2,000) is applied to correct the non-normality (Gao et al., 2008).

5.3 Descriptive Statistics

5.3.1 Carbon Performance

As stated earlier in Chapter 4, carbon emission intensity (emissions relative to economic output) is used as a measure of carbon performance which is calculated as the ratio of total direct (Scope 1) and indirect (Scope 2) emissions to total sales. However, because of the importance of absolute carbon emission scores and the information that the average, minimum, maximum, etc. that this variable provides, Table 5.4 summarises descriptive statistics of both carbon emission intensity and absolute carbon emission scores. Furthermore, in order to gain a better picture of the total of and average CO₂e emitted by sample companies for each year, and to understand the change between different years, descriptive statistics of each year are also provided.

Table 5.4 Descriptive Statistics of Carbon Performance of Carbon Intensive Industries

Variables	Min	Max	Sum	Mean	Std. Deviation	Skewness	Kurtosis
Carbon emission/sale	1.1	2,282		404.7	493.7	1.35	.94
Carbon emission	1,868.6	118,683,046	1,685,915,727	8,429,578.6	20,225,371.2		
Carbon emission 2009	25,732	76,000,000	319,092,090	7,977,302.2	18,962,048.1		
Carbon emission 2010	33,056	118,683,046	446,884,182	11,172,104.5	26,376,994.8		
Carbon emission 2011	36,435	84,000,000	316,413,208	7,910,330.2	19,089,031		
Carbon emission 2012	1,868	81,000,000	309,029,747.2	7,725,743.6	18,502,883.9		
Carbon emission 2013	25,400	83,000,000	294,496,500	7,362,412.5	17,758,207.7	1.35	.94
Sample size	200						

The mean or average indicates the central tendency of data and is an estimate of the centre of a distribution of values (Field, 2013). Standard deviation gives the information about the spread of values around the central tendency (i.e. mean). The carbon emission intensity mean of 404.7 shows that the average of data tends to go towards the minimum score.

To assess the normality of the carbon emission intensity as a proxy of carbon performance, the skewness and kurtosis statistics of this variable are examined. The result shows that the data is normally distributed since the skewness and kurtosis statistics of this variable fall within the acceptable range (-2.58,+2.58) (Hair Jr et al., 2009).

The descriptive statistic of absolute carbon emission provides interesting results. The minimum of 1,868.6 (tons) indicates the lowest carbon emission equivalent (CO₂e) and the maximum of 118,683,046 (tons) shows the highest emitted over the period 2009 to 2013. In total, 1,685,915,727 (tons) CO₂e has been emitted by the 40 sample companies in this study over the period 2009 to 2013. Over this period, 8,429,578.6 CO₂e has been produced on average by each

sample company. The standard deviation of 20,225,371.2 shows the spread of carbon emissions around the mean.

The results of each year show that the sample companies produced, in total, more CO₂e in the year 2010. On average, each company emitted 11,172,104.5 (tons) CO₂e in 2010 which is higher than other years. Apart from that year, companies, on average, produced almost equal carbon emission in each year. As we can see, the sum of carbon emission for each year, except 2010, is almost identical.

5.3.2 Carbon Disclosure

As stated earlier, in order to understand the impact of both volume and nature of carbon disclosure on corporate reputation, the quality and quantity of carbon disclosure as proxies of corporate carbon disclosure are employed. Descriptive statistics of the quantity of carbon disclosure are presented in Table 5.5. In order to understand companies' disclosure trends over the period under investigation, descriptive statistics of each year are presented as well.

Table 5.5 Descriptive Statistics of Quantity of Carbon Disclosure in Carbon Intensive Industries

Variables	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Quantity of carbon disclosure	0	0.45	0.12	0.97	1.33	1.36
2009	0	0.41	0.11	0.10		
2010	0	0.46	0.12	0.10		
2011	0	0.35	0.11	0.09		
2012	0.01	0.43	0.11	0.09		
2013	0.02	0.39	0.12	0.09		
Sample size	200					

The mean and standard deviation of the quantity of carbon disclosure imply that the majority of data tend to lean towards the minimum score. Also, it shows that over this period, on average, 12% of total sentences from the sustainability reports or CSR section of the annual reports has been allocated to carbon-related issues. Descriptive statistics of the quantity of carbon disclosure for each year suggest that, on average, companies have disclosed more or less the same volume

of carbon information in their sustainability reports or CSR section of their annual reports for each year.

Table 5.6 depicts the descriptive statistics of the quality of carbon disclosure over the whole period under investigation and for each year.

Table 5.6 Descriptive Statistics of Quality of Carbon Disclosure in Carbon Intensive Industries

Variables	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Quantity of carbon disclosure	0	5.6	1.54	1.31	1.13	1.12
2009	0	5.6	1.48	1.54		
2010	0	5	1.38	1.20		
2011	0	5.25	1.46	1.07		
2012	0	5	1.69	1.39		
2013	0	5	1.68	1.33		
Sample size	200					

Like quantity of disclosure, the average and standard deviation of quality of disclosures indicate that the majority of data tend to lean towards the minimum score. Since the quality of disclosure has been calculated as the ratio of behavioural disclosure to substantive disclosure, the mean of 1.54 implies that, on average, companies have disclosed more behavioural sentences than symbolic ones. The skewness and kurtosis of this variable are within the acceptable range (-2.58, +2.58) suggesting that this variable is normally distributed. The mean of the quality of carbon disclosure in 2012 and 2013 imply that the quality of such disclosure has improved slightly in comparison with 2009, 2010 and 2011 in which firms provided such disclosure with more or less the same quality.

5.3.3 Carbon Reputation

As stated earlier, newspaper articles have been employed and classified into different categories based on their impact on a firm's carbon footprint and climate change legitimacy to measure the carbon reputation. Out of 1,424 newspaper articles, 965 articles related to carbon intensive industries, where 664 articles provided good news, 246 provided bad news and 55 articles

provided neutral news. Descriptive statistics of corporate carbon reputation over the whole period and for each year are presented in Table 5.7.

Table 5.7 Descriptive Statistics of Carbon Reputation of Carbon Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-5.25	6.25	0.77	1.66	-0.174	2.26
2010	-2	4	0.94	1.55		
2011	-4	4.84	1.15	1.7		
2012	-4.25	4	0.80	1.7		
2013	-5.25	6.25	0.52	1.8		
2014	-5.20	3.85	0.43	1.46		
Sample size	200					

Based on the results in Table 5.7, the average corporate carbon reputation of 0.77 over the whole period, which is close to zero, indicates that media perception, on average, has been neutral about corporate carbon-related issues in carbon sensitive industries. Detailed data of each year reveals that after 2010 and 2011, in which companies, on average, had approximately the same reputation, the averages of firms' carbon reputation had a descending trend, and in 2014 companies had the lowest average of carbon reputation. Finally, the skewness and kurtosis values of carbon reputation are within the acceptable range (-2.58, +2.58) showing the normal distribution of this variable.

5.3.4 Economic Performance

An annual share return is employed to measure corporate economic performance. However, accounting-based measures are also used as a sensitivity test to ensure that the results are not a function of the particular economic performance measure. Table 5.8 indicates the descriptive statistics of the annual share return over the whole period and for each year.

Table 5.8 Descriptive Statistics of Annual Share Return of Carbon Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-0.89	0.60	0.021	0.24	-0.85	1.44
2010	-0.30	0.60	0.15	0.18		
2011	-0.48	0.39	-0.02	0.2		
2012	-0.39	0.53	0.044	0.21		
2013	-0.65	0.37	0.068	0.21		
2014	-0.89	0.29	-0.13	0.28		
Sample size	200					

The annual share return mean of 0.021 implies that the average share return of sample companies to shareholders over the whole period has been 2p (which is close to zero), showing to some extent the weak performance of sample companies. Further information regarding each year reveals that sample companies had, on average, the highest and lowest annual share returns in 2013 and 2014 respectively, and no specific pattern can be inferred from the means of reported years. Finally, the skewness and kurtosis of -0.85 and 1.44 show that the annual share return is normally distributed (based on the range (-2.58, +2.58) obtained from Hair Jr et al. (2009)). Tables 5.9, 5.10, and 5.11 indicate the descriptive statistics of accounting-based measures over the whole period and for each year.

Table 5.9 Descriptive Statistics of ROA of Carbon Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-14.01	24.66	5.87	5.62	-0.15	2
2010	-1.46	17.40	6.98	4.41		
2011	-3.87	64.83	9.36	10.47		
2012	-8.65	15.55	6.12	5.24		
2013	-14.01	17.57	4.90	5.12		
2014	-53.54	43.49	2.62	12.55		
Sample Size	200					

The results in Table 5.9 imply that the average return on the assets of sample companies for the whole period is 5.87 with a standard deviation of 5.62. According to Garson (2012), when the distribution of data is normal, 95% of the values fall within two standard deviations of the mean. Thus, it can be concluded that 95% of companies' ROA values for the whole period fall between -5.37 and 17.11. Descriptive statistics of each year indicate that companies had the highest ROA average in 2011 and afterwards, they had a descending trend. The normal distribution assessment of ROA suggests that this variable is normally distributed since the skewness and kurtosis fall within the acceptable range (-2.58, +2.58).

Table 5.10 Descriptive Statistics of ROE of Carbon Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-35.78	66.76	16.75	14.83	0.21	2.37
2010	-3.79	66.76	21.59	14.53		
2011	7.37	84.52	23.26	15.64		
2012	-15.13	52.97	17.32	14.31		
2013	-35.78	46.88	14.42	15.00		
2014	-33.39	120.43	10.65	22.48		
Sample size	200					

The results show that the average of returns on equity over the period 2010 to 2014 is 16.75 with a standard deviation of 14.83, implying that 95% of the scores are between -12.97 and 46.41 since the data is normally distributed. Like ROA, the average of ROE for each year indicates that companies had the highest ROE average in 2011 and afterwards, they had a descending trend. Finally, the skewness and kurtosis of 0.21 and 2.37 falling within the acceptable range (-2.58, +2.58) suggest that this measure of corporate economic performance is normally distributed.

Table 5.11 Descriptive Statistics of EPS of Carbon Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-2.09	3.52	0.60	0.78	1	2.74
2010	-0.13	4.70	0.71	0.91		
2011	-0.04	3.18	0.86	0.83		
2012	-1.03	2.97	0.56	0.76		
2013	-0.60	1.93	0.56	0.61		
2014	-2.09	2.43	0.36	0.86		
Sample size	200					

The last measure of economic performance employed in this study is earning per share (EPS). The average of 60p suggests that the shareholders of sample companies over the period under investigation may receive 60p for each share if all the profits are distributed to outstanding shares at the end of the year. Like other accounting-based measures, the average of each year reveals that in 2011, sample companies had the highest average of EPS and after that they had a descending trend. The skewness and kurtosis of 1 and 2.74 respectively show that, in general, EPS has a normal distribution, although the kurtosis falls slightly beyond the acceptable range (-2.58, +2.58).

5.3.5 Control Variables

As stated earlier, corporate size and previous economic performance have been employed as control variables. Table 5.12 depicts descriptive statistics of control variables.

Table 5.12 Descriptive Statistics of Control Variables of Carbon Intensive Industries

Variables	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Log of total assets	8.70	11.35	9.72	0.61	1.11	0.61
Annual share return	-0.95	0.95	0.11	0.27	-0.042	1.77
ROA	-14.01	24.66	6.33	4.95	0.14	2.71
ROE	-35.78	74.06	18.84	14.21	0.69	2.95
EPS	-0.93	3.18	0.62	0.67	1.43	3.01
Sample size	200					

All control variables can be considered, in general, normally distributed although the kurtosis of ROA, ROE and EPS are slightly beyond the acceptable range (-2.58, +2.58).

5.4 Multicollinearity

Multicollinearity arises from the strong correlation between two or more independent variables in the model under investigation. According to Field (2013), a small correlation among the independent variables and a high correlation between the independent variables and the dependent variable can be deemed as the best option for the researcher. Tables 5.13 and 5.14 show the correlation matrix of Model I (the model having the quantity of disclosure as a measure of carbon disclosure) and Model II (the model having the quality of disclosure as a measure of carbon disclosure) respectively.

Table 5.13 Correlation Matrix of Model I of Carbon Intensive Industries

Variables	Carbon performance	Quantity of carbon disclosure	Carbon reputation	Economic performance	Previous economic performance
Carbon performance	1				
Quantity of carbon disclosure	-.005	1			
Carbon reputation	.011	.423**	1		
Economic performance	.088	.169*	.232**	1	
Previous economic performance	-.027	.081	.123	.215**	1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

Table 5.14 Correlation Matrix of Model II of Carbon Intensive Industries

Variables	Carbon performance	Quality of carbon disclosure	Carbon reputation	Economic performance	Previous economic performance
Carbon performance	1				
Quality of carbon disclosure	-.008	1			
Carbon reputation	.011	-.031	1		
Economic performance	.088	-.032	.232**	1	
Previous economic performance	-.027	-.040	.123	.215**	1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

The high correlation between exogenous (independent) variables may impact on the validity of the results since it may lead to an incorrect estimation of the regression coefficients (Field, 2013). According to Hair Jr et al. (2009, p.210), “as multicollinearity increases, the total variance explained decreases (estimation). Moreover, the amount of unique variance of independent variable is reduced to levels that make estimation of their individual effects quite problematic (explanation)”. One way to assess multicollinearity is to check the correlation matrix. The existence of high correlations between independent variables (0.90 or more) is an indication of a multicollinearity problem (Field, 2013). As it can be inferred from Tables 5.13 and 5.14, there is no high correlation between independent variables of the current study (i.e. carbon performance, quantity of carbon disclosure, carbon reputation, and previous economic performance in Model I and carbon performance, quality of carbon disclosure, carbon reputation, and previous economic performance in Model II). Hence, there is no multicollinearity problem.

5.5 Path Models and Hypotheses Testing

5.5.1 Path Models

In this section, two path models are presented. Models I and II present a path analysis of hypothesised relationships using the quantity and quality of carbon disclosure as measures of carbon disclosure respectively. As noted earlier, due to multivariate non-normality, Bollen-

Stine's p-value, rather than the usual maximum likelihood-based p-value, is employed to assess overall model fit (although the researcher relies on Bollen-Stine's p-value to ensure that the models have acceptable fit, the maximum likelihood-based p-value is reported as well). In addition, bootstrapped parameter estimates and two-tailed unbiased significance levels for direct, indirect and total effects are reported by the researcher, as provided by AMOS. Figure. 5.1 presents the results of Model I and Figure. 5.2 shows the results of Model II.

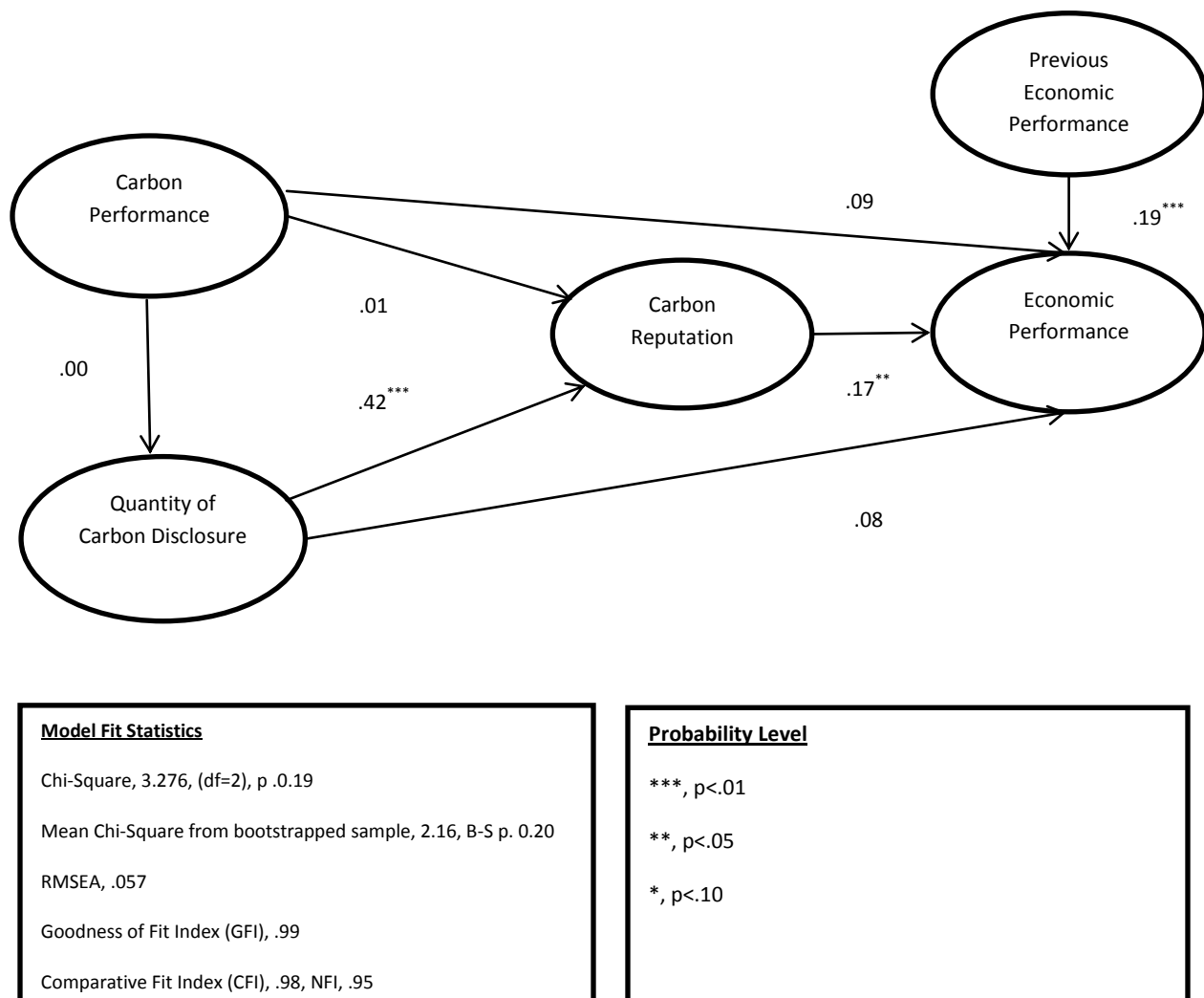


Figure 5.1 Model I

All indices demonstrate that the model has acceptable fit. Firstly, both Bollen-Stine's p-value and maximum likelihood-based p-value present the non-significant chi-square, showing that the path model is a strong fit for the sample. Secondly, the root-mean-square error of approximation (RMSEA) is .057 which is well under the recommended threshold of .08. The GFI of .99, which is greater than the acceptable threshold of .90, also indicates a strong model fit. Finally, the NFI and CFI of .95 and .98 exceed the recommended threshold of .90. Tables 5.15, 5.16, and 5.17 depict direct, indirect, and total effects between Model I variables respectively.

Table 5.15 Direct Effects between Variables of Model I

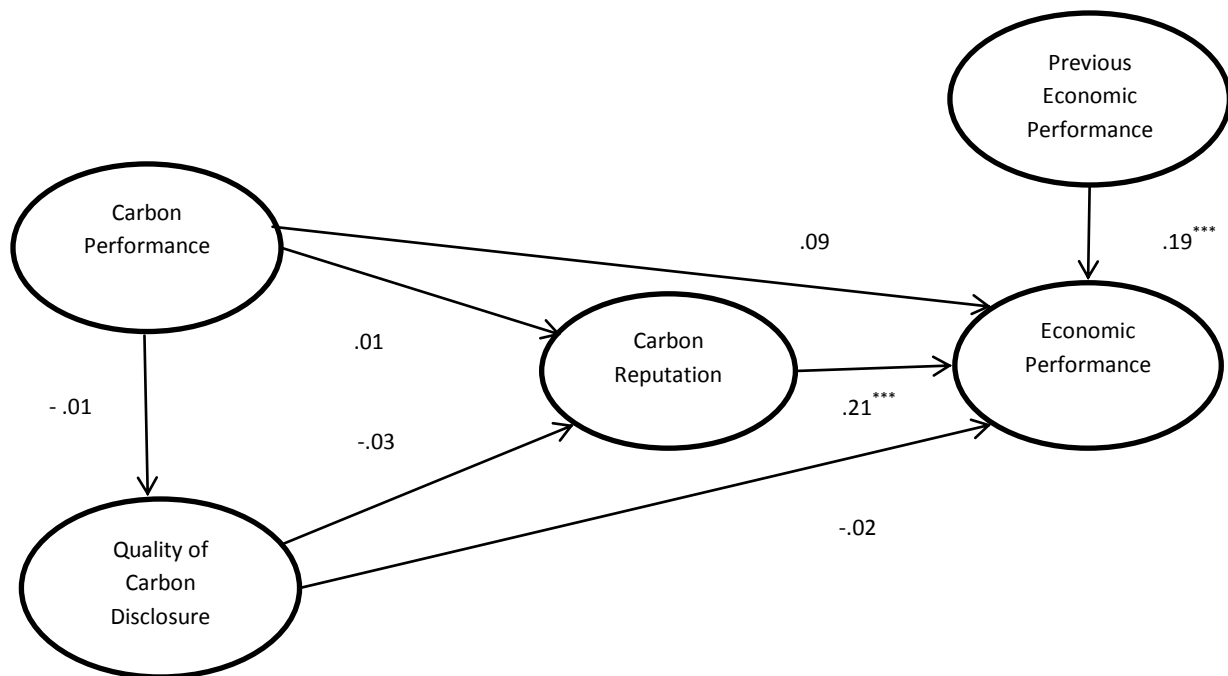
Variables	Carbon performance		Quantity of carbon disclosure		Carbon reputation		Previous economic performance	
Quantity of carbon disclosure	β	p						
	-.005	.995						
Carbon reputation	β	p	β	p				
	.014	.781	.423	.002				
Economic performance	β	p	β	p	β	p	β	p
	.092	.305	.081	.259	.174	.008	.190	.010

Table 5.16 Indirect Effects between Variables of Model I

Variables	Carbon performance		Quantity of carbon disclosure		Carbon reputation		Previous economic performance	
Quantity of carbon disclosure								
Carbon reputation	β	p						
	-.002	.995						
Economic performance	β	p	β	p				
	.002	.884	.074	.008				

Table 5.17 Total Effects between Variables of Model I

Variables	Carbon performance		Quantity of carbon disclosure		Carbon reputation		Previous economic performance	
Quantity of carbon disclosure	β	p						
	-.005	.995						
Carbon reputation	β	p	β	p				
	.011	.842	.423	.002				
Economic performance	β	p	β	p	β	p	β	p
	.094	.359	.155	.014	.174	.008	.190	.010



<u>Model Fit Statistics</u>	<u>Probability Level</u>
Chi-Square, 3.343, (df=2), p .0.19	***, p<.01
Mean Chi-Square from bootstrapped sample, 1.65, B-S p. 0.13	** , p<.05
RMSEA, .058	*, p<.10
Goodness of Fit Index (GFI), .99	
Comparative Fit Index (CFI), .91, NFI, .86	

Figure 5.2 Model II

Like Model I, all indices (except NFI which is slightly lower than the acceptable threshold) indicate that Model II has an acceptable fit. Firstly, both Bollen-Stine's p-value and maximum likelihood-based p-value present the non-significant chi-square, implying that the path model is a strong fit for the sample. Secondly, the root-mean-square error of approximation (RMSEA) is .058 which is well under the recommended threshold of .08. The GFI of .99 also indicates a strong model fit, and finally the comparative fit index (CFI) of .91 exceeds the recommended threshold of .90. Tables 5.18, 5.19, and 5.20 indicate direct, indirect, and total effects between Model II variables respectively.

Table 5.18 Direct Effects between Variables of Model II

Variables	Carbon performance		Quality of carbon disclosure		Carbon reputation		Previous economic performance	
Quality of carbon disclosure	β	p						
	-.008	.779						
Carbon reputation	β	p	β	p				
	.011	.878	-.031	.553				
Economic performance	β	p	β	p	β	p	β	p
	.091	.326	-.018	.714	.208	.001	.192	.008

Table 5.19 Indirect Effects between Variables of Model II

Variables	Carbon performance		Quality of carbon disclosure		Carbon reputation		Previous economic performance	
Quality of carbon disclosure	β	p						
Carbon reputation	β	p						
	.000	.684						
Economic performance	β	p	β	p				
	.003	.847	-.006	.510				

Table 5.20 Total Effects between Variables of Model II

Variables	Carbon performance		Quality of carbon disclosure		Carbon reputation		Previous economic performance	
Quality of carbon disclosure	β	p						
	-.008	.779						
Carbon reputation	β	p	β	p				
	.011	.842	-.031	.553				
Economic performance	β	p	β	p	β	p	β	p
	.094	.360	-.024	.625	.208	.001	.192	.008

5.5.2 Hypotheses Testing

5.5.2.1 Test of H1a and H2a

The first two hypotheses investigate whether carbon performance is associated with the quantity and quality of carbon disclosure respectively. As shown in Figure. 5.1 and Figure. 5.2, the paths from carbon performance to both the quantity and quality of carbon disclosure are not statistically significant ($\beta=.00$ and $p=.99$ and $\beta=-.01$ and $p=.78$ respectively). Thus, H1a and H2a are not supported. The results do not support Clarkson et al.'s (2008) argument that legitimacy theory is robust in predicting what is being disclosed.

5.5.2.2 Test of H3a, H4a and H5a

The second set of hypotheses is related to determinants of corporate carbon reputation. They investigate whether corporate carbon performance and both quality and quantity of carbon disclosure are associated with carbon reputation. As indicated in Figure. 5.1 and Figure. 5.2, the paths from carbon performance to carbon reputation in both models are not significant ($\beta=.01$ and $p=.78$ and $\beta=.01$ and $p=.88$ respectively), documenting that real carbon performance is not reflected in a firm's carbon reputation. H3a is therefore not supported.

In contrast, the path from the quantity of carbon disclosure to carbon reputation is positive and strongly statistically significant ($\beta=.42$ and $p<.01$), indicating more carbon disclosure improves corporate carbon reputation. Hence, H4a is supported. However, as shown in Figure. 5.2, there is no significant relationship between quality of such disclosure and carbon reputation ($\beta=-.03$ and $p=.55$) which is not supporting H5a. The findings indicate that the volume of such disclosures can enhance a firm's carbon reputation irrespective of its quality.

5.5.2.3 Test of H6a

As indicated in both Model I and Model II, the paths from carbon reputation to economic performance are positive and statistically significant ($\beta=.17$ and $p<.05$ and $\beta=.21$ and $p<.01$ respectively). These findings, which are consistent with resource-based theory, suggest that firms with better carbon reputation can enjoy a better economic performance and carbon reputation is presently a driver of share prices. Therefore, H6a is supported.

5.5.2.4 Test of H7a

No significant association is found between carbon performance and corporate economic performance in both models ($\beta=.09$ and $p=.30$ and $\beta=.09$ and $p=.33$ respectively). Hence, H7a is

not supported. Such results show that a firm's carbon emissions are not presently drivers of share prices and better carbon performers are not rewarded in the market.

5.5.2.5 Test of H8a and H9a

Finally, the last set of hypotheses investigates the association between both quality and quantity of carbon disclosure and a firm's economic performance. As shown in Figure. 5.1 and Figure. 5.2, the paths from both the quantity and quality of carbon disclosures to economic performance are not statistically significant ($\beta=.08$ and $p=.26$ and $\beta=-.02$ and $p=.71$ respectively), documenting that the financial market is not yet responsive to a firm's carbon disclosures, or maybe the information provided is not sufficient enough to send a clear signal to the market. H8a and H9a are therefore not supported.

5.5.2.6 Mediation tests

In order to test the mediating effect in both models, the bootstrapping method by AMOS 20 is used. As aforementioned, bootstrapping involves repeatedly and randomly sampling observations with replacement from the data set to compute the desired statistic in each resample. Over hundreds of bootstrap resamples provide an approximation of the sampling distribution of the statistic of interest. Our results indicate no significant indirect relationship between carbon performance and carbon reputation, whereas there is a strongly statistically significant indirect relationship between the quantity of carbon disclosure and economic performance ($\beta=.07$ and $p<.01$). From further investigation, since there is no statistically significant relationship between the quantity of disclosure and economic performance and since economic performance is significantly associated with carbon reputation, it can be inferred that carbon reputation fully mediated the relationships between the quantity of such disclosures and economic performance.

5.5.2.7 Sensitivity test-alternative economic performance measures

To ensure that path findings are not a function of a specific economic performance measure used, the researcher repeated the path analysis, employing other alternatives economic performance measures including ROE, ROA, and EPS and re-ran both models with each of these three economic performance measures. All goodness of fit indices reflected acceptable model fit in all six models. Path analysis findings in both models did not change after replacing annual share return with ROE in both models. However, although the path from the quantity of carbon

disclosure to reputation remained positive and statistically significant after using ROA and EPS, the researcher failed to find a positive and statistically significant relationship between carbon reputation and economic performance in both models after replacing annual share return with ROA and EPS.

5.5.2.8 Additional control variable

Following suggestions by Patten (1991), Toms (2002), Cho and Patten (2007), Clarkson et al. (2011) and Cho et al. (2012)) that corporate environmental disclosure and environmental reputation might be influenced by corporate size, the researcher controls for potential firm size effects using a log of total assets in Model I. All indices show that the new model has an acceptable fit. Although the paths from size to carbon reputation and quantity of carbon disclosure are statistically significant ($\beta = -.25$ and $p < .01$ and $\beta = .13$ and $p < .01$ respectively), previously reported path analysis findings do not change and hence the results in the original analysis continue to hold.

The researcher also controls for potential firm size effects in Model II. All indices show that the new model has an acceptable fit. Although the path from size to carbon reputation is negative and statistically significant ($p < .01$), previously reported path analysis findings do not change and hence the results in original analysis continue to hold.

5.6 Conclusion

Table 5.21 summarises the results of hypotheses of carbon intensive industries.

Table 5.21 Summary Results for Testing the Research Hypotheses of Carbon Intensive Industries

Research hypothesis	Result
Ceteris paribus, for firms from carbon intensive industries, the quantity of carbon disclosure is negatively associated with carbon performance.	Rejected
Ceteris paribus, for firms from carbon intensive industries, the quality of carbon disclosure (i.e. ratio of behavioural disclosure to symbolic disclosure) is positively associated with carbon performance.	Rejected
Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with carbon performance.	Rejected
Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with quantity of carbon disclosure.	Supported
Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with quality of carbon disclosure.	Rejected
Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with carbon reputation.	Supported
Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with carbon performance.	Rejected
Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with quantity of carbon disclosure.	Rejected
Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with quality of carbon disclosure.	Rejected

The path models' results from carbon intensive industries showed that real carbon performance is not related to both quality and quantity of carbon disclosure. They also indicated that carbon performance is not reflected in corporate carbon reputation, and the quantity of carbon disclosure (irrespective of its quality) can enhance a firm's carbon reputation. The findings showed a significant positive relationship between carbon reputation and corporate economic performance, and they did not support that it pays to be green. In other words, no significant positive

association was found between carbon performance and corporate economic performance. In addition, no relationship was found between both the quality and quantity of carbon disclosure and a firm's economic performance. The bootstrapping method indicates a significant positive and indirect relationship between the quantity of carbon disclosure and a firm's economic performance. Since there is no direct relationship between these two constructs, further investigation demonstrated that this association is fully mediated by carbon reputation. The next chapter will present the findings in carbon non-intensive industries.

CHAPTER 6: Path Analysis and Findings in Carbon Non-Intensive Industries

6.1 Introduction

This chapter presents path analysis models and findings from hypotheses testing of carbon non-intensive companies. The remainder of this chapter is organised as follows. Section 2 discusses the results of data screening including missing value analysis, detecting outliers and assessing data normality. Section 3 provides the descriptive statistics of the variables. Section 4 presents correlation matrixes of both carbon non-intensive industries' models. Section 5 explains the results of path models and hypotheses testing, and the last section is a conclusion of this chapter.

6.2 Data Screening

6.2.1 Missing Data

In this study there is no missing data since all the data are available and collected from various databases and corporate annual reports. Therefore, there is no requirement to conduct a missing value analysis.

6.2.2 Outliers

Z scores and Mahalanobis distance (D) are used to detect univariate and multivariate outliers respectively. A Z score indicates whether the score is above or below the mean and by how many standard deviations. After transforming all data into standardised scores by SPSS, the results showed a few number of univariate outliers based on the threshold value of 3 (i.e. $|z| > 3$). However, according to Hair Jr et al. (2009), for a larger sample size (over 80) it can be extended by up to 4 (the sample size of carbon non-intensive companies is 275). Table 6.1 reports cases with univariate outliers.

Table 6.1 Univariate Outliers

Variable	Case Number	Z-Score
Carbon performance/Sales	86	3.22
Carbon performance/Sales	87	3.22
Carbon performance/Sales	88	3.26
Carbon performance/Sales	101	3.32
Carbon Reputation	2	3.43
Carbon Reputation	11	3.43
Carbon Reputation	13	3.43
Carbon Reputation	62	-3.59
Carbon Reputation	63	3.43
Carbon Reputation	170	3.43
Carbon Reputation	178	-3.15
Quantity of Disclosure	175	3.43
Quantity of Disclosure	256	3.96
Quantity of Disclosure	257	3.12
Quality of disclosure	11	3.67
Quality of disclosure	31	3.24
Quality of disclosure	35	3.57
Quality of disclosure	71	4.04
Quality of disclosure	75	3.68
Quality of disclosure	257	3.47

According to Kline (2011), the case can be deemed as a multivariate outlier if it has values between two and three standard deviations above the mean of all variables. To detect multivariate outliers, Mahalanobis distance (D) analysis has been employed. This analysis assesses the position of each of the 275 observations in this chapter, relative to the centre of all observations of a set of variables. Mahalanobis distances reveals 31 and 28 potential multivariate outlying cases at $p=0.05$ (according to Hair Jr et al. (2009)) for Model III and Model IV respectively²². Tables 6.2 and 6.3 depict multivariate outliers of the two models analysed in this chapter.

²² Model III employs quantity of carbon disclosure and in Model IV this variable is replaced by quality of carbon disclosure.

Table 6.2 Multivariate Outliers of Model III

Observation number	Mahalanobis d-squared	p	Observation number	Mahalanobis d-squared	p
62	29.194	.000	101	13.931	.016
63	22.173	.000	257	13.713	.018
256	20.120	.001	13	13.680	.018
171	19.773	.001	87	13.102	.022
198	19.381	.002	109	12.459	.029
197	17.743	.003	143	12.267	.031
175	17.663	.003	22	12.111	.033
88	17.377	.004	103	12.072	.034
271	16.609	.005	86	11.902	.036
11	15.611	.008	259	11.844	.037
110	15.029	.010	16	11.842	.037
89	14.945	.011	140	11.689	.039
2	14.587	.012	38	11.670	.040
178	14.301	.014	21	11.398	.044
173	14.167	.015	174	11.289	.046
64	14.122	.015			

Table 6.3 Multivariate Outliers of Model IV

Observation number	Mahalanobis d-squared	p	Observation number	Mahalanobis d-squared	p
62	27.952	.000	87	13.467	.019
63	22.392	.000	89	13.250	.021
171	20.632	.001	101	12.559	.028
11	20.412	.001	109	12.489	.029
198	19.555	.002	86	12.328	.031
90	18.783	.002	16	12.296	.031
271	18.529	.002	177	12.118	.033
197	17.784	.003	31	12.091	.034
71	17.036	.004	257	11.982	.035
2	15.949	.007	35	11.858	.037
110	15.544	.008	38	11.784	.038
88	14.977	.010			
75	14.678	.012			
178	14.353	.014			
64	14.259	.014			
143	14.052	.015			
13	13.949	.016			

Like the previous chapter, the outliers are not removed or transformed to ensure that the results are generalisable to the whole population, and hence, in order to handle multivariate outliers'

problems, bootstrapped direct, indirect and total effects as well as Bollen-Stine's p-value (to assess overall model fit) are reported.

6.2.3 Assessing Data Normality

Normality is an underlying assumption of multivariate analysis and non-normality can lead to invalid and misleading results. In order to assess the normal distribution of each variable, skewness and kurtosis tests are employed. The skewness and kurtosis of each variable are reported in the Descriptive Statistics section.

As stated earlier, Mardia's multivariate kurtosis is used to evaluate the multivariate normality of both carbon non-intensive industries' models. The assessment of the skewness and kurtosis values for the main variables of this study reveals that univariate normality has been achieved but the Mardia's multivariate kurtosis of both models indicates that there are substantial departures from multivariate normality as follows: Model III (MN=10.11, CR=10.02) and Model IV (MN=9.80, CR=9.71). CR of 10.02 and 9.71 indicates a significant non-normality in both models (according to the CR (1.96) threshold of Kline (2011)). Therefore, due to the non-normality problem, in this study the bootstrapping method (with a sample of 2,000) is used to handle the non-normality problems (Gao et al., 2008).

6.3 Descriptive Statistics of Variables

This section provides descriptive statistics of each variable including skewness and kurtosis measures to assess the normality.

6.3.1 Carbon Performance

Due to the importance of absolute carbon emission scores and the information that average, minimum, maximum, etc. of this variable provide, Table 6.4 presents descriptive statistics of both carbon emission intensity and absolute carbon emission. Furthermore, in order to gain a better picture about the overall and average of CO₂e emitted by the sample companies for each year, and to understand the change between different years, descriptive statistics of each year are also provided.

Table 6.4 Descriptive Statistics of Carbon Performance of Carbon Non-Intensive Industries

Variables	Min	Max	Sum	Mean	Std. Deviation	Skewness	Kurtosis
Carbon emission/sale	1.05	298.24		61	71.38	1.70	2.11
Carbon emission (ton)	400	6,656,000	188665362	686055.82	1343923.48		
Carbon emission 2009	442	6,402,202	37,695,931	685,380.56	1,336,045.31		
Carbon emission 2010	400	6,100,123	37,196,161	676,293.83	1,299,735.01		
Carbon emission 2011	752	6,428,164	38,372,216	697,676.65	1,362,144.54		
Carbon emission 2012	406	6,389,867	36,642,497	666,227.21	1,305,745.63		
Carbon emission 2013	509	6,656,000	38,758,547	704,700.85	1,459,010.59		
Sample Size	275						

Like carbon intensive industries, the mean of carbon emission to sales indicates that the average of data tends to lean towards the minimum score. The skewness and kurtosis show a normal distribution of this variable, since these measures fall within the acceptable range (-2.58, +2.58) (Hair Jr et al., 2009).

Descriptive statistics of carbon emissions reveal that the sample companies' (55 companies) carbon emissions range from 400 to 6,656,000 (tons) over the period 2009 to 2013. It also reveals that over this period, sample companies, on average, had emitted 686,055.82 (tons) CO₂e which is lower than their counterparts' carbon emission of 8,429,578.6 (tons) in carbon intensive industries. In addition, the total carbon emissions of 188,665,362 (tons) over this period are much lower than 1,685,915,727 (tons) CO₂e produced by companies in carbon intensive industries.

The results of each year show that, on average, sample companies have produced, more or less, an equal amount of carbon emissions per year. As expected, the sum and mean of each year show that companies belonging to carbon non-intensive industries emit much less CO₂e in comparison with their counterparts in carbon intensive industry sectors (see Table 5.4).

6.3.2 Carbon Disclosure

This section provides descriptive statistics of both carbon disclosure measures. Table 6.5 depicts descriptive statistics of the quantity of carbon disclosure in carbon non-intensive industries for the whole period and each year.

Table 6.5 Descriptive Statistics of Quantity of Carbon Disclosure in Carbon Non-Intensive Industries

Variables	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Quantity of carbon disclosure	0	0.4	.12	.1	1.20	1.22
2009	0	.4	.13	.11		
2010	0	.38	.11	.09		
2011	0	.34	.10	.081		
2012	0	.36	.11	.08		
2013	0	.39	.13	.11		
Sample size	275					

As it can be inferred from Table 6.5, the mean of .12 shows that, on average, companies allocate 12% of total sentences in their sustainability reports or CSR section of the annual reports to carbon related information. Although carbon intensive industries, which are considered as environmentally sensitive industries, have provided more carbon related information, descriptive statistics of both different industries show that, on average, both carbon intensive and non-intensive industries have allocated the same portion of their sustainability reports or CSR section of the annual reports to such information. On one hand, such results can be contrary to our expectations as it is thought that carbon intensive companies allocate a higher portion of CSR disclosure to carbon information. On the other hand, the results may imply that the importance of carbon-related issues has been understood by non-intensive industries as well, which can be considered as a good sign in tackling climate change and global warming. Table 6.5 also reveals

that companies, on average, have provided almost the same amount of carbon-related information in their reports for each year, which is similar to carbon intensive companies' trend.

The skewness and kurtosis of this variable are within the acceptable range (-2.58, +2.58) suggesting that this variable is normally distributed.

Table 6.6 Descriptive Statistics of Quality of Carbon Disclosure in Carbon Non-Intensive Industries

Variables	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Quantity of carbon disclosure	0	7.83	1.87	1.55	1.27	1.86
2009	0	7.83	2.08	1.88		
2010	0	7.00	1.74	1.48		
2011	0	5.07	1.85	1.25		
2012	0	5.75	1.71	1.37		
2013	0	7.30	1.96	1.75		
Sample size	275					

Interestingly, the descriptive statistics of quality of carbon disclosure show that non-intensive companies, on average, provide slightly more objective and verifiable carbon related information. Such findings may be attributed to the fact that, since carbon intensive industries are under more social and political scrutiny, they may provide more self-serving information over the objective ones to manipulate the perceptions of stakeholders for the sake of legitimacy.

Table 6.6 implies that in 2009 companies have disclosed the most meaningful information over the whole period, and in general, the quality of such disclosures has been the same for each year over the period 2009 to 2013. Overall, the average of the quality of carbon disclosure for each year is slightly higher than their counterparts in carbon intensive industries (see Table 5.6).

6.3.3 Carbon Reputation

As noted earlier, newspaper articles have been used and classified into different categories based on their impact on a firm's carbon footprint and climate change legitimacy to measure corporate carbon reputation. In total, 459 newspaper articles belong to carbon non-intensive companies. Out of these 459 articles, 335 articles have provided good news, 89 have provided bad news and

35 articles have provided neutral news. Descriptive statistics of corporate carbon reputation over the whole period and for each year are presented in Table 6.7.

Table 6.7 Descriptive Statistics of Carbon Reputation of Carbon Non-Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-7	9	1.18	2.28	1.02	2.67
2010	-3.20	9	1.90	2.47		
2011	-7	9	1.03	2.39		
2012	-6	9	1.19	2.59		
2013	-4	7.11	.86	2.23		
2014	0	5.44	.89	1.42		
Sample size	275					

The average of 1.18 and standard deviation of 2.28 over the whole period reveal that 95% of reputation scores are between -3.38 and 5.47 since we have normally distributed data (according to Garson (2012), when the distribution of data is normal, 95% of the values fall within two standard deviations of the mean). Hence, it can be concluded that the majority of reputation scores are in the middle of the range (-16, 16) showing to some extent the neutral position of media regarding corporate carbon activities in non-intensive industries. However, in general, the average of carbon reputation in non-intensive companies over the whole period and for each year is slightly higher than carbon intensive industries. This can be due to more negative newspaper articles belonging to carbon intensive industries. Since they are under more social and political scrutiny, they may face more criticism from the media, and hence, have more negative newspaper articles regarding their carbon activities. And finally, descriptive statistics of annual share return demonstrated that, on average, carbon intensive companies had a better economic performance over the whole period.

The skewness and kurtosis of 1.02 and 2.67 imply that carbon reputation is normally distributed based on the range (-2.58, +2.58) (Hair Jr et al., 2009) although the kurtosis score falls slightly beyond the acceptable range.

6.3.4 Economic Performance

As stated in Chapters 4 and 5, the annual share return has been used to measure the economic performance. However, accounting-based measures are also used as a sensitivity test to ensure that the results are not a function of the particular economic performance measure. Table 6.8 indicates descriptive statistics of annual share return over the whole period and for each year.

Table 6.8 Descriptive Statistics of Annual Share Return of Carbon Non-Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-.75	.88	.10	.21	.14	1.15
2010	-.25	.89	.16	.20		
2011	-.75	.42	-.03	.21		
2012	-.10	.68	.24	.19		
2013	-.30	.55	.11	.21		
2014	-.34	.51	.06	.15		
Sample size	275					

The annual share return mean of .10 indicates that the average share return of sample companies over the whole period has been 10p showing that non-intensive companies have a better performance than carbon intensive companies. Detailed data of each year reveals that sample companies had the highest and lowest, on average, annual share return in 2012 and 2011 respectively, and no specific pattern can be inferred from the means of reported years. Finally, the skewness and kurtosis of -0.14 and 1.15 show that the annual share return is normally distributed (based on the range (-2.58, +2.58) obtained from Hair Jr et al. (2009)). Tables 6.9, 6.10 and 6.11 provide descriptive statistics of accounting-based measures over the whole period and for each year.

Table 6.9 Descriptive Statistics of ROA of Carbon Non-Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-15.11	45.55	6.79	6.03	1.05	2.30
2010	-1.34	18.73	6.84	5.03		
2011	-15.11	19.17	6.10	6.00		
2012	-4.01	16.68	5.90	4.49		
2013	-2.24	45.55	7.62	6.94		
2014	-12.17	31.02	7.51	7.24		
Sample size	275					

Table 6.10 Descriptive Statistics of ROE of Carbon Non-Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-52.70	144.82	19.33	22.62	2.29	2.76
2010	-5.93	144.82	21.18	25.39		
2011	-26.17	144.82	19.08	26.04		
2012	-30.46	91.56	17.15	19.98		
2013	-14.24	100.10	20.97	21.73		
2014	-52.70	83.01	18.27	19.83		
Sample size	275					

Table 6.11 Descriptive Statistics of EPS of Carbon Non-Intensive Industries

Year	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Whole period	-1.09	7.19	.65	.844	2.63	3.04
2010	-.11	3.63	.60	.70		
2011	-.83	4.57	.56	.77		
2012	-1.09	3.12	.54	.66		
2013	-.80	4.46	.71	.79		
2014	-.71	7.19	.84	1.18		
Sample size	275					

The skewness and kurtosis of all accounting-based measures show the normal distribution of these measures (although the kurtosis of ROE and both skewness and kurtosis of EPS fall slightly beyond the acceptable range (-2.58, +2.58)). The average of all measures reveals that from 2010 to 2012, the economic performance of sample companies had a descending trend and afterwards it starts improving. In addition, the mean of the accounting-based measures shows that, on average, non-intensive companies had better economic performance than carbon intensive companies over the period 2010 to 2014.

6.3.5 Control Variables

Previous economic performance and size are two control variables employed to control for the potential effects on the main variables of the current study (a log of total assets has been used as a measure of corporate size (Clarkson et al., 2008). Table 6.12 depicts descriptive statistics of control variables.

Table 6.12 Descriptive Statistics of Control Variables of Carbon Non-Intensive Industries

Variables	Min	Max	Mean	Std. Deviation	Skewness	Kurtosis
Log of total assets	8.68	12.22	9.91	.85	.96	.57
Annual share return	-.75	.68	.137	.22	.02	.48
ROA	-15.11	25.55	6.01	5.36	.01	1.02
ROE	-30.46	120.65	17.667382	19.84	1.73	5.36
EPS	-1.80	3.40	.529527	.63	1.09	3.32
Sample size	275					

The skewness and kurtosis of all control variables show that they are, in general, normally distributed, although the kurtosis of ROE and EPS is slightly beyond the acceptable range (-2.58, +2.58).

6.4 Multicollinearity

The strong correlation between two or more independent variables leads to a multicollinearity problem. Multicollinearity may impact on the validity of results since it may lead to an incorrect estimation of the regression coefficients (Field, 2013). Tables 6.13 and 6.14 present the correlation matrix of Model III (the model having the quantity of disclosure as a measure of

carbon disclosure) and Model IV (the model having the quality of disclosure as a measure of carbon disclosure) respectively.

Table 6.13 Correlation Matrix of Model III of Carbon Non-Intensive Industries

Variables	Carbon performance	Quantity of carbon disclosure	Carbon reputation	Economic performance	Previous economic performance
Carbon performance	1				
Quantity of carbon disclosure	-.163**	1			
Carbon reputation	-.141*	.070	1		
Economic performance	-.030	.014	.024	1	
Previous economic performance	-.038	.028	-.031	.202**	1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

Table 6.14 Correlation Matrix of Model IV of Carbon Non-Intensive Industries

Variables	Carbon performance	Quality of carbon disclosure	Carbon reputation	Economic performance	Previous economic performance
Carbon performance	1				
Quality of carbon disclosure	.035	1			
Carbon reputation	-.141*	.228**	1		
Economic performance	-.030	-.054	.024	1	
Previous economic performance	-.038	-.095	-.031	.202**	1

** Correlation is significant at the 0.01 level.

* Correlation is significant at the 0.05 level.

One way to assess multicollinearity is to check the correlation matrix. The existence of high correlations between independent variables (0.90 or more) is an indication of a multicollinearity

problem (Field, 2013). As it can be inferred from Tables 6.13 and 6.14, there is no high correlation between independent variables of the current study (i.e. carbon performance, quantity of carbon disclosure, carbon reputation, and previous economic performance in Model III and carbon performance, quality of carbon disclosure, carbon reputation, and previous economic performance in Model IV), and hence, there is no multicollinearity problem.

6.5 Path Models and Hypotheses Testing

6.5.1 Path Models

In this section, two path models are presented. Models III and IV present a path analysis of carbon non-intensive companies, using the quantity and quality of carbon disclosure as measures of carbon disclosure respectively. Because of multivariate non-normality, Bollen-Stine's p-value, rather than the usual maximum likelihood-based p-value, is used to evaluate overall model fit (although the researcher relies on Bollen-Stine's p-value to ensure that the models have acceptable fit, the maximum likelihood-based p-value is reported as well). In addition, the bootstrapped parameter estimates and two-tailed unbiased significance levels for direct, indirect and total effects are reported by the researcher as provided by AMOS. Figure. 6.1 presents the results of Model III and Figure. 6.2 shows the results of Model IV.

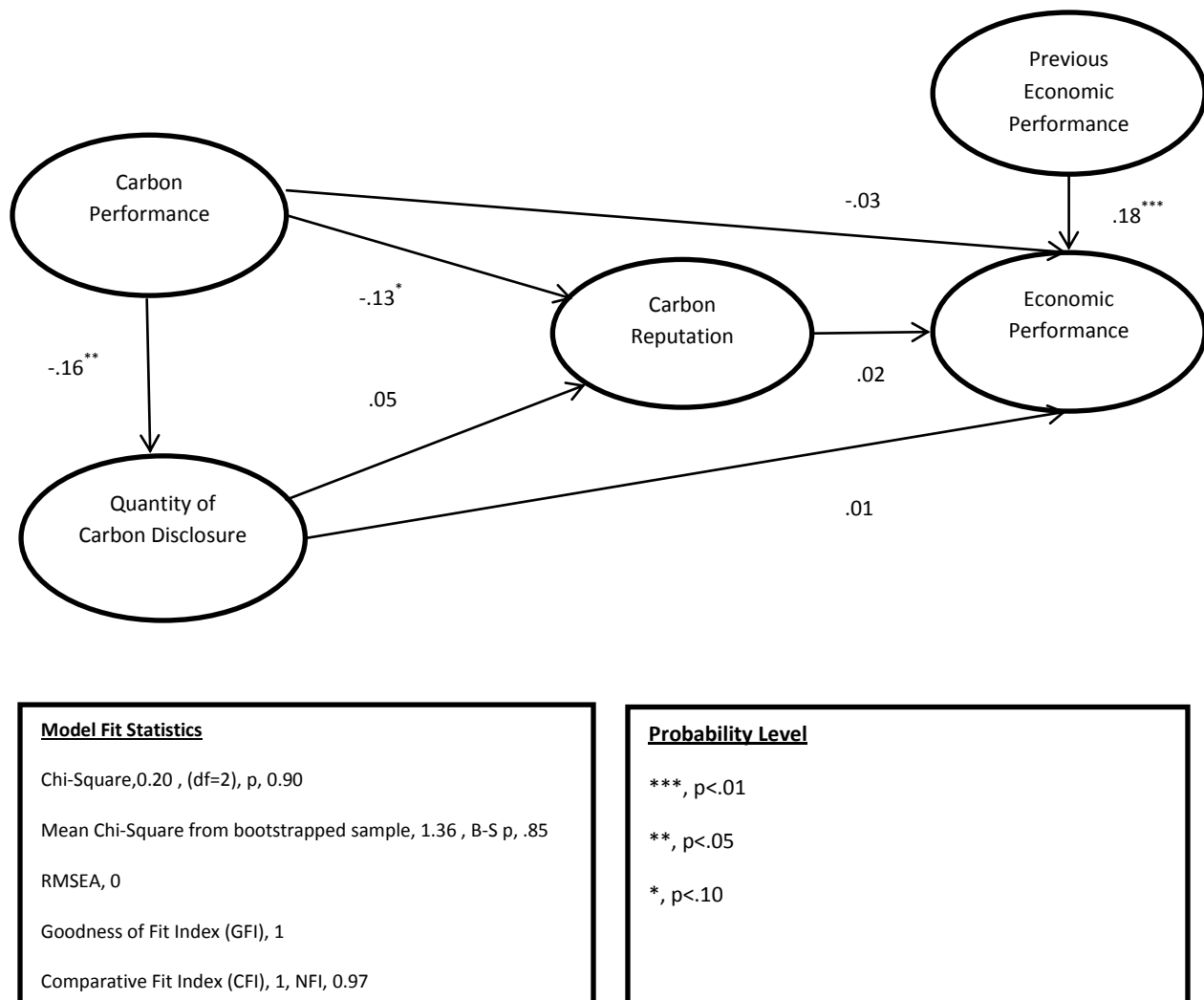


Figure 6.1 Model III

All indices demonstrate that the model has an acceptable fit. Firstly, both Bollen-Stine's p-value and maximum likelihood-based p-value present the non-significant chi-square, showing that the path model is a strong fit for the sample. Secondly, the root-mean-square error of approximation (RMSEA) is 0, presenting a strong model fit. The GFI of 1, which is greater than the acceptable threshold of 0.90, also indicates a strong model fit. Finally, the NFI and CFI of .97 and 1 exceed the recommended threshold of .90. Tables 6.15, 6.16 and 6.17 provide direct, indirect and total effects between the variables of Model III respectively.

Table 6.15 Direct Effects between Variables of Model III

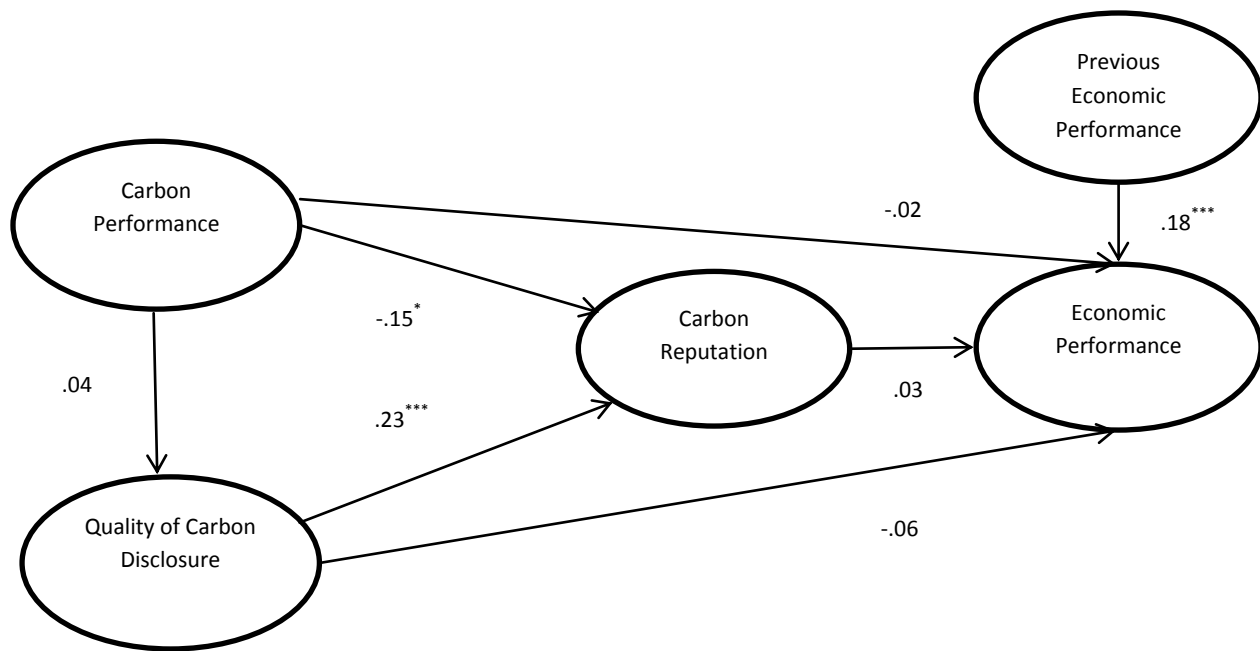
Variables	Carbon performance		Quantity of carbon disclosure		Carbon reputation		Previous economic performance	
Quantity of carbon disclosure	β	p						
	-.163	.027						
Carbon reputation	β	p	β	p				
	-.133	.091	.048	.477				
Economic performance	β	p	β	p	β	p	β	p
	-.026	.680	.009	.900	.019	.706	.18	.007

Table 6.16 Indirect Effects between Variables of Model III

Variables	Carbon performance		Quantity of carbon disclosure		Carbon reputation		Previous economic performance	
Quantity of carbon disclosure								
Carbon reputation	β	p						
	-.008	.273						
Economic performance	β	p	β	p				
	-.004	.693	.001	.392				

Table 6.17 Total Effects between Variables of Model III

Variables	Carbon performance		Quantity of carbon disclosure		Carbon reputation		Previous economic performance	
Quantity of carbon disclosure	β	p						
	-.163	.027						
Carbon reputation	β	p	β	p				
	-.141	.076	.048	.477				
Economic performance	β	p	β	p	β	p	β	p
	-.031	.630	.010	.895	.019	.706	.18	.007



Model Fit Statistics

Chi-Square, 0.68, (df=2), p, 0.71

Mean Chi-Square from bootstrapped sample, 1.8 , B-S p, 0.67

RMSEA, 0

Goodness of Fit Index (GFI), 0.99

Comparative Fit Index (CFI), 1 , NFI, 0.96

Probability Level

***, $p < .01$

**, $p < .05$

*, $p < .10$

Figure 6.2 Model IV

Like Model III, all indices indicate that this model has an acceptable fit. Firstly, both Bollen-Stine's p-value and maximum likelihood-based p-value present the non-significant chi-square, implying that the path model is a strong fit for the sample. Secondly, the root-mean-square error of approximation (RMSEA) is 0, revealing a strong model fit. The GFI of .99 shows that the path model is a strong fit for the sample, and finally the NFI and CFI of .96 and 1 exceeds the recommended threshold of .90. Tables 6.18, 6.19 and 6.20 indicate direct, indirect and total effects between variables of Model IV respectively.

Table 6.18 Direct Effects between Variables of Model IV

Variables	Carbon performance		Quality of carbon disclosure		Carbon reputation		Previous economic performance	
Quality of carbon disclosure	β	p						
	.035	.532						
Carbon reputation	β	p	β	p				
	-.149	.062	.234	.001				
Economic performance	β	p	β	p	β	p	β	p
	-.024	.748	-.064	.260	.035	.534	.18	.006

Table 6.19 Indirect Effects between Variables of Model IV

Variables	Carbon performance		Quality of carbon disclosure		Carbon reputation		Previous economic performance	
Quality of carbon disclosure								
Carbon reputation	β	p						
	.008	.449						
Economic performance	β	p	β	p				
	-.007	.351	.008	.457				

Table 6.20 Total Effects between Variables of Model IV

Variables	Carbon performance		Quality of carbon disclosure		Carbon reputation		Previous economic performance	
Quality of carbon disclosure	β	p						
	.035	.532						
Carbon reputation	β	p	β	p				
	-.141	.076	.234	.001				
Economic performance	β	p	β	p	β	p	β	p
	-.031	.625	-.056	.305	.035	.534	.18	.006

6.5.2 Hypotheses Testing

6.5.2.1 Test of H1b and H2b

The first two hypotheses test whether carbon performance is associated with the quantity and quality of carbon disclosure respectively. As shown in Figure. 6.1, the path from carbon performance to the quantity of carbon disclosure is negative and statistically significant ($\beta = -.16$ and $p < .05$). Therefore, H1b is supported. But, as indicated in Figure. 6.2, the path from carbon performance to the quality of carbon disclosure is not statistically significant ($\beta = .03$ and $p = .53$). Thus, H2b is not supported. Like carbon intensive companies, the results do not support Clarkson et al.'s (2008) argument that legitimacy theory is robust in predicting what is being disclosed. Such results are consistent with Hughes et al. (2001), Patten (2002), and Cho and Patten (2007) that poorer carbon performers disclose more voluntary carbon-related information.

6.5.2.2 Test of H3b, H4b and H5b

The second set of hypotheses is related to determinants of corporate carbon reputation. Surprisingly, as indicated in Figure. 6.1 and Figure. 6.2, the paths from carbon performance to carbon reputation in both models are statistically significant ($\beta = -.13$ and $p < .10$ and $\beta = -.15$ and $p < .10$ respectively) documenting that worse performers have a better reputation. Thus, the results show that real carbon performance is not reflected in a firm's carbon reputation and H3b is therefore not supported.

As shown in Figure. 6.1, there is no significant relationship between the quantity of such disclosure and carbon reputation ($\beta = .05$ and $p = .477$), which is not supporting H4b. In contrast, the path from the quality of carbon disclosure to carbon reputation is positive and strongly statistically significant ($\beta = .23$ and $p < .01$), indicating that meaningful carbon disclosure improves corporate carbon reputation. Hence, H5b is supported.

6.5.2.3 Test of H6b

As indicated in both path models, the paths from carbon reputation to economic performance are not statistically significant ($\beta = .02$ and $p = .706$ and $\beta = .03$ and $p = .534$ respectively). Therefore, H6b is not supported. These findings suggest that unlike carbon intensive companies, carbon reputation does not improve economic performance of carbon non-intensive companies. Such results are consistent with Cho et al.'s (2012) argument that that environmental reputation is

likely to be more important for those companies from environmental sensitive industries whose operations are subject to higher social and political examination.

6.5.2.4 Test of H7b

No significant association is found between carbon performance and corporate economic performance in both models ($\beta = -.03$ and $p = .680$ and $\beta = -.02$ and $p = .748$ respectively). Hence, H7b is not supported. Like carbon intensive companies, such results indicate that firm's carbon emissions are not presently drivers of share prices and better carbon performers are not rewarded in the market.

6.5.2.5 Test of H8b and H9b

Finally, the last set of hypotheses investigates the association between both the quality and quantity of carbon disclosure and a firm's economic performance. As shown in Figure. 6.1 and Figure. 6.2, the paths from both quantity and quality of carbon disclosures to economic performance are not statistically significant ($\beta = .01$ and $p = .90$ and $\beta = -.06$ and $p = .26$ respectively). Like carbon intensive companies, the results document that the financial market is not yet responsive to a firm's carbon disclosures, or maybe the information provided is not sufficient enough to send a clear signal to the market. H8b and H9b are therefore not supported.

6.5.2.6 Mediation tests

In order to test the mediating effect in both carbon non-intensive industries' models, the bootstrapping method is employed. Our results indicate no statistically significant indirect relationship between the variables of this study in both models.

6.5.2.7 Sensitivity test-alternative economic performance measures

To ensure that the path findings are not a function of specific economic performance measure (i.e. annual share return), the researcher re-ran both models with each of the accounting-based measures. All goodness of fit indices reflect an acceptable model fit in all six models. Path analysis findings in both models did not change after replacing annual share return with ROA and EPS in both models.

After replacing ROE with the annual share return in both models, the researcher found a positive and statistically significant relationship between carbon reputation and economic performance ($\beta = .08$ and $p = .08$ and $\beta = .08$ and $p = .05$ respectively). However, since no significant relationship

was found between three economic performance measures and carbon reputation, the researcher cannot support H6, and hence, the original finding continues to hold.

6.5.2.8 Additional control variable

Following suggestions by Patten (1991), Toms (2002), Cho and Patten (2007), Clarkson et al., (2011) and Cho et al. (2012) suggesting that the volume of environmental disclosure and environmental reputation might be influenced by corporate size, the researcher controls for potential firm size effects using a log of total assets in Model III. All indices show that the new model has an acceptable fit. Although the path from size to quantity of carbon disclosure is statistically significant ($\beta=.15$ and $p<.05$), previously reported path analysis findings do not change, and hence, the results in the original analysis continue to hold.

The researcher also controls for potential firm size effects in Model IV. All indices show that the new model has an acceptable fit. The results indicate that previously reported path analysis findings did not change, and hence, original findings continue to hold.

6.6 Conclusion

Table 6.21 summarises the results of the hypotheses of carbon non-intensive industries.

Table 6.21 Summary Results for Testing the Research Hypotheses of Carbon Non-Intensive Industries

Research hypothesis	Result
Ceteris paribus, for firms from carbon non-intensive industries, the quantity of carbon disclosure is negatively associated with carbon performance.	Supported
Ceteris paribus, for firms from carbon non-intensive industries, the quality of carbon disclosure (i.e. ratio of behavioural disclosure to symbolic disclosure) is positively associated with carbon performance.	Rejected
Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with carbon performance.	Rejected
Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with quantity of carbon disclosure.	Rejected
Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with quality of carbon disclosure.	Supported
Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with carbon reputation.	Rejected
Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with carbon performance.	Rejected
Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with quantity of carbon disclosure.	Rejected
Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with quality of carbon disclosure.	Rejected

The path models' results from carbon non-intensive industries showed that quantity of carbon disclosure is associated with carbon performance (i.e. the worst performers disclose more information) and no relationship was found between carbon performance and quality of carbon disclosure. The results also indicated that carbon performance is not reflected in corporate carbon reputation (on the contrary, the worst performers have a better carbon reputation) and meaningful information (i.e. quality of carbon disclosure) can enhance a firm's carbon reputation. The

findings did not support a significant relationship between carbon reputation and corporate economic performance, and they also did not support that it pays to be green. In other words, no significant positive association was found between carbon performance and corporate economic performance. In addition, no relationship was found between both the quality and quantity of carbon disclosure and a firm's economic performance. The next chapter will discuss the results of all models and compare carbon intensive and non-intensive industries' findings. It will also discuss the study's findings against previous studies and the premises of proposed theories.

CHAPTER 7: Discussion

7.1 Introduction

The aim of this study was to investigate the extent to which corporate economic performance is influenced by carbon performance, carbon disclosure and corporate carbon reputation. It also aimed to examine the extent to which corporate carbon performance and carbon disclosure are reflected in the carbon reputation of a firm and whether carbon disclosure mediates the negative impacts of carbon performance on carbon reputation. To this end, this study investigated the interrelationship between carbon performance, carbon disclosure, carbon reputation and a firm's economic performance within a single inclusive model in both carbon intensive and non-intensive industries.

In the previous chapters, the research hypotheses were tested and the results were reported. This chapter interprets and discusses the results of all path models. It also compares the results of carbon intensive and non-intensive industries to address the research questions and objectives. The rest of this chapter is organised into seven sections. Section 2 discusses the results of the hypotheses related to the association between carbon performance and carbon disclosure. Section 3 discusses the results of the hypotheses related to the relationships between carbon performance and carbon reputation, as well as both the quality and quantity of carbon disclosure and carbon reputation. Section 4 discusses the results of the hypotheses related to the relationship between carbon reputation and a firm's economic performance. Section 5 discusses the results of the hypotheses related to the association between carbon performance and corporate economic performance. In Section 6, the results of the relationships between both the quality and quantity of carbon disclosure and economic performance are discussed. Section 7 provides the discussion of mediation findings, and the last section is a conclusion of the chapter.

7.2 Carbon Performance and Carbon Disclosure

Given the conflicting results of recent studies on the relationship between environmental performance and environmental disclosure, one of the primary goals of this study was to further examine the reliability of such voluntary disclosures²³. The results from Model I (carbon

²³ As noted already, this study has specifically focused on one aspect of corporate environmental practice (i.e. carbon practice).

intensive industries) indicated a non-significant relationship between carbon performance and quantity (volume or level) of carbon disclosure. Although the results did not support H1a, such a non-significant relationship can still be consistent with legitimacy theory premises. According to Luo and Tang (2014), a non-significance relationship between carbon performance and carbon disclosure implies that firms disclose such information to gain and/or maintain their legitimacy irrespective of their real performance.

But the results of Model III (carbon non-intensive industries) indicated a negative significant association ($\beta = -.16$ and $p < .05$) between carbon performance and the quantity of carbon disclosure. The results, which are consistent with legitimacy theory, supported H1b and showed that the worst performers tend to disclose more carbon information. According to legitimacy theory, since the worst performers are under more social and political pressure and examination from their respective society, they provide more information to mitigate such pressure and protect their legitimacy. Although the results of both models are consistent with legitimacy theory, the findings that firms from carbon non-intensive industries provide higher levels of disclosure for higher levels of CO₂ emissions than firms from carbon intensive industries may be justified by an explanation provided by Patten (2002). Patten (2002, p.772) argues that as firms from environmentally sensitive industries already face higher exposure to the political and social environment, “environmental performance data may not provide sufficient additional exposure to warrant additional amounts of disclosure”. For non-sensitive companies not already facing social and political pressures because of industry involvement, however, relatively poorer environmental performance may result in exposure which leads to greater levels of environmental disclosure. Thus, Patten (2002, p.772) takes a view that “the differing industry results can also be interpreted as providing support for socio-political theories of social disclosure”.

The results that the worst performers disclose more information are consistent with several previous studies (Cho et al., 2012; Cho and Patten, 2007; Clarkson et al., 2011; Deegan and Rankin, 1996; Hughes et al., 2001; Patten, 2002). As stated earlier, a wide spectrum of previous studies mainly conducted in the US has documented a negative association between environmental performance and a firm’s environmental disclosure. Before Patten (2002), studies (Fekrat et al., 1996; Freedman and Wasley, 1990; Ingram and Frazier, 1980; Wiseman, 1982)

had mostly documented a non-significant association between these two constructs. Patten (2002) critically argues that previous studies appear to present the results rather than providing convincing evidence of why such a relationship does not exist. He (p. 765) further asserts that there are some problems which bring the findings of previous studies into question. These include “(1) failure to control for other factors associated with the level of environmental disclosure; (2) inadequate sample selection; and (3) an inadequate measure of environmental performance” (Patten, 2002, p. 765). Given the shortcomings of previous studies, he conducts new research by controlling other factors impacting environmental disclosure, employing a larger sample size and using a more adequate measure of environmental performance. He documents a negative association between environmental performance and environmental disclosure and critically argues that since firms with poor environmental performance experience threatened legitimacy, they are motivated to disclose more social and environmental information to maintain their legitimacy. Cho and Patten (2007), Clarkson et al. (2011) and Cho et al. (2012) also revisit this relationship in different contexts and industries and document a negative association which is consistent with legitimacy theory.

On the other hand, some studies (e.g. Al-Tuwaijri et al., 2004; Clarkson et al., 2008) have found a positive relationship between environmental performance and environmental disclosure which is consistent with economic-based voluntary disclosure theory. As noted in Chapter 2, Clarkson et al. (2008) argue that, since the predictions of both legitimacy theory and voluntary disclosure theory relate to voluntary environmental disclosure, the problem with previous studies is that they did not carefully draw the distinction between truly voluntary channels (such as sustainability reports) and mandatory ones (such as annual reports). Hence, by focusing exclusively on voluntary disclosure channels, they documented a positive relationship between environmental performance and environmental disclosure. This positive relationship implies that better performers are motivated to disclose meaningful and objective environmental performance indicators that are difficult for rivals to mimic for the sake of competitive advantage.

Following the problems documented by both Patten (2002) and Clarkson et al. (2008), which bring previous findings into question, this study has controlled other factors affecting the level of

carbon disclosure²⁴, focusing on a larger sample size, adopted carbon emission intensity and carbon disclosure as a measure of environmental performance and environmental disclosure respectively²⁵, and concentrating on a purely voluntary channel (i.e. sustainability reports and voluntary CSR sections of annual reports) to overcome the shortcomings of previous studies. Thus, the findings are robust enough to bring the reliability of carbon disclosure into question and document that voluntary carbon disclosure is not indicative of a firm's actual carbon performance. Such findings support the legitimacy theory premises that companies employ such voluntary disclosure to mitigate the social and political pressures to gain and/or maintain their legitimacy.

As noted earlier, Clarkson et al.'s (2008) preliminary evidence suggests that legitimacy theory is not robust enough to predict the level (quantity) of voluntary disclosure and it is more robust in predicting the nature of such disclosure (i.e. what is being disclosed). Thus, in order to further address the reliability of carbon disclosure, not only in terms of their level but also in terms of their nature (i.e. symbolic and behavioural disclosures), and to test legitimacy theory for the nature of voluntary disclosure, this study examined the relationship between carbon performance and quality of carbon disclosure. Clarkson et al. (2011) argue that according to legitimacy theory, firms with the worst environmental performance records experience threatened legitimacy and hence disclose more self-serving information to change individuals' perceptions regarding their performance rather than revealing their actual performance. On the other hand, according to the voluntary disclosure theory, the best performers are motivated to disclose more

²⁴ In line with previous studies (Cho and Patten, 2007; Clarkson et al., 2008; Gray et al., 1995; Patten, 2002, 1992) suggesting that environmental disclosure is positively influenced by size (It is argued that larger firms "benefit from economies of scale with respect to information production costs" (Clarkson et al., 2011, p. 38).), this study has controlled the potential size by using log of total assets. Likewise, following previous studies (Cho et al., 2010; Cho and Patten, 2007; Patten, 2002) conducting separate analysis to control for potential effects of industry's types, this study carried out separate path analysis models related to carbon intensive and non-intensive industries.

²⁵ The problem with previous environmental performance such as CEP (the most frequently used in previous studies) is that different criteria are used to assess companies in different industries. Thus, inter-industry comparisons are not possible (Patten, 2002). Likewise, other environmental performance proxies such as toxic emissions indicate only one aspect of a firm's overall environmental performance which makes it difficult, and to some extent illogical, to investigate that one facet with whole voluntarily environmental information representing different aspects of a firm's environmental performance. Hence, to overcome this problem, this study investigates the relationship between carbon performance and carbon disclosure to compare one aspect of environmental performance (i.e. CO₂e emissions) with the disclosure related to that aspect (i.e. carbon disclosure).

meaningful and verifiable information that is not easy for rivals to mimic for the sake of competitive advantage.

The non-significant relationship between carbon performance and quality of carbon disclosure in both Model II (carbon intensive industries) and Model IV (carbon non-intensive industries) did not support Clarkson et al.'s (2008) preliminary evidence that legitimacy theory is robust in predicting what is being said rather than the level of disclosure. The findings are also not consistent with Clarkson et al.'s (2011) findings where they found that the worst performers disclose more objective and verifiable measures of environmental performance. The results, which are not consistent with both legitimacy theory and voluntary disclosure theory, suggest that the nature of carbon disclosure may also not be indicative of a firm's carbon performance and, like the level of such disclosure, bring the reliability of voluntary carbon disclosure into question.

7.3 Carbon Performance, Carbon Disclosure and Corporate Carbon Reputation

The second set of hypotheses proposed in this study was related to determinants of corporate carbon reputation. Neither of the four path models' findings supported H3a and H3b. In other words, the results indicated that real carbon performance is not reflected in a firm's carbon reputation, and surprisingly the results of both carbon non-intensive industries' models showed that the worst performers have a better carbon reputation, which is totally in contrast to normative expectations. One possible explanation for such unexpected findings could be due to the mediating effect that carbon disclosure may have on the relationship between carbon performance and carbon reputation. As previously noted, a normative sense reputation should be based on real performance. However, since reputation is constructed by individuals' perceptions about corporate activities, there is a room to manipulate those individual perceptions by employing such tools as voluntary social and environmental disclosure. Thus, the researcher further investigated the indirect relationship between carbon performance and carbon reputation via carbon disclosure to understand whether carbon disclosure mediates the negative aspects of poorer carbon performance related to those assessments. The bootstrapping method was conducted to test this mediating effect and the researcher did not find the mediatory role of carbon disclosure in any of the models. Hence, such an unexpected result (i.e. the relationship

between carbon performance and reputation) may be justified by the mediatory role of other filtering processes such as carbon press releases (Aerts and Cormier, 2009) and/or membership in sustainability indices such as Dow Jones Sustainability Indices (DJSI) and FTSE4GOOD (Cho et al., 2012), etc.

The findings that the worst performers from carbon non-intensive industries have higher carbon reputation scores than firms from carbon intensive industries may be justified by the potential explanation proposed by Cho et al. (2012). By referring to the Brammer and Pavelin (2006, p.438) argument that “since industry environments are correlated with significant pressure from institutional, and other, stakeholders”, Cho et al. (2012) take a view that the association between environmental performance and environmental reputation may vary between different industries. Hence, since the real performance of carbon non-intensive companies are under less public scrutiny, they may enjoy more symbolic and impression management techniques than carbon intensive industries by employing various types of disclosure channels and filtering processes.

As aforementioned, corporate carbon disclosure can be employed as one of the most important and frequently used sources of information to inform stakeholders about corporate real changes (behavioural management) or as a filtering tool to manipulate the perceptions of individuals without any real change in actions (symbolism). Although both scenarios may lead to a firm's better carbon reputation, the question is raised whether or not companies are truly motivated to improve their real carbon performance and inform society about that change if voluntary carbon disclosure appears to be an effective tool of perception manipulation (symbolism). In order to answer this question, first there is a need to investigate the relationship between carbon disclosure and carbon reputation. Therefore, H4a, H4b, H5a and H5b attempted to answer this question by testing the relationship between both quantity (level) as well as quality of such disclosure and carbon reputation. The results from carbon intensive companies' models indicated a positive and strongly statistically significant ($p < .01$) association between quantity of carbon disclosure and a firm's carbon reputation and a non-significant relationship between the quality of such disclosure and carbon reputation. Thus, the results imply that carbon intensive companies can enhance their carbon reputation by disclosing more carbon information irrespective of its quality. In other words, they may enjoy an enhanced reputation by shaping and

filtering the individuals' perceptions without necessarily changing their real performance (symbolism).

The results appear to be consistent with the previous findings (Cho et al., 2012; Hasseldine et al., 2005; Toms, 2002) and in line with Bebbington et al.'s (2008) argument representing such voluntary disclosure as a mechanism for perception creation and as a tool for reputation risk management. The results are also consistent with Hopwood's (2009) concern that it seems many companies tend to channel their environmental disclosure more towards symbolic disclosure than providing meaningful and verifiable information. Hopwood (2009) argued that while increased level of voluntary disclosure can have a constructive outcome, there is a risk that such disclosures, in the pursuit of legitimation, aim to create a positive impression of corporate activities without changing the real actions (symbolism). Thus, our results can send a clear message to regulatory bodies that the current policy for voluntary carbon disclosure is not sufficient enough to address the heart of climate change and global warming issues.

In contrast to the findings of carbon intensive companies, the results from carbon non-intensive companies showed a non-significant relationship between quantity of carbon disclosure and carbon reputation and a strongly statistically significant ($p < .01$) association between quality of such disclosure and corporate carbon reputation. In other words, only objective and verifiable (behavioural) disclosure can enhance the reputation of the carbon non-intensive firms. The findings are consistent with the results from Brown et al. (2010) and Hasseldine et al. (2005) where Brown et al. (2010) documented that only the quality of such voluntary disclosure can improve corporate reputation, and where Hasseldine et al. (2005) found that the quality of environmental disclosure has a stronger effect on a firm's environmental reputation than merely the quantity of disclosure. The lack of impact of the quantity (level) of carbon disclosure on carbon reputation can be justified by the Aerts and Cormier (2009, p. 23) explanation where they argue that "public media seem to discount transparent self-promotional behaviour, recognizing that firms tend to exaggerate their specific merits in the environmental management domain. It may be another occurrence of the "self-promoter's paradox": as actors increase claims of competence, audiences become more skeptical as competent actors often downplay their successes".

Overall, the findings which are consistent with Bebbington et al.'s (2008) representation of reporting as a reputation risk management tool suggest that firms from carbon intensive companies enjoy more from symbolic disclosure than their counterparts in non-intensive industries. Such findings seem to be inconsistent with both Patten's (2002) and Aerts and Cormier's (2009) argument where they contend that environmental disclosures may be perceived as less credible for companies from environmentally sensitive industries and with higher environmental exposure. According to Aerts and Cormier (2009, p.5), "Belonging to an environmentally-sensitive industry (with its negative connotations) may be the first observation one has about a firm, leading to a discounting of later positive messages coming from that firm and impeding the effectiveness of its legitimacy-enhancement efforts".

7.4 Carbon Reputation and Economic Performance

H6a and H6b tested the association between a firm's carbon reputation and economic performance. The findings of both carbon intensive models indicated a positive and statistically significant association ($p < .05$) between carbon reputation and economic performance, whereas the results of carbon non-intensive models did not support a significant relationship between these two variables. These results therefore showed the importance of carbon reputation as an intangible asset for carbon intensive companies. Since carbon intensive companies have greater carbon exposure and are under more public scrutiny relative to their counterparts in carbon non-intensive industries, it is not surprising that good reputation in this area can improve the competitive advantage of a firm and consequently its economic performance (which is consistent with resource-based theory). Such findings are consistent with Cho et al.'s (2012) argument that environmental reputation is likely to be more important for those companies from environmental sensitive industries whose operations are subject to higher social and political examination. Thus, the results demonstrated that reputation as an intangible asset needs to be interpreted within organisational and industrial contexts.

The positive association supported in both Model I and Model II is consistent with the premises of the resource-based theory. This theory addresses the capabilities and competencies of a firm (Barney, 1991), and asserts that those firms whose assets are valuable and difficult for rivals to imitate may possess a competitive advantage and enhanced economic performance (Hall, 1992; Roberts and Dowling, 2002). According to this theory, in order for assets to be considered as

sources of competitive advantage, they must have four characteristics including value, rareness, inimitability and non-substitutability (Barney, 1991). Good carbon reputation is rare since not all of the companies within the industry and market have a good reputation. Carbon reputation may also be imperfectly imitable since the development of good carbon reputation usually depends on time and specific difficult-to-copy historical records. Likewise, since such reputation is based on stakeholders' perceptions about corporate carbon activities and such perception is an outcome of informal social relations between the firm and its key stakeholders, these informal relations can be considered as socially complex phenomena and thus imperfectly imitable. Good carbon reputation is also a non-substitutable resource. Although some believe that firms can reassure their suppliers and customers by using some types of guarantees instead of developing a good reputation, it is not clear whether such guarantees have the same psychological impact on stakeholders as the good reputation has (Barney 1991). Hence, consistent with our results, a good carbon reputation possesses all of the above characteristics to enhance a firm's competitive advantage and consequently improve corporate economic performance.

Several studies (Deephouse, 2000; Hussainey and Salama, 2010; Kim et al., 2007; Kim, 2001; Roberts and Dowling, 2002; Shamsie, 2003; Vergin and Qoronfleh, 1998) have also documented a positive relationship between a firm's reputation and economic performance in the business world. Vergin and Qoronfleh (1998) found that the least reputable companies suffer from financial problems and pay no dividends, whereas highly reputed companies have an average 2.1 percent dividends. They conclude that reputation is a valuable intangible asset which can make attracting and retaining good customers and employees, as well as obtaining capital, easier. Inglis et al. (2006) also take the view that the financial benefits of a positive reputation can include increased sales, profit and return on investment.

Roberts and Dowling (2002) also found a positive association between reputation and profitability and argue that some of the things companies undertake to improve profitability also enhance their reputations. Hence, this enhanced reputation makes it easier for firms to sustain superior performance outcomes over time. Shamsie (2003) also found that a strong and growing reputation in some industries, including chewing gum, laundry detergents and photographic film, can provide a firm with valuable information asymmetry among a growing number of customers. In other words, she found that informational asymmetries work best in industries whose products

are frequently bought by customers who tend to have a relatively lower purchase price. She argues (p. 209) that “consumers would not usually find it worthwhile to undertake an extensive search for information for products whose purchase they attach less significance to. Under these circumstances, they would tend to rely more upon the reputation of the leading firm to make their purchase decisions”. She concludes that firms can build upon this reputation over time and increase the magnitude of a reputation’s advantage over all other rivals.

Kim et al. (2007) also investigated the impact of different dimension of corporate reputation (i.e. symbolic reputation and performance reputation) and documented a positive association between performance reputation and a firm’s profitability. In other words, they found that only a reputation building upon corporate actual performance and changes improves a firm’s financial performance.

Among those studies specifically investigating the impact of environmental reputation on economic performance, Konar and Cohen (2001) document a positive and significant association between these two constructs. They argue that major companies voluntarily comply with environmental regulations and externally show a positive image of being environmentally concerned in order to be rewarded in the marketplace for taking these actions.

Hussainey and Salama (2010) also document a positive and significant relationship between environmental reputation and an investor’s ability to anticipate future earnings which means that a firm’s environmental reputation provides investors with value-relevant information. They argue that because a decent environmental reputation leads to a better forecast of companies’ future earnings by investors, “the attention to develop a sound environmental policy, through allocating some resources toward environmental agenda, and therefore developing a reputation for that policy, does not represent a competitive disadvantage” (Hussainey and Salama, 2010, p. 15).

7.5 Carbon Performance and Economic Performance

The results of all models showed that firms’ economic performances are not influenced by carbon performance. In other words, the researcher did not find a significant association between carbon performance and economic performance, and hence, H7a and H7b were not supported by all models. Although the results did not support the argument that it pays to be green, they

implied that the firms' economic performance are not negatively impacted by carbon reduction activities. Thus, the findings, which are consistent with Rockness et al. (1986), Freedman and Jaggi (1992) and Sarumpaet (2006) do not support the expectation that reducing corporate carbon emissions comes out of shareholders' pockets.

Overall, the non-significant association between carbon performance and economic performance can be interpreted in two different ways. On one hand, this non-significant relationship sends a clear message to corporate management that pursuing carbon reduction activities to tackle climate change and global warming does not happen at the expense of a firm's economic growth. On the other hand, it may imply that environmentally friendly products or services that usually bring higher prices are not supported by most consumers, and many customers still prefer price over environment (Sarumpaet, 2006).

The relationship between environmental performance and economic performance is complex, and several researchers from environmental economics discipline have produced mixed and inconclusive results. Such a positive association may imply that effective management leading a company towards more profit also considers the demands of various stakeholders and uses resources more completely and efficiently (Russo and Fouts, 1997). Negative association, which is in line with the traditional economic view, may imply that achieving a high level of environmental performance is in conflict with the interests of investors, and resources required for such activities come out of shareholders' pockets. Another proposition takes a middle view and suggests a U-shaped association between environmental performance and economic performance. This U-shaped association asserts that there is an optimal level between environmental performance and related resource allocations, and economic performance can suffer when too many or too few resources are allocated to environmental performance (Hart and Ahuja, 1996).

Apart from those studies documenting a positive, negative or non-significant association between environmental performance and economic performance, some studies (Horváthová, 2012; Rassier and Earnhart, 2011) conclude that the impact of environmental performance on economic performance differs in the short term and long term. Horváthová (2012) found that, while the effect of environmental performance on economic performance is negative in the short term (lagged by one year), it becomes positive in the long run (lagged by two years). He argues

that, although it is clear that firms should spend money in the short term to adjust to new environmental regulations or invest in new equipment to improve their environmental performance, they can enjoy better economic performance in the long run through such adjustments.

Even though the vast majority of studies have indicated a positive association between environmental performance and economic performance and support the idea that good environmental performance does not lead to poor financial performance (Margolis and Walsh, 2001; Nishitani et al., 2011; Roman et al., 1999), this issue is not yet resolved. As we move forwards, there is a need to overcome the most important challenge noted by several researchers (Griffin and Mahon, 1997; Roman et al., 1999), i.e. having a standard measure of environmental performance as a multidimensional construct, and having reliable and valid sources of data with respect to that.

7.6 Carbon Disclosure and Economic Performance

Prior studies on the association between voluntary environmental disclosure and economic performance have been mixed and inconclusive. One reason for such inconsistent results can be industry effects (Chua, 2006). Chua (2006) documents the impact of industry when examining the association between environmental reporting and stock price movements. He concludes that firms with higher environmental impact and greater environmental exposure are more sensitive to environmental disclosures since their core business is impacted by environmental risks. Hence, he argues that it is not surprising that such disclosures in environmental sensitive sectors are more associated with stock price movements. To overcome this shortcoming, this study controlled the impact of industry type by separating carbon intensive and non-intensive companies to reach more robust results.

The results of all four models showed a non-significant association between quantity, as well as quality, of carbon disclosure and a firm's economic performance. These results suggest that the financial market is not yet responsive to carbon disclosure or disclosed information may not be sufficient to send a clear message to the market. In other words, one may argue that investors may not be able to interpret the disclosed carbon information, and hence, decide not to value such information, or they are able to understand it but they think it is not relevant and decide not to attribute any value to it. If the first hypothesis is true, a further standardisation and

harmonisation of the carbon disclosure framework at national and international level can help the market to improve its capability to interpret carbon-related information disclosed by firms.

On the other hand, if the second hypothesis is true (i.e. the investors think that the carbon information is not relevant and decide not to attribute any value to it), it seems the market is suggesting that carbon information disclosed by companies is not useful (Carnevale et al., 2012). This conclusion is consistent with some results obtained by Slack and Campbell (2008) who examine the perceptions of analysts with regard to voluntary social and environmental disclosure. Chua (2006) argues that there is consistent evidence that voluntary environmental disclosure is not associated with actual environmental performance. Hence, if the reliability of environmental disclosure is in doubt, the investors decide not to value such information as they think that the environmental disclosure does not meet their information needs (Carnevale et al., 2012). Therefore, a revision of the contents of carbon information and/or more comprehensive and mandatory regulations regarding carbon disclosure may be helpful in improving the reliability of such disclosure.

Another possible explanation for non-significant association in carbon non-intensive industries is that investors are not interested in the carbon issues of carbon non-intensive companies as they think that the economic performance of these companies is not influenced by their carbon behaviour, or that the potential impacts of noncompliant behaviour will only appear over the long term since these companies are under less social and political scrutiny.

Three accounting-based measures have also been used in the current study to ensure that the results are not functions of specific measures. However, the results did not change and continued to hold. According to Carnevale et al. (2012, p. 172), one may argue that voluntary social and environmental disclosure “does not add any information on the composition and future trend of accounting variables”. If this is the case, the social and environmental content “is not able to clarify the impact on equity and on profit of potential future risks and benefits related to compliant (or noncompliant) CSR behaviour” (Carnevale et al., 2012, p. 172).

In spite of the ambiguity about the impact of voluntary environmental disclosure on economic performance, several studies have consistently evidenced that environmental disclosure made by external or regulatory bodies is value-relevant (Barth and McNichols, 1994; Berthelot et al.,

2003; Blacconiere and Northcut, 1997; Cormier and Magnan, 2003; Hughes, 2000). Hughes (2000) found that externally produced environmental information affecting the environmental risk profiles of the firms is associated with movement of share prices. Cormier and Magnan (2003) also document a significant association between stock market value and environmental information for those companies facing fines and penalties for high levels of pollution.

In summary, according to Chua (2006, p. 31) “it is reasonable to conclude that disclosure would be prudent for firms in industries that have significant environmental risks since they would be punished less by investors in the event of known accidents or infringements. It is clear that information affecting the future cash flows of firms is value-relevant, that is share prices move in response to the release of such information”. While the impact of voluntary environmental disclosure on economic performance is still a matter of debate, it seems that markets trust standardised information produced by regulatory or external bodies (Chua, 2006).

7.7 Mediation Results

The bootstrapping method was conducted to investigate the indirect relationships between the variables of current study. The main goal of conducting mediation test was to understand whether carbon disclosure mediates the negative impacts of carbon performance on carbon reputation and to what extent carbon reputation plays a mediatory role between carbon performance, as well as carbon disclosure, and a firm’s economic performance.

The results of both carbon non-intensive models demonstrated that the worst carbon performers have a better corporate carbon reputation which is totally in contrast to the normative expectation. Since the results showed that the worst performers disclose more carbon information, the researcher ran a mediation test to examine whether carbon disclosure mediates the negative effects of carbon performance on carbon reputation. However, bootstrapping results did not support an indirect association between carbon performance and carbon reputation through carbon disclosure. Thus, the negative relationship between carbon performance and carbon reputation may be due to employing other filtering tools such as mass media, press release, and so forth.

The results also indicated a strongly statistically significant indirect relationship between quantity of carbon disclosure and economic performance ($p < .01$) in carbon intensive industries.

Further investigation showed that carbon reputation fully mediated the relationships between the quantity of carbon disclosures and economic performance. Thus, the results demonstrated that carbon intensive companies are taking more advantage of carbon disclosure than their counterparts in non-intensive industries in improving corporate reputation and, consequently, the economic performance of a firm.

Finally, the mediation test results did not show an indirect relationship between carbon performance and economic performance through carbon disclosure. In other words, it did not support that better performers, by disclosing more objective and verifiable information, or worse performers, by disclosing more symbolic information, can send a signal to the market to attract more investors. As already discussed, this can be mainly explained by the non-significant relationship between carbon disclosure and economic performance.

7.8 Conclusion

The previous chapter discussed the results of the hypotheses testing, as suggested by the path models in the previous chapters, under the premises of both legitimacy and resource-based theories. It also discussed the results of both carbon intensive and non-intensive industries models against each other. The overall results, which have been in line with legitimacy theory and resource-based theory, showed that collectively companies using carbon disclosure as a reputation risk management tool, and carbon reputation as a valuable intangible asset can improve their economic performance. The findings also indicated that carbon performance is not reflected in corporate carbon reputation and surprisingly the worst performers in carbon non-intensive industries have a better carbon reputation. The results, which are consistent with legitimacy theory, also showed that since the worst performers in carbon non-intensive industries are under more social and political pressure, they disclose a higher level of carbon information (irrespective of its quality) to protect their legitimacy.

The findings also suggested that carbon intensive companies take more advantage of carbon disclosure since, unlike non-intensive companies where only meaningful information improves their carbon reputation, they can improve their carbon reputation by providing more carbon information irrespective of its quality. Finally, the results indicated that carbon reputation as an intangible asset is more valuable for carbon intensive industries since it improves economic performance of the firms and attracts more investors. This finding is in line with Cho et al.'s

(2012, p. 17) argument that “environmental reputation is more likely to be an important resource for companies whose operations are subject to greater political scrutiny”. The next chapter will be the conclusion of this study.

CHAPTER 8: Conclusion

8.1 Introduction

This study proposed and validated a model that explained how corporate carbon behaviour affects carbon reputation and financial performance of firms in both FTSE350 carbon intensive and non-intensive industries.

This final chapter explains the main findings, implications and recommendations of this study. The remainder of this chapter is organised as follows. Section 2 reviews the findings of the study and revisits the research questions and their related hypotheses. This is followed by the implications and contributions of the research in Sections 3 and 4, respectively. Section 5 outlines some limitations of the study and suggests avenues for future research. The last section is the final conclusion of this study.

8.2 Review of the Findings

Prior empirical research on the relationships between environmental performance, environmental disclosure, environmental reputation and economic performance has, in general, considered the strength of pairwise relationships between two of these four factors whilst not addressing the others. As previously noted, Al-Tuwaijri et al. (2004) argue that previous studies ignore the fact that the management's overall strategy affects each of these corporate factors and in order to have robust results, these corporate functions should be jointly determined. Thus, this study aimed at not only addressing this gap in the literature, but also adding to the limited number of studies in the carbon-accounting discipline by investigating the extent to which corporate economic performance is influenced directly and indirectly (through carbon reputation) by carbon performance and both the quality and quantity of carbon disclosure. It also aimed to examine the extent to which carbon performance and carbon disclosure are reflected in firms' carbon reputation and whether corporate carbon disclosure and specifically symbolic carbon disclosure mediates the negative impacts of carbon performance on carbon reputation. To serve these purposes, a comparative study based on pooled cross sectional time series data of 95 UK firms (40 carbon intensive companies and 55 non-intensive companies) over the period 2009 to 2014 was employed to understand how different industry sectors react to climate change and global warming, and how various stakeholder groups respond to corporate carbon behaviour and

its consequence in different industry sectors (i.e. carbon intensive and non-intensive industries). Thus, four research questions and eighteen hypotheses were developed in this study.

8.2.1 First Research Question

Corporate carbon information has become more and more important in the decision making of stakeholders. However, the voluntary nature of this information raises the question regarding its reliability. Legitimacy theory brings the reliability of voluntarily corporate carbon disclosure into question by predicting a negative association between carbon performance and carbon disclosure since it argues that the worst performers disclose more information to mitigate social and political pressures.

The first research question examined how both quantity (level) and the quality (nature) of carbon information voluntarily disclosed by FTSE350 firms relate to their underlying carbon performance. This research question and its related hypotheses and findings are discussed in this sub-section.

RQ1: Consistent with legitimacy theory, do firms with the worst carbon performance disclose more carbon information? And are their disclosures consistent with the symbolic management approach towards legitimacy?

H1a: Ceteris paribus, for firms from carbon intensive industries, the quantity of carbon disclosure is negatively associated with carbon performance. (Rejected)

H1b: Ceteris paribus, for firms from carbon non-intensive industries, the quantity of carbon disclosure is negatively associated with carbon performance. (Supported)

H2a: Ceteris paribus, for firms from carbon intensive industries, the quality of carbon disclosure (i.e. ratio of behavioural disclosure to symbolic disclosure) is positively associated with carbon performance. (Rejected)

H2b: Ceteris paribus, for firms from carbon non-intensive industries, the quality of carbon disclosure (i.e. ratio of behavioural disclosure to symbolic disclosure) is positively associated with carbon performance. (Rejected)

The results showed different behaviour in carbon intensive and non-intensive industries. They suggest no association between carbon performance and quantity (level) of carbon disclosure in

carbon intensive industries and also suggest that the worst carbon performers in non-intensive industries disclose more carbon information. Both a non-significant association and a negative significant association, which is consistent with legitimacy theory and several previous studies (Cho et al., 2012; Cho and Patten, 2007; Clarkson et al., 2011; Hughes et al., 2001; Patten, 2002), suggest that voluntary carbon disclosure is not indicative of a firm's actual carbon performance and brings the reliability of such disclosure into question.

To further examine the reliability of voluntary carbon disclosure and the extent to which corporate carbon disclosure is indicative of a firm's underlying carbon performance, the second part of this research question deals with the relationship between carbon performance and the quality (nature) of carbon disclosure. As previously noted, the variation in the nature and range of voluntary carbon disclosure shows that corporate strategies towards legitimacy and maintaining a social contract may vary across firms and can be both symbolic and behavioural (substantive) (Hrasky, 2011). Clarkson et al. (2011) argue that according to legitimacy theory, since firms with poor environmental performance experience threatened legitimacy, they are motivated to disclose more self-serving (symbolic) information to change perceptions regarding their performance rather than revealing their actual performance. Thus, this theory predicts a positive association between carbon performance and the quality of carbon disclosure (the ratio of behavioural disclosure to symbolic disclosure).

The findings of both industry sectors did not suggest that the best performers disclose more meaningful and verifiable carbon information to differentiate themselves from firms with poor performance. Like the level of carbon disclosure, the findings show that the nature of carbon disclosure may not be indicative of a firm's carbon performance. Thus, the findings did not support Clarkson et al.'s (2008) preliminary evidence that legitimacy theory is robust in predicting what is being said rather than the level of disclosure. On the contrary, the findings which are consistent with several previous studies (Cho et al., 2012; Cho and Patten, 2007; Clarkson et al., 2011; Hughes et al., 2001; Patten, 2002) showed that legitimacy theory is robust in predicting the level of voluntary disclosure.

8.2.2 Second Research Question

The second research question focused on the role of carbon performance, as well as both the quantity and quality of carbon disclosure, in enhancing corporate carbon reputation and the extent to which such disclosure mediates the negative impacts of firms' carbon performances on the perceptions of their carbon reputation. This research question and its related hypotheses and findings are discussed in this sub-section.

RQ2: To what extent are corporate carbon performance and carbon disclosure reflected in the carbon reputation of a firm? And does carbon disclosure mediate the negative impacts of carbon performance on corporate carbon reputation?

H3a: Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with carbon performance. (Rejected)

H3b: Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with carbon performance. (Rejected)

H4a: Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with quantity of carbon disclosure. (Supported)

H4b: Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with quantity of carbon disclosure. (Rejected)

H5a: Ceteris paribus, for firms from carbon intensive industries, carbon reputation is positively associated with quality of carbon disclosure. (Rejected)

H5b: Ceteris paribus, for firms from carbon non-intensive industries, carbon reputation is positively associated with quality of carbon disclosure. (Supported)

This research question was mainly aimed at addressing Hopwood's (2009) concern where he identified the area of corporate legitimation and voluntarily environmental disclosure in an urgent need for more research. He (p. 437) argued that, although the increased level of environmental disclosure can have a positive outcome in enhancing corporate accountability, there is a risk that in the pursuit of legitimation, such disclosure actually "thickens the corporate veil". In other words, such disclosure can create a positive impression of a firm's operations with no associated changes in corporate activities.

In order to address this concern, this research question focused on the determinants of corporate carbon reputation to provide the answer about the extent to which carbon performance and voluntary carbon disclosure (especially symbolic disclosure) are reflected in corporate carbon reputation. It also deals with the extent to which corporate carbon disclosure, especially symbolic carbon disclosure, mediates the negative impact of carbon performance on carbon reputation. Interestingly, and in contrast to normative expectation, the results showed that the worst performers in carbon non-intensive industries have a better carbon reputation. As already discussed, one possible explanation is that since the real carbon performance of non-intensive industries are subject to less public scrutiny, they may enjoy more filtering processes than carbon intensive industries to shape and/or manipulate the perception of the society. The results also showed a non-significant association between the carbon performance and carbon reputation of carbon intensive companies. Collectively, the results suggest that carbon reputation is not based on corporate carbon performance, supporting Brady's (2005) argument and Hopwood's (2009) concern that companies may employ different filtering techniques, such as voluntary carbon disclosure, to create a positive image of corporate activities irrespective of their real performance.

Overall, the results, which are consistent with several previous studies (Cho et al., 2012; Cho and Patten, 2007; Clarkson et al., 2011; Hrasky, 2011; Hughes et al., 2001; Patten, 2002) suggest that firms are making disclosure responses that are consistent with legitimization behaviour and support Hopwood's (2009) concern that such disclosures can "thicken the corporate veil". The results showed that, unlike carbon non-intensive industries whose quality of carbon disclosure improves corporate carbon reputation, carbon intensive companies are taking more advantage of such disclosure to enhance their carbon reputation by disclosing higher levels of carbon information irrespective of their quality. In other words, the results suggest that symbolic management techniques employed by carbon intensive companies have been useful in rationalising their impacts.

The results are also consistent with Bebbington et al.'s (2008) argument that social and environmental reporting can be perceived as a mechanism for perception creation, and can be employed as a reputation risk management tool. The findings are also consistent with Talbot and Boiral's (2014) findings that industrial companies use several impression management strategies

to rationalise their impacts. They document that “self-proclaimed excellence, promotion of a systemic view, denial and minimization, denouncing unfair treatment and deceptive appearances, economic and technological blackmail, and blaming others” (Talbot and Boiral, 2014, p.329) are the main impression management strategies employed by industrial emitters in Canada.

The results did not show that carbon disclosure mediates the negative impacts of carbon performance on carbon reputation. Since the real performance is not reflected in the carbon reputation of the firms, future research needs to investigate other filtering techniques such as press releases, etc.

8.2.3 Third Research Question

The third research question aimed to address the longstanding debate about whether it pays to be green. In other words, it investigated whether improving corporate carbon performance leads to better economic performance. It also examined the extent to which the market is reacting to corporate carbon disclosure. This research question and its related hypotheses and findings are discussed in this sub-section.

RQ3: To what extent is economic performance influenced by corporate carbon performance and carbon disclosure?

H7a: Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with carbon performance. (Rejected)

H7b: Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with carbon performance. (Rejected)

H8a: Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with quantity of carbon disclosure. (Rejected)

H8b: Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with quantity of carbon disclosure. (Rejected)

H9a: Ceteris paribus, for firms from carbon intensive industries, economic performance is positively associated with quality of carbon disclosure. (Rejected)

H9b: Ceteris paribus, for firms from carbon non-intensive industries, economic performance is positively associated with quality of carbon disclosure. (Rejected)

This research question deals with how the market reacts to both the carbon performance and carbon disclosure of a firm. The findings, which are consistent with the results of Freedman and Jaggi (1992), Rockness et al. (1986) and Sarumpaet (2006), did not show any significant association between carbon performance and economic performance in any of the models. Although the results did not support both proponents' and opponents' arguments regarding the association between environmental performance and economic performance, they can send a message to corporate management that improving corporate carbon performance is not at the expense of profitability. The results showing that there is not a tradeoff between environmental goals and profitability suggest that investment in emissions abatement technologies may not only benefit the environment but also do not harm a firm's economic performance. Since annual share returns have been used to represent a firm's economic performance, a non-significant association between carbon performance and economic performance shows that investors do not believe that acting in a socially and environmentally responsible way imposes costs that a company may not recover in the future and/or that investing in emissions abatement technologies comes out of their pocket. Such results can be considered as good news for proponents of climate change and global warming.

The second part of this research question aimed to examine the market's reaction to both the quantity and quality of carbon disclosure. The results which are consistent with the findings of Carnevale et al. (2012) and Murray et al. (2006) suggest that the financial market does not value both the quality and quantity of carbon disclosure or such information may not be sufficient to send a clear message to the market. In other words, the results suggest that investors may not be able to interpret the disclosed information regarding corporate carbon activities, and hence, decide not to value such information, or that they are able to understand it but they think it is not relevant so decide not to attribute any value to it. In both scenarios, more comprehensive and mandatory regulations regarding carbon disclosure may enhance the interpretability and reliability of such disclosure and improve investors' trust.

8.2.4 Fourth Research Question

The last research question aimed to investigate the role of corporate carbon reputation in enhancing the competitive advantage of a firm and subsequently improving its economic performance. It also aimed to provide answers about whether corporate carbon reputation serves as a mediatory role between carbon performance as well as carbon disclosure and a firm's economic performance. This research question and its related hypotheses and findings are discussed in this sub-section.

RQ4: Does carbon reputation improve corporate economic performance? And do both carbon performance and carbon disclosure indirectly improve corporate economic performance by enhancing a firm's carbon reputation?

H6a: *Ceteris paribus*, for firms from carbon intensive industries, economic performance is positively associated with carbon reputation. (Supported)

H6b: *Ceteris paribus*, for firms from carbon non-intensive industries, economic performance is positively associated with carbon reputation. (Rejected)

The results showed that only carbon reputation of carbon intensive companies improves corporate economic performance. Such findings, which are consistent with Cho et al.'s (2012) argument, suggested that carbon reputation is more important for those companies with higher carbon exposure. Although the findings of carbon intensive models support resource-based theory, overall the results suggest that enhanced reputation does not necessarily lead to an improved economic performance and reputation as an intangible asset needs to be interpreted within organisational and industrial contexts.

Apart from the direct impact of both carbon performance and carbon disclosure on economic performance, these corporate functions may indirectly improve a firm's economic performance by enhancing its carbon reputation. Thus, the second part of this research question deals with these indirect relationships. The bootstrapping findings showed that the quantity of carbon disclosure in carbon intensive companies indirectly improves a firm's economic performance. The findings show that not only can corporate carbon disclosure, irrespective of its quality and real performance, of a firm enhance corporate carbon reputation, but it can also indirectly improve the economic performance of a firm through enhanced carbon reputation. Thus, in such

case, there is no real incentive for corporate management to change their real operations in order to decrease their level of carbon emissions.

8.3 Research Implications for Investors, Media, Policy Makers and Managers

This study has investigated the market's reaction to corporate carbon performance, carbon disclosure and carbon reputation. It has also examined how corporate carbon behaviour (i.e. carbon performance and disclosure related to that performance) is reflected in perceptions of its carbon reputation. Therefore, at the practical level, this study has implications and recommendations for the users of carbon information including media and investors. The findings also have some implications and recommendations for corporate management and the policy makers.

For the investors, this thesis has some implications regarding corporate carbon reputation. The results show that such a reputation is an important factor in the decision-making of investors who invest in carbon intensive industry sectors. However, the findings revealed that such a reputation is not based on a firm's real carbon performance. Hence, investors need to be cautious when making a decision and looking at a firm's real carbon performance, for instance by using CDP FTSE350 reports regarding corporate carbon performance, rather than a good reputation in this area. Otherwise, such investors' behaviour may actually reduce the managements' incentives to improve a firm's carbon performance.

For the mass media, this thesis has implications with respect to the assessment of corporate carbon behaviour. The results show a certain degree of naivety on the part of the media in evaluating corporate carbon behaviour, since it values the carbon disclosure of a firm more than its real performance. More specifically, the findings that the worst performers of carbon non-intensive companies have a better reputation and quantity of carbon disclosure (irrespective of its quality) and can improve the carbon reputation of carbon intensive companies, bring the media assessment of corporate carbon behaviour into serious question and further investigation is needed to explore the reasons for such assessments by the media. Like investors, such media behaviour may actually hinder future improvement in a firm's carbon performance.

As companies can improve their carbon reputation by disclosing more carbon information (irrespective of their real performance), the message of this thesis for the policy makers is that

the current carbon disclosure policy is not addressing the heart of climate change and global warming, and hence tougher regulation is needed on the part of voluntary carbon disclosure. To the extent that such disclosure lessens the negative impact of real corporate carbon performance, it can actually reduce managements' incentive to have a better carbon performance in the future. Apart from that, the findings that investors do not value a firm's carbon disclosure may suggest that the users of such information are not able to interpret it or they can understand it but they think it is not trustworthy. Therefore, a further standardisation of carbon disclosure by regulatory bodies may help the users of such information to improve their capability to interpret such information or improve investors' trust with regards to reliability of corporate carbon information. In the absence of such investors' trust, companies may not be motivated to disclose more verifiable and objective carbon information as it can incur more costs without being valued by the market and/or other relevant users of such disclosure.

Finally, the recommendation of this study for corporate management is that improving corporate carbon performance does not come out of shareholders' pockets. In other words, a non-significant association between carbon performance and economic performance in all models sends a clear message to corporate management that pursuing carbon reduction activities to mitigate the impact of climate change and global warming does not happen at the expense of a firm's economic growth. In other words, investing in activities, such as installing more efficient equipment to minimise the carbon footprint of a firm, does not harm corporate economic performance.

8.4 Research Contribution

This thesis has several contributions at the theoretical, empirical and research design levels as follows.

8.4.1 Contribution to Theory

The review of the literature revealed that several studies have mostly employed legitimacy theory to test the relationship between environmental performance and environmental disclosure. However, as previously noted, Clarkson et al.'s (2008) preliminary evidence showed that legitimacy theory may be useful in predicting the nature of such disclosure rather than mere quantity, and they argue that future environmental disclosure research should move beyond the level of disclosure. Thus, in order to respond to their call, this study moved the focus of enquiry

beyond the level of disclosure and examined the association between carbon performance and the quality of such disclosure. The results did not support their argument that this theory is more robust in predicting the nature of disclosure, and consistent with several previous studies, this study confirmed the power of this theory in predicting the level of voluntary disclosures.

Prior empirical research on the relationship between reputation and economic performance has mostly documented a positive association and argued that according to resource-based theory, reputation as a valuable intangible asset enhances the competitive advantage of a firm which subsequently leads to improved economic performance. However, the results that only carbon reputation of carbon intensive firms improves corporate economic performance showed that enhanced reputation does not necessarily lead to improved economic performance and reputation, as an intangible asset needs to be interpreted within organisational and industrial contexts. Such results are consistent with Cho et al.'s (2012) argument that environmental reputation is likely to be more important for those companies from environmental sensitive industries whose operations are subject to higher social and political examination.

8.4.2 Variable Measurement Contribution

For the first time, this study developed and measured the concept of corporate carbon reputation. To this end, this study relied on newspaper articles since they have strong effects on the public's perceptions (Palmgreen et al., 2001). Baum and Powell (1995) argue that the content analysis of press media is useful in studying legitimization and reputation processes because detailed archives of press media have existed for many years and many industries, and they offer powerful techniques for operationalising legitimization and reputation. Furthermore, as noted in Chapter 4, unlike previous studies adopting a weighting method using three cardinal scales (i.e. favourable (+1), neutral (0), and unfavourable (-1)) for measuring corporate environmental reputation, for the first time, this study developed and adopted nine scales to weight newspapers' articles.

Another measurement contribution of this thesis is related to the quality of carbon disclosure. Previous studies (Al-Tuwaijri et al., 2004; Hughes et al., 2001; Patten, 2002; Wiseman, 1982) have used a weighting system to capture the quality of environmental disclosure. However, for the first time, this study captured the quality of carbon disclosure by employing symbolic and

behavioural disclosure categories obtained from Hrasky (2011)²⁶ not only to investigate the association between carbon performance and symbolic carbon disclosure, but also the impact of such symbolic disclosure on corporate carbon reputation.

8.4.3 Empirical Contribution

At the empirical level, this study contributed to the body of knowledge in several ways. Firstly, in order to provide more robust results on the pairwise association between the variables of this study and investigate the direct and indirect relationship between carbon performance, carbon disclosure, carbon reputation and economic performance, this study developed and validated a mediation model of corporate carbon behaviour, carbon reputation and economic performance in both carbon intensive and non-intensive industry sectors. To the researcher's best knowledge, no study has attempted to examine carbon performance, carbon disclosure, carbon reputation and economic performance within a single inclusive model.

Secondly, following the emphasis of Patten (2002), Cho and Patten (2007) and Cho et al. (2010) on the impact of an industry's type on corporate environmental behaviour and its consequences, this study for the first time investigated the impact of corporate carbon behaviour on carbon reputation and a firm's economic performance in both carbon intensive and non-intensive industries. As noted in Chapter 6, sample carbon non-intensive companies have emitted, on average, 37,733,070 (tons) CO₂e per year which can be considered a high amount of greenhouse gas emission. Therefore, they are required to play their role in tackling climate change and global warming and more research can help them to immensely understand their role in mitigating the impact of climate change.

Finally, this study adds to the limited number of studies in the carbon accounting discipline. As stated earlier, few studies have examined the relationship between carbon performance and carbon disclosure. This study extended these studies by examining not only the relationship between carbon performance and the level of carbon disclosure (i.e. quantity of disclosure), but also the relationship between carbon performance and the nature of such disclosure (i.e. quality of disclosure). This study also contributed to the literature on carbon accounting by examining the impact of carbon performance as well as both the quality and quantity of carbon disclosure

²⁶Quality of carbon disclosure= Behavioural sentences/Symbolic sentences

on corporate carbon reputation. Furthermore, this study, for the first time, investigated different communication and legitimation strategies (i.e. behavioural and symbolic management strategies) used by FTSE350 companies in enhancing a firm's carbon reputation and subsequently economic performance. Finally, this study contributed to the literature by investigating the extent to which carbon reputation improves a firm's economic performance and the extent to which the financial market responds to both corporate carbon performance and corporate carbon disclosure.

8.5 Limitations of the Study and Avenues for Future Research

While this study has achieved its objectives and empirically and theoretically contributed to carbon accounting literature, like all studies, it was subject to some limitations as follows.

Firstly, this study as an archival study can only provide evidence on relationships, but not causality (Alewine, 2010). Future research can explore how investors and the media perceive carbon disclosure in relation to carbon reputation using qualitative design or experimental to add evidence along this dimension.

Secondly, this study focused only on relatively large UK companies (FTSE350) and thus it cannot be generalised to other contexts. Future research can use the theoretical model of this study for other developed or developing countries and compare their results to see how different countries with different cultures and social and political situations react to carbon-related issues.

Thirdly, the researcher measured both the quantity and quality of carbon disclosure based on a review of hard-copy reporting (i.e. a sustainability report or voluntary CSR section of an annual report) and not web-based disclosure, due to the problem with timing of web-based disclosure. Although it is acknowledged as one of this study's limitations, according to Cormier and Magnan (2004), hard-copy environmental reporting and web-based disclosures are very consistent. In addition, recent studies on environmental disclosure have concentrated only on hard-copy reporting.

Fourthly, the measure of carbon reputation may raise questions since it depends on the classification of newspaper articles to different categories which may differ between different individuals. In addition, this proxy merely captures media perceptions of corporate activities, not other stakeholders' perceptions. However, to the best of the researcher's knowledge, currently

there is no database related to carbon reputation, and the available data sources such as America's, Britain's and the World's Most Admired Companies only capture the broader area, i.e. environmental reputation. Thus, future studies can employ another method to measure this variable, for instance, by using the same method as Britain's Most Admired Companies to capture the perception of corporate managers and analysts regarding a firm's carbon activities.

Finally, in order to have more consistent and reliable data regarding corporate carbon emission, the Carbon Disclosure Project (CDP) rather than corporate annual reports has been employed. However, it is acknowledged that reported Scope 1 and Scope 2 emissions' data to the CDP may not be consistent in terms of boundaries and protocols between all sample companies. By surveying companies, future studies may ask them to provide their level of carbon emissions using same protocols and boundaries.

8.6 Revisiting Theoretical Framework

Like other theoretical frameworks, the theoretical framework of the current study is subject to some limitations leading to rejections of some hypotheses developed in chapter 3.

Firstly, variables' measurements can be subject to some limitations in all quantitative studies. Although sensitivity analysis has been employed to ensure that the results are not function of specific measures, and the measures of variables' current study have been deeply explained in chapter 4 and compared with other measures and proxies in the literature to ensure that they best represent the phenomena under investigation, they may suffer from some limitations. For instance, as explained in section 8.5, corporate carbon reputation merely captures the media perception about corporate carbon activities and ignores the perception of other stakeholders' groups, and corporate carbon performance may suffer from inconsistency between reported carbon emissions in terms of boundaries and protocols. Finally, although methods such as Cronbach's alpha has been used to reduce the subjectivity of content analysis, content analysis used to measure corporate carbon reputation and carbon disclosure is subject to some limitations such as increased error due to individual bias. Therefore, other methods can be used by future studies to measure the variables of this study and re-test hypotheses developed in chapter 3.

Secondly, even though literature has been reviewed thoroughly to develop the hypotheses of this study and the relationships between variables, and to ensure that all control, mediator and/or

moderator variables (such as corporate size and previous economic performance) have been included in theoretical framework, there may be some missing control, mediator and/or moderator variables in the current study's theoretical framework impacting the results. Despite these limitations, it is encouraging that this study for the first time investigated the interrelations between carbon performance, carbon disclosure, carbon reputation and firm's economic performance within a single inclusive model.

8.7 Final Conclusion

This study has made a solid contribution to knowledge in the carbon accounting field. The current study was significant as it not only increased academic knowledge in the carbon accounting field, but also made a significant contribution to the literature on social and environmental accounting. This thesis also responded to previous calls in the literature for more research in the area of legitimation and corporate environmental reporting (Clarkson et al., 2008; Hopwood, 2009) and further research on different management strategies (i.e. symbolic and behavioural management) towards climate change and carbon footprints in different industry sectors (i.e. carbon intensive and non-intensive industries) (Hrasky, 2011).

The findings showed that, in order to successfully mitigate the impact of climate change and global warming, more changes are needed in investors', managers' and media's behaviour. Also tougher regulation is needed on the part of voluntary carbon disclosure. As long as investors and media value voluntary carbon disclosure more than real performance, there will be less incentive for corporate managers to reduce their levels of carbon emissions. Therefore, the changes in investors' and media's behaviour, along with tougher regulation in the carbon disclosure area, may guarantee that companies play their role in tackling climate change. Finally, more ethical behaviour from the corporate managers' side in preparing voluntary carbon disclosure, and providing more meaningful and trustworthy information related to their real carbon performance, may increase the trust among the users of such disclosures.

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Appendices

Appendix I: Sample Companies

Carbon Intensive Companies

Companies' Names		
1. Amec	15. Travis Perkins	29. Randgold Resources
2. Carillion	16. Balfour Beatty	30. Centrica
3. Cobham	17. Bunzl	31. Drax Group
4. Experian Group	18. Senior	32. Pennon Group
5. IMI	19. Serco Group	33. Severn Trent
6. G4S	20. Anglo American	34. Cairn Energy
7. Interserve	21. BHP Billiton	35. United Utilities
8. Kier Group	22. Croda International	36. Premier Oil
9. MITIE Group	23. BP	37. Royal Dutch Shell
10. Rentokil Initial	24. Johnson Matthey	38. Tullow Oil
11. Rolls-Royce	25. Lonmin	39. Petrofac
12. BG Group	26. Mondi Group	40. BBA Aviation
13. Smiths Group	27. Rio Tinto	
14. Stagecoach Group	28. Antofagasta	

Carbon Non-Intensive Companies

Companies' Names		
1. Berkeley Group Holdings	20. Morrison Supermarkets	39. Provident Financial
2. Bovis Homes Group	21. SABMiller	40. Royal Bank of Scotland Group
3. British Sky Broadcasting	22. Tate & Lyle	41. Schroders
4. Burberry Group	23. Tesco	42. Segro
5. Euromoney Institutional Investors	24. Unilever	43. Shaftesbury
6. Greene King	25. 3i Group	44. Standard Life
7. Kingfisher	26. Admiral Group	45. AstraZeneca
8. N Brown Group	27. Amlin	46. GlaxoSmithKline
9. Pearson	28. Aviva	47. Shire
10. Persimmon	29. Barclays	48. Electrocomponents
11. Redrow	30. British Land Company	49. Premier Farnell
12. Reed Elsevier	31. Derwent London	50. Vodafone Group
13. TUI Travel	32. F&C Asset Management	51. British American Tobacco
14. Whitbread	33. Great Portland Estates	52. Catlin Group
15. WPP	34. Hammerson	53. International Personal Finance
16. Dairy Crest Group	35. Henderson Group	54. BTG
17. Diageo	36. HSBC Holdings	55. ARM Holdings
18. Associated British Foods	37. Land Securities	
19. J Sainsbury	38. Old Mutual	

Appendix II: Sample of Newspapers' Articles BP

2014

'Keep it in the ground lobby would condemn billions to life of poverty (Unfavourable and not focused)

The Daily Telegraph (London), April 18, 2015 Saturday, Pg. 28, 823 words, Andrew Critchlow

Liberal green lobby will condemn BRICS to colonial servitude; Demonisation of oil industry will put future energy supplies at risk and threaten to tip billions back into poverty (Favourable and not focused)

telegraph.co.uk, April 17, 2015 Friday 5:42 PM GMT, FINANCE, 952 words, By Andrew Critchlow
Commodities editor

BP and Rio Tinto face protests over environmental record; Fishermen and trade union campaigners plan noisy protests outside companies' annual meetings (Unfavourable and focused)

The Guardian, April 16, 2015 Thursday 7:42 AM GMT, BUSINESS, 509 words, Terry Macalister

BP shareholders back motion for company to be more transparent about climate policy; Some 98 per cent of investors voted for the climate change resolution (Favourable and focused)

Independent.co.uk, April 16, 2015 Thursday 4:49 PM GMT, BUSINESS NEWS, 218 words, Tom Bawden

Ten million gallons of 'missing oil' from 2010 BP disaster discovered at bottom of Gulf of Mexico (Unfavourable and focused)

MailOnline, February 5, 2015 Thursday 3:45 AM GMT, NEWS, 528 words, JULIAN ROBINSON FOR MAILONLINE

Fossil fuel firms are still bankrolling climate denial lobby groups; BP has withdrawn support to Alec, a group known for misrepresenting climate science, but appearances can be deceptive. Oil, gas and coal companies remain firmly behind climate disinformation campaigns (Favourable and not focused)

The Guardian, March 25, 2015 Wednesday 1:30 PM GMT, ENVIRONMENT, 1186 words, Peter C Frumhoff and Naomi Oreskes

Shareholders challenge BP to confront climate change risk; Over 150 investors, including Environment Agency and Church of England, demand that BP test whether their business model is compatible with international pledge to limit global warming to 2C (Neutral)

The Guardian, January 21, 2015 Wednesday 3:15 PM GMT, ENVIRONMENT, 620 words, Damian Carrington

Church threatens to withdraw money from biggest oil firms; BP and Shell told to cut greenhouse emissions in C of E 'divestment' campaign (Neutral)

The Independent (London), December 11, 2014 Thursday, NEWS; Pg. 22, 465 words, TOM BAWDEN
ENVIRONMENT EDITOR

BP and Shell to unveil multi-billion pound deals with China; Oil majors expected to lead deals worth a total of £18bn expected to be announced as the apex of Premier Li's three-day visit to Britain (Favourable and focused)

telegraph.co.uk, June 17, 2014 Tuesday 6:46 PM GMT, FINANCE, 584 words, By Louise Armitstead
Chief Business Correspondent

Shell and BP to announce new China trade deals; Chinese Premier Li Keqiang currently on a three-day visit to UK (Favourable and focused)

Independent.co.uk, June 17, 2014 Tuesday 10:23 AM GMT, FRONTPAGE, 221 words, Maria Tadeo

BP renewable energy archive still closed despite promise to open to public; Critics call for BP to provide immediate access to Warwick University archive containing billions of pounds worth of scientific research by the oil group from the 80s and 90s (Unfavourable and focused)

The Guardian, April 24, 2015 Friday 1:03 PM GMT, ENVIRONMENT, 618 words, Terry Macalister

Investors push BP on climate (Favourable and focused)

i-Independent Print Ltd, April 17, 2015, NEWS; Pg. 51, 105 words

2013

Ashley and Mackie teams win NE young engineers' challenge (Favourable and not focused)

Aberdeen Press and Journal, April 7, 2014 Monday, BUSINESS; ENERGY; Educ/Training; Pg. 26, 277 words, Jeremy Cresswell

Time for a greener Big Oil? (Unfavourable and not focused)

Petroleum Economist, March 2014,
INTERNATIONAL,CORPORATE,ENVIRONMENT,MARKETS,OIL,POLICY AND
POLITICS,TECHNOLOGY,ANALYSIS,PE,INTERNATIONAL,POLICY & POLITICS, 919 words

How Activists Should Engage Fossil Fuel Companies (Unfavourable and not focused)

Institutional Investor, January 2014, 1381 words, Daniel Abbasi

BP wins £10billion Oman gas deal (Neutral)

Aberdeen Press and Journal, December 17, 2013 Tuesday, NEWS; 999; Campaigns; Pg. 30, 392 words, Ryan Crighton

Climate change: Global warming down to '90 big firms': New study points finger at small number of polluters Gore hails analysis holding carbon giants to account (Unfavourable and not focused)

The Guardian (London), November 21, 2013 Thursday, GUARDIAN HOME PAGES; Pg. 15, 958 words, Suzanne Goldenberg US environment correspondent

Just 90 companies caused two-thirds of man-made global warming emissions (Unfavourable and not focused)

Guardian.com., November 20, 2013 Wednesday, 1231 words, Suzanne Goldenbergtheguardian.com

Aberdeen Press and Journal (Neutral)

, October 16, 2013 Wednesday, NEWS; POLITICS; MPs; Pg. 10, 135 words, Calum Ross

CAR INDUSTRY GETS £1BN TO FIND ENGINE OF THE FUTURE (Favourable and not focused)

DAILY MAIL (London), July 13, 2013 Saturday, 238 words, BY DAILY MAIL REPORTER

Government unveils £1bn investment in car of the future; The Government and the car industry will invest £1bn over the next 10 years in a research centre to develop the "car of the future" and help secure the jobs of 30,000 people working in the car engine supply chain. (Favourable and not focused)

telegraph.co.uk, July 12, 2013 Friday 11:09 AM GMT, FINANCE, 513 words

2012

BP to sell US wind farms as it sticks to oil and gas (Unfavourable and focused)

Independent.co.uk, April 4, 2013 Thursday 1:09 AM GMT, BUSINESS NEWS, 310 words, Tom Bawden

Vince Cable must force the banks to come clean about their dirty investments; While millions of people in developing countries pay the price of inaction on climate change, the UK's financial sector gets away with pouring billions into dirty energy (Unfavourable and not focused)

Independent.co.uk, March 14, 2013 Thursday 11:34 AM GMT, COMMENT, 719 words, Alex Scrivener

Carbon tax cost killed off ScottishPower's Longannet CCS plan (Neutral)

Sunday Herald, January 20, 2013 Sunday, HS - BUSINESS; Pg. 42, 725 words, Government actions criticised by auditor By Steven Vass

Carbon capture 'alarm bells' (Unfavourable and not focused)

Aberdeen Press and Journal, November 22, 2012 Thursday, NEWS; POLITICS; MPs; Pg. 10, 208 words, Calum Ross

Firm wants to be a millionaire (Favourable and not focused)

South Wales Echo, September 4, 2012 Tuesday, BUSINESS; Pg. 12, 405 words

BP invests in UK research to help it drill deeper (Favourable and focused)

The Daily Telegraph (London), August 7, 2012 Tuesday, BUSINESS; Pg. 22, 291 words, Emily Gosden

How Green will the London Olympics really be?; Rows about sponsors and merchandising have overshadowed the effort which has gone into limiting the actual damage to the environment (Unfavourable and not focused)

Independent.co.uk, July 28, 2012 Saturday 2:09 AM GMT, NEWS, 1407 words, Michael McCarthy

Offset Olympic footprint; In Brief (Favourable and not focused)

Hull Daily Mail, June 21, 2012 Thursday, NEWS; Pg. 20, 160 words

2011

Where are the new engineers queuing up for these jobs?; Despite the sector's problems with recruitment, some firms are having success in changing graduate perceptions, writes Andrew Collier (Favourable and not focused)

The Times (London), April 25, 2012 Wednesday, POWER OF SCOTLAND;FEATURES; Pg. 4, 900 words, Andrew Collier

Environmentalists enraged by BP s new project in North Sea (Unfavourable and focused)

The Herald (Glasgow), March 23, 2012 Friday, HS - NEWS; Pg. 5, 396 words, Alison Campsie

A firm fuelled by the same spirit as the Olympic and Paralympic Games; Mike Sharrock is the man helping BP to bring twenty-first century energy to the London 2012 Games (Favourable and not focused)

City A.M., March 7, 2012 Wednesday, NEWS; Pg. 19, 790 words

Ecometrica attracts fresh funding (Favourable and not focused)

The Scotsman, January 12, 2012, Thursday, Pg. 41, 173 words, Scott Reid

BP closes solar power business and blames global downturn (Unfavourable and focused)

The Guardian (London) - Final Edition, December 22, 2011 Thursday, GUARDIAN FINANCIAL PAGES; Pg. 29, 248 words, Terry Macalister

BP axes solar power business (Unfavourable and focused)

Guardian.com, December 21, 2011 Wednesday, 311 words, Terry Macalisterguardian.co.uk

False figures (Unfavourable and not focused)

The Guardian (London) - Final Edition, November 25, 2011 Friday, GUARDIAN FINANCIAL PAGES; Pg. 44, 162 words

SSE and Shell plan carbon capture (Unfavourable and not focused)

The Scotsman, November 10, 2011, Thursday, Pg. 1, 194 words, Frank Urquhart

Carbon challenge for Olympics fans (Favourable and focused)

Western Morning News (Plymouth, UK), September 30, 2011 Friday, NEWS; Pg. 14, 79 words

BP all set to go green; Controversial oil giant funds carbon offset scheme for Games-goers (Favourable and focused)

Metro (UK), September 29, 2011 Thursday, NEWS; Pg. 29, 346 words, Aidan Radnedge

BP Chemicals gas leak; In Brief (Unfavourable and focused)

Hull Daily Mail, July 23, 2011 Saturday, NEWS; Pg. 7, 117 words

Star Jessica flying the flag for efficiency (Favourable and not focused)

Hull Daily Mail, July 22, 2011 Friday, MOTORS;FEATURES; Pg. 14, 816 words

How you can take part in an Olympic challenge; Special report in partnership with BP The chairman of the Cultural Olympiad, Tony Hall, on how he is determined to create a world-class festival that will celebrate Britain's rich culture and arts heritage (Favourable and not focused)

The Daily Telegraph (London), July 16, 2011 Saturday, OPEN WEEKEND;FEATURES; Pg. 2,3, 3209 words, Tony Hall

BP joins carbon fund (Favourable and focused)

The Guardian (London) - Final Edition, June 1, 2011 Wednesday, GUARDIAN HOME PAGES; Pg. 10, 107 words, John Vidal, environment editor

Big firms blasted for failing to back strict EU climate targets (Unfavourable and not focused)

Sunday Herald, May 22, 2011 Sunday, HS - NEWS; Pg. 4, 390 words, Exclusive By Rob Edwards
Environment Editor

2010

SRI Fund Coalition Targets BP (Unfavourable and not focused)

Fund Action, April 4, 2011, 350 words, Hillary Jackson

Leading industry figures to address carbon-storage seminar (Favourable and not focused)

Aberdeen Press and Journal, March 16, 2011 Wednesday, BUSINESS; UTILITIES; Oil; Pg. 17, 240 words, Ian Forsyth

Energy policy role at No 10 for former BP man (Favourable and not focused)

Guardian.com, March 10, 2011 Thursday, 366 words, Allegra Strattonguardian.co.uk

Ministers must fight the low-carbon corner (Neutral)

Guardian.com, March 9, 2011 Wednesday, 718 words, Terry Macalisterguardian.co.uk

HEaidng g hgh gh gh gh ghg hgh g hghgh (Unfavourable and not focused)

Aberdeen Evening Express, February 10, 2011 Thursday, NEWS; OTHER; Others; Pg. 10, 354 words, Kevin Duguid

MORNING MEETING; CITY & BUSINESS EDITED BY PETER CUNLIFFE (Neutral)

The Express, January 20, 2011 Thursday, CITY; 65, 155 words

BP shares gain despite Abu Dhabi project delay (Favourable and not focused)

City A.M., January 19, 2011 Wednesday, NEWS; Pg. 16, 136 words, MARION DAKERS

BP spill prompts increase in oil and gas drill checks (Unfavourable and not focused)

The Herald (Glasgow), January 12, 2011 Wednesday, POL; Pg. 6, 333 words, NO BYLINE

Carbon dioxide capture plans could add £60bn to UK coffers (Favourable and not focused)

The Independent on Sunday, January 9, 2011, Pg. 72, 460 words, John Lawless

Methane munched (Unfavourable and not focused)

The Guardian (London) - Final Edition, January 7, 2011 Friday, GUARDIAN FINANCIAL PAGES; Pg. 26, 129 words

Green investment groups' fury over oil sands plan (Favourable and not focused)

The Times (London), December 1, 2010 Wednesday, BUSINESS; Pg. 56, 355 words, Robin Pagnamenta

BRITISH FIRM'S WORLD FIRST IN CLEAN POWER (Favourable and not focused)

MAIL ON SUNDAY (London), November 14, 2010 Sunday, 361 words

Green shoots spring up in the oil-rich desert; The UAE is taking rapid steps to reduce its carbon footprint, says Nick Wilson (Favourable and not focused)

The Times (London), October 26, 2010 Tuesday, THE WAY AHEAD;FEATURES; Pg. 13, 955 words, Nick Wilson

Carbon capture: A race no one wants to win (Unfavourable and not focused)

The Guardian (London) - Final Edition, October 21, 2010 Thursday Correction Appended, GUARDIAN HOME PAGES; Pg. 17, 205 words, Tim Webb

Hydrogen Energy California: one of the most do-able projects in the US (Favourable and focused)

Petroleum Economist, October 2010, ANALYSIS, 277 words

Financial: BP brushes off calls to keep away from ecologically risky areas (Unfavourable and focused)

The Guardian (London) - Final Edition, July 3, 2010 Saturday, GUARDIAN FINANCIAL PAGES; Pg. 34, 506 words, Terry Macalister

Royal Dutch Shell

2014

Shell lobbied to undermine EU renewables targets, documents reveal; Weak renewable energy goals for 2030 originated with Shell pitch for gas as a key technology for Europe to cut its carbon emissions in an affordable way (Unfavourable and focused)

The Guardian, April 27, 2015 Monday 5:29 PM GMT, ENVIRONMENT, 1054 words, Arthur Neslen in Brussels

DUDLEY'S £10M PAY GUSHER (Favourable and not focused)

DAILY MAIL (London), April 17, 2015 Friday, 770 words, BY RUTH SUNDERLAND

Europe's carbon capture dream beset by delays, fears and doubt; Plans for a major new trial for carbon capture and storage technology at a cement factory in Norway have sparked anger and divided the environmental movement (Favourable and not focused)

The Guardian, April 9, 2015 Thursday 4:57 PM GMT, ENVIRONMENT, 1364 words, Arthur Neslen in Brevik, Norway

What does future hold for troubled oil and gas industries?; Does this latest price crash mark the beginning of the end of all oil cycles and the imminent "deflation of the carbon bubble"? PETER McCUSKER reports (Favourable and not focused)

The Journal (Newcastle, UK), April 8, 2015 Wednesday, BUSINESS; Pg. 8,9, 1334 words, PETER McCUSKER

Asset owners pushed to take leadership on climate change; Even the most forward-thinking funds haven't done enough homework on climate risk. It's a gap they need to tackle. (Unfavourable and not focused)

The Guardian, April 7, 2015 Tuesday 3:16 PM GMT, GUARDIAN SUSTAINABLE BUSINESS, 649 words, Julian Poulter

RACE TO EXPLORE OIL'S FINAL FRONTIER; Three years after halting work in the Arctic when a rig broke loose, Shell is attempting to uncover potentially vast riches despite environmental worries (Unfavourable and not focused)

The Sunday Telegraph (London), March 29, 2015, BUSINESS; Pg. 5, 1797 words

Clean energy plans pass new milestone (Favourable and not focused)

Aberdeen Press and Journal, March 30, 2015 Monday, NEWS; OTHER; Others; Pg. 1, 609 words, Josh King

Expert praises Peterhead in being carbon capture leader (Favourable and not focused)

Aberdeen Press and Journal, March 31, 2015 Tuesday, NEWS; OTHER; Others; Pg. 2, 339 words, Josh King

Harvesting the skills of energy innovators (Favourable and not focused)

The Plymouth Herald, March 4, 2015 Wednesday, NEWS:EMPLOYMENT; Pg. 10, 317 words

Shell Springboard Awards National Final (Favourable and focused)

Future News - Media Planner, February 26, 2015 Thursday, VERTICALS, 39 words

Scotland could use oil price crash to kick-start CCS; Shell's announcement that it is to decommission North Sea oil platform could open up an opportunity for carbon capture and storage (CCS) (Favourable and focused)

The Guardian, February 23, 2015 Monday 7:50 AM GMT, GUARDIAN SUSTAINABLE BUSINESS, 788 words, Jonny Hazell

Shell urges shareholders to accept climate resolution; Resolution brought by activist shareholders requires oil firm to test its business model is compatible with global targets to limit global warming (Favourable and focused)

The Guardian, January 30, 2015 Friday 11:53 AM GMT, ENVIRONMENT, 640 words, Damian Carrington

North-east can become CCS 'powerhouse' of all Europe (Favourable and not focused)

Aberdeen Press and Journal, January 27, 2015 Tuesday, BUSINESS; ENERGY; Oil&Gas; Pg. 30, 479 words, Keith Findlay

Public hear latest CCS project news (Favourable and not focused)

Buchan Observer, December 18, 2014 Thursday, 284 words

Blue Toon set to be 'green hub'(Favourable and not focused)

Aberdeen Press and Journal, December 16, 2014 Tuesday, NEWS; OTHER; Others; Pg. 2, 371 words, Josh King

Shell invites residents to public exhibition(Favourable and focused)

Buchan Observer, December 11, 2014 Thursday, 309 words

Church threatens to pull investments from oil giants; ENERGY (Unfavourable and not focused)

i-Independent Print Ltd, December 11, 2014, NEWS; Pg. 21, 383 words, Tom Bawden ENVIRONMENT EDITOR

Shell Springboard call (Favourable and focused)

Liverpool Echo, November 13, 2014 Thursday, BUSINESS WEEK;NEWS; Pg. 3, 82 words

Residents tour site of world first carbon capture scheme (Favourable and not focused)

Aberdeen Press and Journal, August 6, 2014 Wednesday, NEWS; OTHER; Others; Pg. 4, 312 words, Josh King

2013

Praise for firm's innovative technology (Favourable and focused)

Peterborough Today, March 20, 2014 Thursday, 177 words

Firms celebrate awards success (Favourable and focused)

Lancaster Evening Post, March 10, 2014 Monday, 217 words

Low carbon idea earns cash award (Favourable and focused)

Nottingham Post, March 7, 2014 Friday, BUSINESS:OTHER; Pg. 39, 188 words

Major role for Technip in Peterhead CCS project (Favourable and not focused)

Aberdeen Press and Journal, March 6, 2014 Thursday, BUSINESS; ENERGY; Oil&Gas; Pg. 36, 278 words, Keith Findlay

A world first for Peterhead (Favourable and not focused)

Buchan Observer, March 4, 2014 Tuesday, 669 words

Western Europe NIBS (Favourable and not focused)

Petroleum Economist, March 2014, 915 words

Shell and SSE get state funding for Peterhead CCS (Favourable and not focused)

Project Finance, March 2014, 235 words

Peterhead confirmed as base for CCS facility (Favourable and not focused)

Aberdeen Press and Journal, February 25, 2014 Tuesday, NEWS; ENVIRONMENT; Energy; Pg. 12, 386 words, Christopher Rae

A world first for Peterhead (Favourable and not focused)

Inverurie Herald, February 24, 2014 Monday, 669 words

Low carbon tech: North Sea is ideal (Favourable and not focused)

Aberdeen Press and Journal, February 4, 2014 Tuesday, NEWS; POLITICS; MPs; Pg. 14, 396 words, Calum Ross

Funding boost for Scottish carbon-capture plan (Favourable and not focused)

The Daily Telegraph (London), February 24, 2014 Monday, BUSINESS; Pg. 5, 246 words, Emily Gosden

Funding boost for Shell and SSE's gas carbon capture plan; Energy firms win state funding as Energy Secretary warns going green will be more expensive without embryonic technology (Favourable and focused)

telegraph.co.uk, February 24, 2014 Monday 8:00 AM GMT, FINANCE, 244 words, By Emily Gosden
Energy Editor

£1bn green energy bid moves to next stage (Favourable and not focused)

Aberdeen Evening Express, February 24, 2014 Monday, NEWS; POLITICS; MPs; Pg. 4, 622 words, Craig Walker

Public have their say on Shell project (Favourable and focused)

Buchan Observer, January 22, 2014 Wednesday, 399 words

How public service pension schemes are funding drone attacks, big tobacco and pollution (Unfavourable and not focused)

Sunday Herald, January 19, 2014 Sunday, HS - NEWS; Pg. 6, 1551 words, investigation By Rob Edwards

Green energy plan 'global landmark' (Favourable and focused)

Aberdeen Press and Journal, January 9, 2014 Thursday, NEWS; BUSINESS; Construction; Pg. 4, 673 words, Jamie Buchan

Capturing the energy of young scientists (Favourable and not focused)

Buchan Observer, January 7, 2014 Tuesday, 489 words

Shell Springboard 2014: The deadline [...]; Business briefing (Favourable and focused)

Nottingham Evening Post, December 2, 2013 Monday, BUSINESS; Pg. 21, 70 words

Climate change: Global warming down to '90 big firms': New study points finger at small number of polluters Gore hails analysis holding carbon giants to account (Unfavourable and not focused)

The Guardian (London), November 21, 2013 Thursday, GUARDIAN HOME PAGES; Pg. 15, 958 words, Suzanne Goldenberg US environment correspondent

Just 90 companies caused two-thirds of man-made global warming emissions (Unfavourable and not focused)

Guardian.com., November 20, 2013 Wednesday, 1231 words, Suzanne Goldenbergtheguardian.com

Fuel giant Shells out cash for eco ideas (Favourable and focused)

Paisley Daily Express, November 6, 2013 Wednesday, NEWS; Pg. 4, 176 words, Kenneth Speirs

Natural gas the ideal fuel for world's urban future (Neutral)

Petroleum Economist, October 2013, 599 words

Is carbon capture & storage in the last chance saloon? (Favourable and not focused)

Aberdeen Press and Journal, October 7, 2013 Monday, BUSINESS; ENERGY; OtherEnergy; Pg. 22, 979 words, Dick Winchester

Cost holds back carbon capture storage projects; With carbon dioxide emissions from fossil-fuel power plants contributing to climate change why not capture and store them? PETER MCCUSKER reports on developments in the carbon capture and storage industry. (Favourable and not focused)

The Journal, October 2, 2013 Wednesday, FEATURES; Pg. 36,37, 1578 words, PETER McCUSKER

Putting CCS to the test (Favourable and not focused)

Petroleum Economist, September 2013, 1907 words

Green efforts help small businesses drive growth (Favourable and not focused)

South Wales Echo, August 20, 2013 Tuesday, GO GREEN;FEATURES; Pg. 25, 389 words

Are UK CCS projects finally poised for take-off? (f and not related)

World Oil, May 2013, 1372 words, Jeff Chapman

Shell halts drilling in Alaskan Arctic (Favourable and focused)

Western Morning News (Plymouth, UK), January 31, 2014 Friday, NEWS; Pg. 17, 503 words, EMILY BEAMENT

SHELL'S BID TO DRILL FOR OIL IN ALASKA ON ICE (Unfavourable and focused)

DAILY MAIL (London), January 24, 2014 Friday, 298 words, BY ROB DAVIES

Shell's bid to drill for oil in Alaska on ice after US court ruling (Unfavourable and focused)

MailOnline, January 23, 2014 Thursday 10:25 PM GMT, NEWS, 299 words, ROB DAVIES

2012

Minister to speed £1bn green energy decision (Favourable and not focused)

Aberdeen Press and Journal, April 27, 2013 Saturday, NEWS; POLITICS; MPs; Pg. 1, 512 words, Calum Ross

Shell's Alaska rigs broke emissions rules (Unfavourable and focused)

Aberdeen Press and Journal, February 4, 2013 Monday, BUSINESS; ENERGY; Drilling; Pg. 16, 390 words, Jeremy Cresswell

Shell Springboard Awards National Final (Favourable and focused)

Future News - Media Planner, April 26, 2013 Friday, VERTICALS, 39 words

Are UK CCS projects finally poised for take-off? (Favourable and not focused)

World Oil, April 2013, 1374 words, Jeff Chapman

Peterhead plan in front (Favourable and not focused)

The Times (London), March 21, 2013 Thursday, NEWS; Pg. 4, 94 words

Shell a preferred bidder with Peterhead carbon capture plan (Favourable and focused)

Buchan Observer, March 20, 2013 Wednesday, 636 words

Firms vie for £1bn clean coal contest (Favourable and not focused)

Sunday Express, March 10, 2013, FINANCIAL; BUSINESS; Pg. 2, 418 words, Tracey Boles

Shell looks at future scenarios (Favourable and focused)

Aberdeen Press and Journal, March 1, 2013 Friday, BUSINESS; ENERGY; MarketInfo; Pg. 30, 137 words, Alexander Holmes

Shell peers into future of the world, but does it see itself? (Favourable and focused)

The Times (London), February 28, 2013 Thursday, BUSINESS; Pg. 34, 182 words, Tim Webb

We need joined - up thinking now to stave off energy and resource crisis (Favourable and focused)

The Sunday Telegraph (London), February 24, 2013, BUSINESS; Pg. 7, 832 words, PETER VOSER

Green funding on offer (Favourable and focused)

Aberdeen Press and Journal, January 17, 2013 Thursday, BUSINESS; ENERGY; Oil&Gas; Pg. 40, 147 words, Ian Forsyth

That slick sarnie snatcher may just save the Arctic (Neutral)

The Sunday Times (London), December 16, 2012 Sunday, FEATURES; Pg. 25, 886 words, CHARLES CLOVER

World of Oil and Gas (Favourable and not focused)

World Oil, October 2012, 2471 words, Nell Lukosavich

Shell moves ahead with Canadian CCS project (Favourable and focused)

Petroleum Economist, October 2012, 482 words

Double joy for green energy company (Favourable and not focused)

Sheffield Telegraph, September 13, 2012 Thursday, 407 words

Could this be the future for CCS? (Favourable and not focused)

Aberdeen Press and Journal, September 11, 2012 Tuesday, NEWS; POLITICS; MPs; Pg. 4, 508 words, Calum Ross

Shell charges ahead with its CCS project (Favourable and focused)

City A.M., September 6, 2012 Thursday, NEWS; Pg. 5, 185 words, CATHY ADAMS

SHELL'S FOSSIL FUEL CLEAN-UP' (Favourable and focused)

DAILY MAIL (London), September 6, 2012 Thursday, 117 words, BY NO BYLINE AVAILABLE

Blow for BP as hopes of US legal deal fade (Favourable and not focused)

The Express, September 6, 2012 Thursday, BUSINESS; Pg. 50, 355 words, Philip Waller

Shell gets cash boost for carbon capture plan (Favourable and focused)

The Times (London), September 6, 2012 Thursday, BUSINESS; Pg. 35, 397 words, Juliet Samuel

National: Shell 'energy courses' for mandarins anger greens (Favourable and focused)

The Guardian (London) - Final Edition, August 18, 2012 Saturday, GUARDIAN HOME PAGES; Pg. 9, 473 words, Leo Hickman

Shell's stance on wind power reveals a profound truth of capitalism (Unfavourable and focused)

Guardian.com, May 1, 2012 Tuesday, 933 words, Andrew Simmsguardian.co.uk

2011

Windows tap the power of sunshine (Favourable and not focused)

The Sunday Times (London), July 24, 2011 Sunday, BUSINESS; Pg. 9, 491 words, Dominic O'Connell

Natural resources; Need to know (Favourable and not focused)

The Times (London), June 25, 2011 Saturday, BUSINESS; Pg. 52, 69 words

AT YOUR SERVICE (Favourable and focused)

Sunday Mirror, April 8, 2012 Sunday, FEATURES; Pg. 40,41, 107 words, QUENTIN WILLSON

North-east could lead world in carbon capture (Favourable and focused)

Aberdeen Press and Journal, April 4, 2012 Wednesday, NEWS; POLITICS; MPs; Pg. 16, 493 words, Calum Ross

Peterhead seizes pole position for £1bn prize (Favourable and focused)

Aberdeen Press and Journal, April 4, 2012 Wednesday, NEWS; POLITICS; MPs; Pg. 2, 630 words, Calum Ross

'We need quick decision on carbon capture plant' (Favourable and not focused)

Aberdeen Evening Express, March 21, 2012 Wednesday, NEWS; OTHER; Others; Pg. 10, 366 words, Neil Evans

We're chomping at the bit, says Shell (Favourable and focused)

Aberdeen Press and Journal, March 14, 2012 Wednesday, NEWS; POLITICS; MPs; Pg. 6, 359 words, Calum Ross

Company (Favourable and focused)

Beccles and Bungay Journal, March 9, 2012 Friday, ROP, 564 words, Tim Warner

Ludlow based award winning business means green farms (Favourable and not focused)

Ludlow Advertiser, March 1, 2012 Thursday, FARMING (LUDLOW NEWS FARMING), 302 words

Climate change idea is springboard to success(Favourable and focused)

Cambridge Evening News, February 28, 2012 Tuesday, 238 words

Award could be springboard (Favourable and focused)

Beccles and Bungay Journal, February 24, 2012 Friday, ROP, 441 words, Tim Warner

Firm rewarded for green heat pump (Favourable and not focused)

Faversham Times, February 23, 2012, Pg. 8, 212 words

Shell fund gets fired up by city firm's biofuels project (Favourable and focused)

Evening News (Edinburgh), February 11, 2012, Saturday, Pg. 4, 174 words

Revealed: Europe's plan to penalise Canada's tar sands goes Dutch (Unfavourable and not focused)

Guardian.com, January 16, 2012 Monday, 796 words, Damian Carringtonguardian.co.uk

Energy course encourages more women into engineering (Favourable and not focused)

Buchan Observer, December 29, 2011, 208 words

CAPTURING FUNDS (Favourable and not focused)

Aberdeen Evening Express, December 13, 2011 Tuesday, NEWS; OTHER; Others; Pg. 10, 283 words, Neil Evans

'Rug pulled' on carbon capture bid (Favourable and not focused)

Aberdeen Press and Journal, November 29, 2011 Tuesday, NEWS; POLITICS; MPs; Pg. 7, 461 words, Calum Ross

SSE and Shell join forces to develop CCS at Peterhead (Favourable and focused)

Buchan Observer, November 15, 2011, 1794 words

Power giants in green energy deal (Favourable and focused)

Aberdeen Press and Journal, November 10, 2011 Thursday, NEWS; POLITICS; MPs; Pg. 3, 529 words, Calum Ross

SSE and Shell plan carbon capture (Favourable and focused)

The Scotsman, November 10, 2011, Thursday, Pg. 1, 194 words, Frank Urquhart

Joint development agreement on carbon capture and storage (Favourable and focused)

Buchan Observer, November 9, 2011, 891 words

Shell is another country: they do things differently there (Favourable and focused)

Guardian.com, October 27, 2011 Thursday, 465 words, Terry Macalisterguardian.co.uk

Shell's cash awards (Favourable and focused)

Stirling Observer, October 14, 2011, NEWS; Pg. 17, 110 words

2010

Front: Big firms' gas bonanza threatens green energy (Unfavourable and not focused)

The Guardian (London) - Final Edition, April 21, 2011 Thursday, GUARDIAN HOME PAGES; Pg. 1, 888 words, Fiona Harvey Environment correspondent

The fuel-efficient future of transport (Favourable and not focused)

Petroleum Economist, April 2011, 1054 words

SSE seeks EU backing for pilot carbon capture plan (favourable and not focused)

The Times (London), February 10, 2011 Thursday, NEWS; Pg. 17, 195 words, Peter Jones

The Age of Energy: transport; The Reader event in partnership with Shell Shell and the Telegraph invite you to play a part in a Panel debate on March 1 investigating the future of sustainable transport in the UK THE AGE OF ENERGY (Favourable and not focused)

The Daily Telegraph (London), February 9, 2011 Wednesday, NEWS; Pg. 9, 644 words

Energy firm wins £30k prize to fund battery research (Favourable and not focused)

Express and Echo, February 4, 2011 Friday, SPORT; Pg. 36, 376 words, GORDON RICHARDSON

Firm Wins £30,000 For Tilting Turbines (Favourable and not focused)

The Journal (Newcastle, UK), February 3, 2011 Thursday, A; Pg. 25, 349 words, John Hill

£40k deal captured by CCC to combat climate change (Favourable and not focused)

Cambridge Evening News, February 1, 2011 Tuesday, 135 words

Springboard award for innovative Scots firm (Favourable and not focused)

Aberdeen Press and Journal, January 27, 2011 Thursday, BUSINESS; UTILITIES; Oil; Pg. 17, 223 words, Ian Forsyth

Firm wins £40,000 green award to help fight leaks (Favourable and not focused)

The Herald (Glasgow), January 27, 2011 Thursday, HS - BUSINESS; Pg. 30, 122 words, NO BYLINE

Shell puts its faith, and money, behind innovation (Favourable and not focused)

Petroleum Economist, December 2010, ANALYSIS, 1377 words

Eco-friendly agency scoops national award (Favourable and focused)

Chester Chronicle, November 25, 2010, BUSINESS; Pg. 80, 368 words

The Daily Telegraph (London), May 18, 2010 Tuesday, BUSINESS; Pg. 3, 492 words, Rowena Mason

Consumers must cast off 'victim' culture if governments are to hit climate targets (Unfavourable and not focused)

The Independent (London), November 18, 2010 Thursday, NEWS; Pg. 14, 376 words, Terri Judd

We can cut carbon by pouring lime into the oceans, says scientist (Neutral)

The Times (London), November 10, 2010 Wednesday, NEWS; Pg. 23, 425 words, Ben Webster

Green companies can win £40,000 (Favourable and focused)

Richmond and Twickenham Times, October 29, 2010 Friday, TALKING BUSINESS ARTICLES, 149 words, RTT reporter

Low-carbon rewards for firms with ideas (Favourable and focused)

Yorkshire Evening Post, October 19, 2010 Tuesday, 44 words

Blue chips rapped over green boasts (Unfavourable and not focused)

The Sunday Times (London), April 18, 2010, BUSINESS; Pg. 11, 630 words, Ben Marlow

Rolls -Royce

2014

Hopes of green aircraft boost to jobs in city (Favourable and not focused)

Bristol Post, February 20, 2015 Friday, NEWS:OTHER; Pg. 2-3, 234 words

New energy-efficient aeroplane set to welcome first passengers - and it's all thanks to East Lancs workmanship (Favourable and focused)

Lancashire Telegraph, January 6, 2015 Tuesday, NEWS, 611 words, PETE MAGILL

Innovators at R-R build on the past and look to the future (Favourable and not focused)

Derby Telegraph, August 13, 2014 Wednesday, BUSINESS:OTHER; Pg. 12, 628 words, BY ROBIN JOHNSON; rjohnson@derbytelegraph.co.uk

£150m fund to 3D print plane parts (Favourable and not focused)

Western Daily Press, July 17, 2014 Thursday, BUSINESS:ECONOMY; Pg. 1, 455 words, by peter woodman; wdbusiness@b-nm.co.uk

£45m for development of new aircraft engines (Favourable and focused)

The Daily Telegraph (London), June 6, 2014 Friday, BUSINESS; Pg. 4, 369 words, Rebecca Clancy

Region's £45m catalyst to lead aerospace development (Favourable and focused)

The Northern Echo (Newsquest Regional Press), June 5, 2014 Thursday, BUSINESS NEWS, 431 words

Government announces £45m investment in low-carbon aircraft; The joint Government and industry investment will fund three research projects led by Rolls-Royce to development new technology for low-carbon aircraft engines (Favourable and focused)

telegraph.co.uk, June 5, 2014 Thursday 5:14 PM GMT, FINANCE, 450 words, By Rebecca Clancy

Setting our sights on targets for investment to create 55,000 jobs (Favourable and not focused)

Nottingham Post, April 29, 2014 Tuesday, AGENCY:OTHER; Pg. 22-23, 1818 words

COMPANY 'RICHLY DESERVES PLAUDITS' (Favourable and focused)

Derby Telegraph, August 13, 2014 Wednesday, AGENCY:OTHER; Pg. 2, 328 words

2013

Free energy accreditation will help grow SME business (Favourable and not focused)

Evening Gazette, March 24, 2014 Monday, 2020 VISION;FEATURES; Pg. 13, 807 words

5 stories from around the bay (Favourable and not focused)

South Wales Evening Post, March 10, 2014 Monday, SPORT; Pg. 2, 571 words

Derby Telegraph (Favourable and focused)

, February 27, 2014 Thursday, BUSINESS:OTHER; Pg. 1, 595 words

Clippers may return to cut transport costs (Favourable and not focused)

The Daily Telegraph (London), July 15, 2013 Monday, BUSINESS; Pg. 3, 415 words, David Millward

Derby team helped develop pioneering 'hybrid' air engine (Favourable and focused)

Derby Evening Telegraph, June 19, 2013 Wednesday, NEWS; Pg. 4, 458 words, OLIVER ASTLEY

Airbus powered by R-R engines takes to the skies today (Favourable and not focused)

Derby Evening Telegraph, June 14, 2013 Friday, NEWS; Pg. 3, 289 words

City applies for home-heating hotline trial (Favourable and not focused)

Aberdeen Press and Journal, June 4, 2013 Tuesday, NEWS; POLITICS; Local Government; Pg. 6, 349 words, David McKay

BA backs Dreamliner with £2.6bn order (Favourable and not focused)

The Daily Telegraph (London), April 4, 2013 Thursday, BUSINESS; Pg. 4, 309 words, Andrew Trotman

2012

Clegg set to unveil boost for aerospace (Favourable and not focused)

Western Daily Press, March 18, 2013 Monday, NEWS; Pg. 2, 469 words, TINA ROWE

ETI in £1.4m link-up with wavepower firm (Favourable and not focused)

Aberdeen Press and Journal, March 1, 2013 Friday, BUSINESS; ENERGY; Renewables; Pg. 30, 96 words, Alexander Holmes

Energy Technologies Institute set to open new office as part of expansion (Favourable and not focused)

Leicester Mercury, February 6, 2013 Wednesday, BUSINESS; Pg. 31, 214 words

Clegg due to boost aerospace (Favourable and not focused)

The Independent on Sunday, March 17, 2013, Pg. 86, 147 words, Mark Leftly

The Cambs Times (Favourable and not focused)

, November 16, 2012 Friday, LETT, 181 words

£700m nuclear deal could cut energy costs (Favourable and not focused)

The Express, October 31, 2012 Wednesday, NEWS; Pg. 21, 386 words, Martyn Brown

GREEN OR MORE GROWTH? WE CAN HAVE BOTH! (Favourable and not focused)

DAILY MAIL (London), October 8, 2012 Monday, 678 words, BY SIR ROGER BONE

OPINION: Green or more growth? We can have both! (Favourable and not focused)

MailOnline, October 7, 2012 Sunday 10:02 PM GMT, NEWS, 678 words, ROGER BONE

Software deal to fuel clean savings for Virgin flights (Favourable and not focused)

Sunday Express, August 5, 2012, FINANCIAL;BUSINESS; Pg. 3, 209 words, Tracey Boles

Financial: Quiet revolution? Boeing's 787 Dreamliner taxis slowly towards commercial takeoff: The eagerly awaited aircraft is on a tour of the UK, but how does it feel to fly in it? (Favourable and not focused)

The Guardian (London) - Final Edition, April 27, 2012 Friday, GUARDIAN FINANCIAL PAGES; Pg. 36, 934 words, Gwyn Topham, Transport correspondent

Boeing's Dreamliner comes closer to reality for its eager British customers (Favourable and not focused)

Guardian.com, April 26, 2012 Thursday, 1032 words, Gwyn Tophamguardian.co.uk

THE BIG CATCH WITH CO₂; The Government is trying again to get a carbon capture demonstrator off the ground. Tom Bawden looks at the revised £1bn competition (Favourable and not focused)

The Independent (London), April 4, 2012 Wednesday, BUSINESS; Pg. 52, 867 words, Tom Bawden

Is the UK right to invest in carbon capture technology? (Favourable and not focused)

Guardian.com, April 3, 2012 Tuesday, 3093 words, Leo Hickmanguardian.co.uk

Fossil fuel-free ship under development (Favourable and not focused)

Aberdeen Press and Journal, September 3, 2012 Monday, BUSINESS; ENERGY; Oil&Gas; Pg. 18, 345 words, Jeremy Cresswell

Business news in brief: Rolls-Royce | Pace | Imperial Tobacco (Favourable and not focused)

Scotsman, July 25, 2012 Wednesday, 294 words

2011

Sorry, darling, but I've fallen in love with this gadget; Alan O'Brien had to convince his bride-to-be that he needed their house deposit, says Sarah Butler (Favourable and not focused)

The Sunday Times (London), March 4, 2012 Sunday, BUSINESS; Pg. 8, 597 words, Sarah Butler

Green matters (Favourable and not focused)

East Kent Mercury, February 23, 2012, 252 words

Carbon Cutting Not Just For Big Organisations (Unfavourable and not focused)

The Journal (Newcastle, UK), January 17, 2012 Tuesday, A; Pg. 28, 344 words, Karen Dent

Rolls-Royce wins low-carbon tug contract; Making waves (Favourable and focused)

The Daily Telegraph (London), January 13, 2012 Friday, BUSINESS; Pg. 2, 112 words

Clean coal power at a price we can afford; A research laboratory believes it has cracked the problems of carbon capture and storage, reports Ben Marlow (Favourable and not focused)

The Sunday Times (London), September 4, 2011 Sunday, BUSINESS; Pg. 9, 1008 words, Ben Marlow

Now we're cooking: biofuel flight cleared for take-off (Favourable and not focused)

The Times (London), July 1, 2011 Friday, NEWS; Pg. 17, 469 words, Philip Pank

A breath of fresh air; ENVIRONMENT ; Companies make strides towards achieving tough eco-targets, says Lisa Sowards (Favourable and not focused)

The Daily Telegraph (London), June 15, 2011 Wednesday, AEROSPACE;FEATURES; Pg. 6, 1076 words, Lisa Sowards

MP Latham predicts lower bills after a 'dramatic change' in energy policy (Favourable and not focused)

Derby Evening Telegraph, June 6, 2011 Monday, NEWS; Pg. 17, 243 words

Plug into the drive for clean green motoring; Innovators are needed to put more electric cars on the road, says Alan Copps (Favourable and not focused)

The Times (London), June 1, 2011 Wednesday, CAREERS IN ENERGY;FEATURES; Pg. 5, 994 words, Alan Copps

School's green medal (Favourable and not focused)

The Bristol Post, May 19, 2011 Thursday, Pg. 10, 494 words

Drivers not yet switched on to electric revolution; Enda Mullen looks at the slow progress being made to bring electric cars to the masses (Favourable and not focused)

Birmingham Post, April 7, 2011 Thursday, BUSINESS; Pg. 18, 1205 words, Enda Mullen

2010

Airline signs deal for Rolls-Royce engines to power its Dreamliners (Favourable and focused)

Derby Evening Telegraph, April 7, 2011 Thursday, NEWS; Pg. 15, 406 words, ROBIN JOHNSON

ETI and RCUK to launch industrial doctorate centre (Favourable and not focused)

Aberdeen Press and Journal, April 4, 2011 Monday, BUSINESS; UTILITIES; Oil; Pg. 22, 444 words, Jeremy Cresswell

Geneva car show is simply electric (Favourable and not focused)

Metro (UK), March 2, 2011 Wednesday, BUSINESS; Pg. 39, 95 words

£748m contract shows airlines are still backing Rolls-Royce engines (Favourable and not focused)

Derby Evening Telegraph, November 10, 2010 Wednesday, NEWS; Pg. 27, 635 words, ROBIN JOHNSON

Cameron in China: Aerospace: Rolls-Royce in £750m engines deal with Chinese airline (Favourable and not focused)

The Guardian (London) - Final Edition, November 10, 2010 Wednesday, GUARDIAN HOME PAGES; Pg. 8, 435 words, Phillip Inman and Patrick Wintour Beijing

Call for Mayoral Rolls Royce to be replaced with greener car (Unfavourable and focused)

Your Local Guardian, September 30, 2010, UPLOAD NEWS ARTICLES, 363 words, Thais Portilho-Shrimpton

Unilever tops climate change index with 'superb' track record (Favourable and not focused)

Guardian.com, June 28, 2010 Monday, 410 words, Severin Carrellguardian.co.uk

A home from hot air; GREEN PIONEERS David Clarke, head of the Energy Technologies Institute, which develops environmental projects (Favourable and not focused)

The Sunday Times (London), June 27, 2010, BUSINESS; Pg. 9, 912 words, Tom Bawden

Kinnock on 5m Eurogravy airliner (Unfavourable and not focused)

The Sunday Telegraph (London), May 30, 2010, NEWS; Pg. 10, 467 words, MELISSA KITE

Kinnock on 5m Eurogravy airliner (Neutral)

The Sunday Telegraph (London), May 30, 2010, NEWS; Pg. 10, 467 words, MELISSA KITE

Eco hero The green roofs champion (Favourable and not focused)

The Daily Telegraph (London), May 29, 2010 Saturday, TELEGRAPH MAGAZINE;FEATURES; Pg. 65, 571 words, Angela Wintle

Giant steps towards a low-carbon future; As the world's biggest offshore wind farm rises from the waves, Sarah Butler looks at the financial and planning challenges for the industry (Favourable and not focused)

The Sunday Times (London), March 27, 2011 Sunday, BUSINESS; Pg. 8,9, 949 words, Sarah Butler

'GREENPRINT' BY BOSSES (Favourable and not focused)

The Sun (England), November 15, 2010 Monday, NEWS; Pg. 2, 154 words, BEN JACKSON

Rolls-Royce seals £750m China deal (Favourable and not focused)

Metro (UK), November 10, 2010 Wednesday, BUSINESS; Pg. 43, 138 words

Business failing to lobby government on climate change (Favourable and not focused)

Guardian.com, October 14, 2010 Thursday, 705 words, Jo Adetunji guardian.co.uk

Drax

2014

Leader of the pack in renewable energy field; Teesside is the undisputed hub of the North East renewable energy sector, attracting almost £1.5bn of ongoing and earmarked investment which is set to create up to 2,500 jobs. Peter McCusker reports. (Favourable and not focused)

Evening Gazette, March 27, 2015 Friday, OIL AND GAS;NEWS; Pg. 26,27, 1469 words, Peter McCusker

Teesside ahead of the pack in renewable energy field; Up to 2,500 jobs and investment worth £1.5bn are set to see Teesside's renewable energy sector rocket into the big league (Favourable and not focused)

gazettelive.co.uk, March 26, 2015 Thursday 3:51 PM GMT, BUSINESS, 1470 words, By Peter McCusker

Lloyds: Running up the mid-market field (favourable and not focused)

Global Capital Euroweek, March 25, 2015, 1858 words, Owen Sanderson

Climate Bonds standard risks enshrining biofuel fallacy (Favourable and not focused)

Global Capital Euroweek, March 17, 2015, 1391 words, Jon Hay

Drax takes over wood pellet firm (Favourable and focused)

York Press, March 6, 2015 Friday, BUSINESS NEWS, 364 words, Laura Knowlson

Hull Daily Mail (Favourable and not focused)

, February 20, 2015 Friday, NEWS:OTHER; Pg. 32, 76 words

Wind farms should not need subsidies (Favourable and not focused)

Yorkshire Post, January 28, 2015 Wednesday, 741 words

Comment: Renewables drain our resources (Unfavourable and not focused)

Scotsman, January 13, 2015 Tuesday, 904 words

Subsidies go to polluting plants to provide back-up for clean power (Unfavourable and not focused)

The Independent (London), December 20, 2014 Saturday, BUSINESS; Pg. 45, 528 words, TOM BAWDEN ENVIRONMENT EDITOR

Power station's switch to biomass could have a significant effect on region (Favourable and focused)

Hull Daily Mail, December 17, 2014 Wednesday, BUSINESS:ENERGY; Pg. 2-3, 362 words

Energy companies fined for efficiency breaches (Unfavourable and not focused)

The Herald (Glasgow), December 13, 2014 Saturday, Pg. 7, 262 words, Caroline Woollard

Power giants to pay millions to charity after missing targets (Unfavourable and not focused)

The Scotsman, December 13, 2014, Saturday, Pg. 36, 512 words, Graeme Evans and Scott Reid

Fine for Swalec parent company over energy efficiency failures (Unfavourable and not focused)

The Western Mail, December 13, 2014 Saturday, FEATURES; Pg. 6,7, 329 words

Pair fined for efficiency breaches (Unfavourable and not focused)

Belfast Telegraph Online, December 12, 2014 Friday 8:16 AM GMT, UK, 345 words

Power firms to pay millions in redress (Unfavourable and not focused)

Scotland On Sunday, December 12, 2014 Friday, 545 words, Graeme Evans And Scott Reid

British Gas fine for green failings (Unfavourable and not focused)

The Daily Telegraph (London), December 5, 2014 Friday, BUSINESS; Pg. 5, 245 words, Denise Roland

Uni project could save firms millions (Favourable and not focused)

Hull Daily Mail, August 27, 2014 Wednesday, NEWS:OTHER; Pg. 8, 268 words

Jobs hope in £240m carbon plans (Favourable and focused)

The Northern Echo (Newsquest Regional Press), July 9, 2014 Wednesday, BUSINESS NEWS, 151 words #

Drax shows its green credentials (Favourable and focused)

York Press, July 9, 2014 Wednesday, COMMENT, 286 words, Press leader writer

Yorkshire carbon capture power plant gets EU funding (Favourable and not focused)

Guardian.com., July 8, 2014 Tuesday, 379 words, Sean Farrelltheguardian.com

Ports are central to green energy boost (Favourable and not focused)

Hull Daily Mail, April 30, 2014 Wednesday, NEWS:OTHER; Pg. 4, 364 words

Drax shares tumble after plug pulled on green subsidies; ENERGY (Unfavourable and not focused)

i-Independent Print Ltd, April 24, 2014, NEWS; Pg. 41, 226 words, Jim Armitage DEPUTY BUSINESS EDITOR

2013

Western Mail Letters: Friday, 28 March, 2014; Your letters to the national newspaper of Wales (Neutral)

walesonline.co.uk, March 28, 2014 Friday 10:02 AM GMT, 1481 words, By David Prince

'Carbon capture': a win-win solution? (Neutral)

York Press, April 17, 2014 Thursday, LETTERS, 189 words

Carbon saving is a lie (Unfavourable and not focused)

Bradford Telegraph and Argus, April 3, 2014 Thursday, READERS' LETTERS, 209 words

BIOMASS TARGET; COMPANIES TODAY (Favourable and focused)

The Journal (Newcastle, UK), February 19, 2014 Wednesday, BUSINESS; Pg. 42, 44 words

Three months to back clean coal plant in hunt for £250m grant (Favourable and not focused)

Yorkshire Post, February 4, 2014 Tuesday, 655 words

Drax scheme certainly green (Favourable and focused)

York Press, December 24, 2013 Tuesday, LETTERS, 466 words, Readers' letters

Biomass plant 'win for environment' (Neutral)

Western Morning News (Plymouth, UK), December 10, 2013 Tuesday, NEWS; Pg. 15, 239 words

North Yorkshire biomass plant "a win for the environment" (Neutral)

The Northern Echo (Newsquest Regional Press), December 9, 2013 Monday, NEWS, 640 words

Successful test drilling boosts prospects for carbon capture (Favourable and not focused)

Yorkshire Post, August 8, 2013 Thursday, 663 words

Airline duo fuelled for take-off; MARKET REPORT (Favourable and not focused)

The Express, July 31, 2013 Wednesday, BUSINESS; Pg. 51, 438 words, DAVID CRAIK

Coal firm mulls dash for gas (Neutral)

The Guardian (London) - Final Edition, July 31, 2013 Wednesday, GUARDIAN FINANCIAL PAGES; Pg. 27, 157 words, Fiona Harvey Environment correspondent

Airline duo fuelled for take-off; MARKET REPORT (Favourable and not focused)

Scottish Express, July 31, 2013 Wednesday, BUSINESS; Pg. 51, 438 words, DAVID CRAIK

Clean coal power station set for £300m windfall (Favourable and focused)

Yorkshire Post, July 31, 2013 Wednesday, 612 words

State's 'green bank' eyes NI projects; PAUL GOSLING (Favourable and not focused)

Belfast Telegraph, July 1, 2013 Monday, BUSINESS MONTH;BUSINESS; Pg. 8, 221 words

Drax Power Station bosses visit EU to press for sustainability rules (Favourable and focused)

Goole Courier, June 26, 2013 Wednesday, 473 words, Stephanie Bateman

Drax Power Station bosses visit EU to press for sustainability rules (Favourable and focused)

Selby Times, June 26, 2013 Wednesday, 473 words, Stephanie Bateman

Power company urges Europe to act on biomass (Favourable and focused)

York Press, June 26, 2013 Wednesday, NEWS, 179 words, Julie Hayes

Burning wood is far from being a bio-mess; Letters to the Editor (Favourable and not focused)

The Times (London), June 21, 2013 Friday, LETTERS; Pg. 21, 565 words

Subsidies urged to help power stations move away from coal (Favourable and not focused)

Yorkshire Post, May 22, 2013 Wednesday, 659 words

Consumer: Energy watchdog gets tough on missed targets (Unfavourable and not focused)

Yorkshire Evening Post, May 7, 2013 Tuesday, 411 words

Six energy firms face heavy fines for missing efficiency goals (Unfavourable and focused)

The Evening Standard (London), May 1, 2013 Wednesday, SPORT; Pg. 41, 297 words, Lucy Tobin

Are UK CCS projects finally poised for take-off? (Favourable and not focused)

World Oil, May 2013, 1372 words, Jeff Chapman

Profits take a tumble but Drax forecasts a sustainable future (Favourable and focused)

Yorkshire Post, February 19, 2014 Wednesday, 732 words

Nigel Adams: We can lead Europe in renewable power struggle (Favourable and focused)

Yorkshire Post, July 15, 2013 Monday, 817 words

Artful Codger June 28, 2013 (Unfavourable and not focused)

Lynn News, June 28, 2013 Friday, 499 words

Blackfriar: This green energy for the masses should be welcomed (Favourable and focused)

Yorkshire Post, June 13, 2013 Thursday, 783 words

Old and new fuels - 'we need them both' (Favourable and not focused)

Grimsby Telegraph, April 16, 2013 Tuesday, BUSINESS TELEGRAPH;BUSINESS; Pg. 5, 766 words

Drax's dynamo is the power behind our electricity; By 2016 Britain's biggest coal-fired generating station aims to produce half its electricity from biomass. Margareta Pagano meets the woman driving the transformation to a green future (Favourable and focused)

Independent.co.uk, April 8, 2014 Tuesday 8:50 AM GMT, BUSINESS, 974 words, Margareta Pagano

Reply: Letter: Carbon capture, fracking and green-tinged Tories (Favourable and not focused)

The Guardian (London) - Final Edition, February 5, 2014 Wednesday, GUARDIAN LEADER PAGES; Pg. 31, 211 words, Frances O'Grady and Dr Luke Warren

Turbines viewed as a 'green' cathedral (Unfavourable and not focused)

The Huddersfield Daily Examiner, January 6, 2014 Monday, LETTERS; Pg. 14,15, 886 words

Insanity posing as energy policy; Views of Wales (Unfavourable and focused)

The Western Mail, March 28, 2014 Friday, LETTERS; Pg. 32,33, 265 words

Coal still has a future' in the UK (Favourable and focused)

Yorkshire Post, February 4, 2014 Tuesday, 598 words, Jack Blanchard Political Editor

Drax paints it green (Favourable and focused)

The Sunday Times (London), July 28, 2013 Sunday, BUSINESS; Pg. 12, 391 words, DANNY FORTSON

Consumer: Energy watchdog gets tough on missed targets (Unfavourable and not focused)

Yorkshire Evening Post, May 7, 2013 Tuesday, 411 words

Six energy firms face heavy fines for missing efficiency goals (Unfavourable and not focused)

The Evening Standard (London), May 1, 2013 Wednesday, SPORT; Pg. 41, 297 words, Lucy Tobin

Energy firms face watchdog (Unfavourable and not focused)

Eastern Daily Press, May 2, 2013 Thursday, ROP, 118 words, Ben Woods

2012

BUDGET 2013: WHAT DOES IT MEAN FOR OUR REGION?; Angus Young, Catherine Lea and Sophie Jane Evans looks at the highs and lows of the Chancellor's Budget for East Yorkshire (Favourable and not focused)

Hull Daily Mail, March 21, 2013 Thursday, NEWS; Pg. 8,9, 1386 words, Angus Young; Catherine Lea; Sophie Jane

MADNESS! (Neutral)

DAILY MAIL (London), March 9, 2013 Saturday, 2062 words

SATURDAY ESSAY: Eco madness and how our future is going up in smoke as we pay billions to switch from burning coal to wood chips at Britain's biggest power station (Neutral)

MailOnline, March 9, 2013 Saturday 1:05 AM GMT, NEWS, 2031 words, CHRISTOPHER BOOKER

New wave of power plants fuelled by desire to go green - and not go bust; Drax bets £700m on replacing coal with wood (Neutral)

The Times (London), February 23, 2013 Saturday, NEWS; Pg. 66, 587 words, Tim Webb

Drax in swap to green fuel (Favourable and focused)

The Express, February 20, 2013 Wednesday, BUSINESS; Pg. 51, 297 words, Philip Waller

Drax in swap to green fuel (Favourable and focused)

Scottish Express, February 20, 2013 Wednesday, BUSINESS; Pg. 51, 297 words, Philip Waller

Power plant takes green route as coal enters its 'slow death' (Favourable and focused)

The Times (London), November 5, 2012 Monday, BUSINESS; Pg. 31, 760 words, Tim Webb

Financial: Ministers blamed after plans for green power plants halted: 'Institutional bias' against new biomass schemes: Drax raises £190m towards switch from coal to wood (Favourable and focused)

The Guardian (London) - Final Edition, October 26, 2012 Friday, GUARDIAN FINANCIAL PAGES; Pg. 31, 657 words, Terry Macalister

Upgrade is celebrated (Favourable and focused)

Goole Courier, October 3, 2012 Wednesday, 342 words

DRAX DIPS ON ECO SUBSIDIES CHANGE (Favourable and focused)

DAILY MAIL (London), July 26, 2012 Thursday, 107 words, BY NO BYLINE AVAILABLE

Drax shares stabilise after 15% drubbing on back of eco-power subsidy shock (Favourable and focused)

MailOnline, July 26, 2012 Thursday 11:48 AM GMT, MARKETS, 416 words, ADRIAN LOWERY

Turbine upgrade for Drax (Favourable and focused)

Selby Times, June 29, 2012 Friday, 282 words

'Crucial milestone' in bid to build vast CO2 pipe (Favourable and not focused)

Yorkshire Post, June 19, 2012 Tuesday, 618 words

One month away... (Favourable and focused)

Selby Times, May 17, 2012 Thursday, 367 words

Power Station Refit Close To Completion (Favourable and focused)

The Journal (Newcastle, UK), May 11, 2012 Friday, A; Pg. 31, 394 words, John Hill

Drax Power Station to complete modernisation project (Favourable and focused)

York Press, May 11, 2012 Friday, BUSINESS NEWS, 360 words, Julie Hayes

DRAX POWERS ON TO TARGETS HEAG (Favourable and not focused)

DAILY MAIL (London), May 16, 2012 Wednesday, 128 words, BY NO BYLINE AVAILABLE

A hundred new jobs to energise Humber; Careers boost as ABP signs 15-year contract with power firm (Favourable and not focused)

Grimsby Telegraph, March 28, 2013 Thursday, NEWS; Pg. 2, 568 words, David Laister

Investment in green energy (Favourable and focused)

Goole Courier, December 27, 2012 Thursday, 249 words

Anger as green bank lends coal plant £100m for biomass change (Unfavourable and focused)

The Times (London), December 21, 2012 Friday, BUSINESS; Pg. 38, 451 words, Tim Webb

Europe's dirtiest power plant dumps the black stuff to go green; Business briefing (Favourable and focused)

The Times (London), October 26, 2012 Friday, BUSINESS; Pg. 50,51, 723 words, Robert Lea

2011

Drax scraps plan for two biomass power stations, citing lack of government cash (Favourable and not focused)

The Guardian (London) - Final Edition, February 22, 2012 Wednesday, GUARDIAN FINANCIAL PAGES; Pg. 24, 496 words, Richard Wachman

Wood trading exchange fuels row over green energy (Favourable and not focused)

The Guardian (London) - Final Edition, December 29, 2011 Thursday, GUARDIAN FINANCIAL PAGES; Pg. 30, 378 words, Terry Macalister

NUCLEAR POWER? YES PLEASE! (Unfavourable and not focused)

DAILY MAIL (London), November 27, 2011 Sunday, 1123 words

Fuelling a way out of the dark; Drax (Favourable and focused)

The Times (London), November 16, 2011 Wednesday, BUSINESS; OPINION, COLUMNS; Pg. 55, 535 words, Tim Webb

Drax 'could be UK's biggest green energy source' (Favourable and focused)

The Guardian (London) - Final Edition, August 3, 2011 Wednesday, GUARDIAN FINANCIAL PAGES; Pg. 26, 377 words, Fiona Harvey Environment correspondent

'Crop has suffered but I've no regrets'; Farmer pleased with willow yield despite lack of rainfall (Favourable and not focused)

Hull Daily Mail, March 7, 2012 Wednesday, THE BUSINESS; BUSINESS; Pg. 3, 472 words, David Taylor

Timber! Power stations felled by cuts; A plan to burn plants has been scrapped but wood chips will fire Drax's future, reports Danny Fortson (Neutral)

The Sunday Times (London), February 26, 2012 Sunday, BUSINESS; Pg. 9, 987 words, Danny Fortson

Power In Sails Of New Training Centre (Favourable and not focused)

The Journal (Newcastle, UK), November 17, 2011 Thursday, A; Pg. 32, 1030 words, John Hill

Drax: We're ready; Reassurance from company behind power plant proposal (Favourable and focused)

Grimsby Telegraph, August 3, 2011 Wednesday, BUSINESS; Pg. 12, 719 words, David Laister

It's Boom Tyne (Favourable and not focused)

Evening Chronicle (Newcastle, UK), May 13, 2011 Friday, A; Pg. 6, 542 words

Government decision vital to Drax bio plan; Energy giant is still looking at making huge power plant viable (Favourable and focused)

Grimsby Telegraph, February 22, 2012 Wednesday, BUSINESS; Pg. 12, 728 words, David Laister

Drax welcomes power white paper (Favourable and focused)

York Press, July 22, 2011 Friday, ECO NEWS (P NEWS ECO NEWS), 110 words

2010

FREEZE POWERS DRAX EARNINGS BONANZA (Unfavourable and not focused)

DAILY MAIL (London), February 23, 2011 Wednesday, 159 words, BY BEN GRIFFITHS

Drax chief attacks 'unfair' energy rules (Unfavourable and focused)

The Times (London), February 23, 2011 Wednesday, BUSINESS; Pg. 38, 211 words, Robert Lea

Nuclear juggernaut aims to dent fear of power shortage; Power giant says new reactor is vital for Britain's electricity needs, writes Robin Pagnamenta (Unfavourable and not focused)

The Times (London), November 22, 2010 Monday, BUSINESS; Pg. 50,51, 785 words, Robin Pagnamenta

Drax seeks subsidy for move to biomass: Power plant could convert to wood chip by 2020 Half-year profits up by a quarter to £184m (Neutral)

The Guardian (London) - Final Edition, August 4, 2010 Wednesday, GUARDIAN FINANCIAL PAGES; Pg. 22, 688 words, Tim Webb

Biomass decision by Drax waits on Whitehall (Favourable and focused)

Yorkshire Post, August 3, 2010 Tuesday, 705 words, John Collingridge City Reporter

Consumers to pay for greener energy ambitions (Favourable and not focused)

Yorkshire Post, July 27, 2010 Tuesday, 342 words, Greg Wright Deputy Business Editor

Drax plans a giant leap forward in the move to green, clean energy (Favourable and focused)

Yorkshire Post, July 6, 2010 Tuesday, 1001 words, John Collingridge

Drax's vision of producing coal-free energy (Favourable and focused)

Yorkshire Post, July 1, 2010 Thursday, 708 words, John Collingridge City Reporter

Unilever tops climate change index with 'superb' track record (Unfavourable and not focused)

Guardian.com, June 28, 2010 Monday, 410 words, Severin Carrellguardian.co.uk

Innovative power producer accepts the challenge for greener business practices (Favourable and not focused)

Yorkshire Post, June 10, 2010 Thursday, 712 words, Peter Edwards

Huhne's low-carbon vision hits shares in Drax (Neutral)

The Times (London), December 20, 2010 Monday, BUSINESS; Pg. 35, 324 words, Robert Lea

ONE DAY, RELIABILITY WILL EARN DRAX ITS SPURS (Favourable and not focused)

MAIL ON SUNDAY (London), August 22, 2010 Sunday, 524 words

Power Station Deal Helps To Secure Port's Long-term Future (Favourable and not focused)

The Journal (Newcastle, UK), April 1, 2010 Thursday, A; Pg. 45, 418 words, Karen Wilson

Banking on a natural solution; BIOMASS Grow your own talents within the emerging market of renewable, organic fuels, advises Gabrielle Collett-White (Favourable and not focused)

The Daily Telegraph (London), January 27, 2011 Thursday, CAREERS IN ENERGY;FEATURES; Pg. 6, 1053 words, Gabrielle Collett-White

Undercover police in Leeds eco group storm (Unfavourable and not focused)

Yorkshire Evening Post, January 14, 2011 Friday, 221 words

UK 'Dirty 30' blow (Unfavourable and focused)

The Sun (England), April 7, 2010 Wednesday, NEWS; Pg. 2, 80 words

Golden Valley crops up in smoke (Favourable and not focused)

Ripley & Heanor News, June 4, 2010 Friday, 422 words

Companies race for clean-coal cash (Favourable and not focused)

The Daily Telegraph (London), February 11, 2011 Friday, BUSINESS; Pg. 2, 205 words, Rowena Mason

British Sky Broadcasting

2014

UK carbon emission targets 'may have to be jettisoned' (Favourable and not focused)

The Times (London), December 11, 2013 Wednesday, NEWS; Pg. 2, 495 words, Ben Webster

2013

High-flying Darroch puts in the miles to keep up with rivals; City Diary (Favourable and not focused)

The Daily Telegraph (London), August 21, 2013 Wednesday, BUSINESS; Pg. 8, 136 words, Christopher Williams

2012

Will Murdoch's unlikely green achievements collapse with his empire? (Favourable and focused)

telegraph.co.uk, July 24, 2012 Tuesday 10:36 AM GMT, BLOG, 664 words, By Geoffrey Lean

2011

Reply: Letter: Business must show green leadership (Favourable and focused)

The Guardian - Final Edition, January 20, 2011 Thursday, GUARDIAN LEADER PAGES; Pg. 35, 285 words, Marc Bolland and others

Cancun carbon cuts; Letters to the Editor (Favourable and not focused)

The Daily Telegraph (London), December 9, 2010 Thursday, LETTERS; Pg. 31, 232 words

Ban Dihydrogen Monoxide now! (Unfavourable and not focused)

telegraph.co.uk, December 9, 2010 Thursday 4:04 PM GMT, BLOG, 386 words, By James Delingpole

2010

G2: Arts: Sky scraper: What does this building say about BSkyB? James Murdoch gives Jonathan Glancey an exclusive view of his first adventure in architecture: a colossal TV factory (Favourable and focused)

The Guardian - Final Edition, September 27, 2010 Monday, GUARDIAN FEATURES PAGES; Pg. 17, 1349 words, Jonathan Glancey

Sky's the limit for energy (Favourable and focused)

Sunday Express, March 14, 2010 Sunday, FINANCE 188; 02, 184 words, By Geoff Ho

Tesco

2014

British companies call on David Cameron to take stronger climate action; Letter from two big six energy companies and high street names including John Lewis and Tesco calls for strong deal at Paris climate summit (Favourable and not focused)

The Guardian, June 16, 2015 Tuesday 8:08 AM GMT, ENVIRONMENT, 554 words, Adam Vaughan

Retail giants pledge to cut carbon footprint (Favourable and not focused)

The Scotsman, January 15, 2015, Thursday, Pg. 10, 161 words, Jane Bradley

Dismayed by views on Haworth Tesco store bid (Favourable and focused)

Keighley News, October 23, 2014 Thursday, READERS' VIEWS, 279 words

Saving and sharing (Favourable and not focused)

Lytham St Annes Express, August 23, 2014 Saturday, 282 words

Retailers join forum launch (Favourable and not focused)

Blackpool Gazette, July 7, 2014 Monday, 373 words

Big business calls on Government to combat climate change; ENVIRONMENT (Favourable and not focused)

i-Independent Print Ltd, June 10, 2015, NEWS; Pg. 17, 203 words, Tom Bawden ENVIRONMENT EDITOR

2013

Aviation industry is carbon criminal, while supermarkets slash emissions (Favourable and not focused)

Guardian.com., June 10, 2014 Tuesday, 1169 words, Elisabeth Brawtheguardian.com

No bonus for Tesco directors after last year's profits slump (Favourable and not focused)

The Scotsman, May 23, 2014, Friday, Pg. 36, 280 words, Dominic Jeff

Anthesis Consulting Group: shaping the global sustainability debate (Favourable and not focused)

Guardian.com., May 15, 2014 Thursday, 330 words, theguardian.com

Wanted: Crosby pupils with creative designs on recycling; YOUNGSTERS in the Crosby area are going green - to help Tesco promote the benefits of recycling in the local community. (Favourable and focused)

liverpoolecho.co.uk, April 11, 2014 Friday 5:19 PM GMT, NEWS, 365 words, By Crosby Herald

Solar proposals under fire from Merseyside eco firm; FORMBY environmentalists have criticised the area's listing as one of the least green in the UK. (Favourable and not focused)

liverpoolecho.co.uk, April 11, 2014 Friday 4:55 PM GMT, NEWS, 323 words, By Crosby Herald

Spring start for new Tesco store (Favourable and focused)

Newmarket Journal, January 2, 2014 Thursday, 221 words

2012

Making contacts means taking advantage of every opportunity you're given (Favourable and not focused)

Manchester Evening News, April 11, 2013 Thursday, BUSINESS; Pg. 34, 979 words, Ian Kelly, founder and MD of energy management company Matrix

Hundreds of jobs at risk, with Tesco depot to close (Favourable and not focused)

Your Local Guardian, February 28, 2013, NEWS ELMBRIDGE, 383 words, Laura Proto

Tesco not champions of sustainability; Letters (Unfavourable and focused)

Western Daily Press, November 12, 2012 Monday, LETTERS; Pg. 14,15, 147 words

Don't be fooled by greenwash (Unfavourable and focused)

Central Somerset Gazette, November 8, 2012, Pg. 28, 334 words

Tesco's on the right track to slash CO2; SUPERMARKET LAUNCHES RAIL FREIGHT SERVICE WITH PARTNERS (Favourable and focused)

The Western Mail, October 17, 2012 Wednesday, BUSINESS IN WALES;BUSINESS; Pg. 9, 596 words, RHODRI EVANS

Superstore recruits (Favourable and focused)

Central Somerset Gazette, September 13, 2012, Pg. 3, 142 words

Trial is fuelling a change to low-carbon transport (Favourable and not focused)

The Western Mail, August 30, 2012 Thursday, FEATURES; Pg. 24, 604 words

Store customers coughed up (Favourable and not focused)

The Southern Reporter, July 18, 2012 Wednesday, 172 words

Every little helps at Wigan pioneering mini-market (Favourable and focused)

Wigan Today, July 9, 2012 Monday, 602 words

2011

ENER-Ghails world first with Tesco deal (Favourable and not focused)

Manchester Evening News, June 20, 2012 Wednesday, BUSINESS; Pg. 38, 380 words, James Ferguson

Planned store would create 120 jobs (Neutral)

Cheddar Valley Gazette, April 26, 2012 Thursday, Pg. 3, 191 words

Carbon Footprinting Gallery launch (Favourable and not focused)

Future News - Media Planner, March 28, 2012 Wednesday, ENTERTAINMENT; Highlight; Art, 74 words

Questions need to be answered over Tesco; Letters (Unfavourable and not focused)

Herald Express (Torquay), March 29, 2012 Thursday, LETTERS; Pg. 24, 359 words

Tesco fails to hit 'green' store targets (Unfavourable and focused)

Leatherhead Advertiser, March 8, 2012, Pg. 1, 197 words

Tesco and RSPB join forces to protect rainforests (Favourable and focused)

Guardian.com, February 23, 2012 Thursday, 465 words, Rebecca Smithersguardian.co.uk

WHAT THE OTHER PAPERS SAY THIS MORNING (Favourable and not focused)

City A.M., January 31, 2012 Tuesday, NEWS; Pg. 2, 647 words

Tesco drops carbon-label pledge (Neutral)

Guardian.com, January 30, 2012 Monday, 504 words, Adam Vaughanguardian.co.uk

Co-op named top retailer for cutting its carbon output (Neutral)

Evening News (Norwich), December 1, 2011 Thursday, ROP, 148 words, Caroline Jenkinson

Hundreds object to 236ft wind turbine; Residents angry at farmer's plan for green energy (Favourable and not focused)

The Sentinel (Stoke), November 26, 2011 Saturday, NEWS; Pg. 19, 404 words, PHIL CORRIGAN

A life in engines drives couple to renewable energy success; Alistair Houghton meets KEITH and ANNE O'CONNOR, of Wirral renewable energy firm, Fleetsolve (Favourable and not focused)

Daily Post (North Wales), November 23, 2011 Wednesday, BUSINESS; Pg. 3, 1372 words

Tesco in pounds 27m deal with US IT partner (Favourable and focused)

Daily Post (North Wales), August 30, 2011 Tuesday, BUSINESS; Pg. 8, 145 words

2010

Tesco executive pay overhauled (Favourable and focused)

Coventry Evening Telegraph (England), June 1, 2011 Wednesday, BUSINESS; Pg. 81, 191 words

Can we hit the carbon target? (Favourable and not focused)

Daily Post (North Wales), May 30, 2011 Monday, NEWS; Pg. 12, 624 words

Tesco is targeted in protest over CO2 (Unfavourable and focused)

The Sun (England), March 22, 2011 Tuesday, NEWS; Pg. 27, 123 words, BEN JACKSON

How Tesco is helping cows and customers go green; Tesco (Favourable and focused)

The Daily Telegraph (London), March 21, 2011 Monday, BUSINESS; Pg. 6, 499 words

Time to grasp the green future; Lord Stern has seen changing attitudes on the environment across the world. In an interview with Andrew Stone to mark the UK's inaugural Climate Week, he says big companies have risen to the challenge but clear government policy is now needed for further progress (Favourable and not focused)

The Daily Telegraph (London), March 21, 2011 Monday, BUSINESS; Pg. 6,7, 1095 words, Andrew Stone

Community champion helps gain silver green honours (Favourable and focused)

Milford Mercury, March 4, 2011, NEWS (MILF NEWS), 364 words

Tesco removes turbines after trial period finishes; In Brief (Favourable and focused)

Scunthorpe Telegraph, March 1, 2011, FEATURES; Pg. 7, 133 words

Green grocer; Tesco urges carbon cut (Favourable and focused)

The Daily Telegraph (London), October 13, 2010 Wednesday, BUSINESS; Pg. 4, 190 words, James Hall

Carbon footprint labels: the latest aid for ethical shopping (Favourable and not focused)

The Independent (London), October 13, 2010 Wednesday, NEWS; Pg. 12, 558 words, Martin Hickman
Consumer Affairs Correspondent

Eco-friendly Tesco store opens in T Southam (Favourable and focused)

Coventry Evening Telegraph (England), August 25, 2010 Wednesday, BUSINESS; Pg. 85, 235 words

Speak out about Tesco (Favourable and focused)

Central Somerset Gazette, August 12, 2010, Pg. 3, 254 words

HSBC Holdings

2014

How to divest your bank account of fossil fuels; The big five UK banks are among the world's biggest lenders to the coal, oil and gas industries. If you don't want to help them support climate change, there are viable alternatives[Sign up to our series on personal divestment on the form at the bottom](#) (Unfavourable and not focused)

The Guardian, May 18, 2015 Monday 11:16 AM GMT, MONEY, 1480 words, Patrick Collinson
UK energy bill subsidies driving boom in polluting diesel farms; National Grid to offer a new set of subsidies to diesel generator operators under a scheme designed as insurance against the lights going out (Unfavourable and not focused)

The Guardian, May 6, 2015 Wednesday 6:08 PM GMT, ENVIRONMENT, 1166 words, Terry Macalister, energy editor

Fossil fuel-free funds outperformed conventional ones, analysis shows; Investors who dumped holdings in coal, oil and gas earned an average return of 1.2% more a year over last five years, data from the world's leading stock market index reveals (Favourable and not focused)

The Guardian, April 10, 2015 Friday 6:42 PM GMT, ENVIRONMENT, 807 words, Patrick Collinson
What is a green bond? And who should decide? (Favourable and not focused)

Global Capital Euroweek, October 3, 2014, 2575 words, Jon Hay

Green Bonds Planting Seeds for Eco-Friendly Investment (Favourable and not focused)

Institutional Investor (America's Edition), September 2014, Americas, Europe, Asia, Featured News Slider, Editor's Choice, Pimco, Global Market Thought Leaders, Article, 995 words, Ben Emons, Luke Spajic

2013

Protesters demonstrate outside bank (Unfavourable and focused)

Bradford Telegraph and Argus, March 13, 2014 Thursday, NEWS, 136 words

Protesters clear the air at HSBC; NEWS IN BRIEF BANKING (Unfavourable and focused)

The Independent (London), December 18, 2013 Wednesday, BUSINESS; Pg. 50, 52 words

Brighton and Hove "miners" protest outside HSBC (Unfavourable and focused)

The Argus (Newsquest Regional Press), November 5, 2013 Tuesday, NOW AND THEN, 96 words

2012

HSBC SHAREHOLDERS REVOLT OVER FATCAT PAY PACKAGES (Unfavourable and focused)

DAILY MAIL (London), May 25, 2013 Saturday, 379 words, BY ROGER BAIRD

Financial: Barrage of shareholder protests for HSBC: Issues include mis-selling, job cuts and environment: Bank embarrassed by 11% vote against pay report (Unfavourable and focused)

The Guardian - Final Edition, May 25, 2013 Saturday, GUARDIAN FINANCIAL PAGES; Pg. 44, 681 words, Patrick Collinson and Rupert Neate

Embarrassment for bankers as HSBC shareholders revolt over fat-cat pay (Unfavourable and focused)

MailOnline, May 25, 2013 Saturday 9:45 AM GMT, NEWS, 379 words, ROGER BAIRD

HSBC under fire from all sides at AGM (Unfavourable and focused)

Guardian.com., May 24, 2013 Friday, 728 words, Patrick Collinsonguardian.co.uk

2011

Coal study names top 20 'climate killer' banks (Unfavourable and not focused)

Guardian.com, November 30, 2011 Wednesday, 741 words, Fiona Harveyguardian.co.uk

Killing Ugandans to save the planet (Unfavourable and not focused)

telegraph.co.uk, September 27, 2011 Tuesday 5:45 PM GMT, BLOG, 538 words, By James Delingpole

2010

CalPERS to put \$500m in green portfolio (Favourable and not focused)

Global Investor, November 2010, 96 words

Learn how to switch off; PC power management software provides a simple way to make big savings (Favourable and focused)

The Sunday Telegraph (London), October 24, 2010, GREEN ICT;FEATURES; Pg. 9, 499 words

Business failing to lobby government on climate change (Favourable and not focused)

Guardian.com, October 14, 2010 Thursday, 705 words, Jo Adetunji guardian.co.uk

Greenpeace links HSBC climate change fund to deforestation (Neutral)

Guardian.com, May 21, 2010 Friday, 627 words, Zara Maung guardian.co.uk

GlaxoSmithKline (GHG&OP)

2014

GSK begins to make inroads on supply-chain emissions; The pharmaceuticals multinational has begun giving awards to suppliers that have managed to reduce their energy levels - among other initiatives (Favourable and focused)

The Guardian, April 30, 2015 Thursday 10:21 AM GMT, GUARDIAN SUSTAINABLE BUSINESS, 300 words, Lorna Thorpe

MBA Guide: Career progression or chord progression? Students can pursue their passion; Business schools are offering new specialised qualifications in only one industry or field - but appeal to employers is linked to the school's prestige (Favourable and not focused)

Independent.co.uk, April 12, 2015 Sunday 6:45 PM GMT, MBAS GUIDE, 1951 words, Geraldine Hackett

Beer tradition to bottle up evil spirits (Favourable and not focused)

Nottingham Post, July 4, 2014 Friday, BUSINESS:ECONOMY; Pg. 35, 155 words

2013

University is praised for helping business (Favourable and not focused)

Nottingham Post, April 21, 2014 Monday, NEWS:EDUCATION; Pg. 17, 178 words

Hospital's 'homemade' power saves £400k (Favourable and not focused)

Daily Echo (Newsquest Regional Press), March 26, 2014 Wednesday, SOUTHAMPTON, 298 words, Melanie Adams

How uni leads the world in securing a greener future; The University of Nottingham is the "greenest" on the planet. Jeremy Lewis visits its Jubilee Campus to see how it won the world No 1 ranking (Favourable and not focused)

Nottingham Evening Post, January 25, 2014 Saturday, NEWS; Pg. 12,13, 1262 words

Work begins on £20m 'green' lab (Favourable and focused)

Nottingham Evening Post, October 16, 2013 Wednesday, NEWS; Pg. 6,7, 370 words, Richard Tresidder

Green technology driving sales across the globe (Favourable and not focused)

Manchester Evening News, October 10, 2013 Thursday, FEATURES; Pg. 16, 2248 words, Paul Ogden

University to invest £50m in student facility improvements (Favourable and not focused)

Nottingham Evening Post, August 8, 2013 Thursday, NEWS; Pg. 5, 172 words

Planning refusal for tidal turbines (Favourable and focused)

Montrose Review, May 8, 2013 Wednesday, 618 words

2012

Selling our city as a place to invest (Favourable and not focused)

Nottingham Evening Post, April 18, 2013 Thursday, NEWS; Pg. 28,29, 1316 words, Richard Tresidder

£12m boost for university from healthcare giant (Favourable and not focused)

Nottingham Evening Post, April 12, 2013 Friday, NEWS; Pg. 24, 386 words, Marcus Boocock

Inhaler recycling scheme a good wheeze (Favourable and focused)

Montrose Review, April 1, 2013 Monday, 297 words

Scheme to build five 99-metre wind turbines near Ulverston splits planning committee, but scheme is thrown out (Favourable and not focused)

The Westmorland Gazette, April 1, 2013 Monday, GAZETTE NEWS, 545 words, Hannah Upton

Praise for inhaler recycling initiative (Favourable and focused)

Daily Post, March 6, 2013 Wednesday, NEWS; Pg. 2, 148 words

Asthma sufferers told to recycle their inhalers (Favourable and focused)

Manchester Evening News, February 28, 2013 Thursday, NEWS; Pg. 22, 111 words, WFnode

Wanted, tech entrepreneurs (Favourable and not focused)

Manchester Evening News, December 5, 2012 Wednesday, BUSINESS; Pg. 36, 802 words, Kevin Feddy

2011

How the 'Chinplant' has become the latest must-have for U.S teens wanting to dazzle on prom night (Favourable and not focused)

MailOnline, April 29, 2012 Sunday 1:02 PM GMT, FEMAIL, 893 words, SADIE WHITELOCKS and TED THORNHILL

£12m centre will lead the way in world of research (Favourable and related)

Nottingham Evening Post, April 27, 2012 Friday, BUSINESS; Pg. 30, 863 words, Richard Tresidder

Chins are the new boobs: Numbers of 'chinplants' explode as career women want to look good for video conferencing (Favourable and not focused)

MailOnline, April 16, 2012 Monday 3:11 PM GMT, 870 words, SADIE WHITELOCKS

It is time for an anti-transport policy (Favourable and not focused)

Guardian.com, January 20, 2012 Friday, 691 words, Juliette Jowitguardian.co.uk

New inhaler recycling scheme is rolled out (Favourable and focused)

Birmingham Evening Mail, November 22, 2011 Tuesday, NEWS; Pg. 16, 236 words

Co-op recycle scheme is a breath of fresh air (Favourable and focused)

Great Barr Observer, November 11, 2011, Pg. 12, 405 words, Chris Philpotts

Carbon emissions report reveals increase in company disclosures (Favourable and focused)

Guardian.com, September 14, 2011 Wednesday, 671 words, Jo Confinoguardian.co.uk

2010

Glaxo takes green medicine (Favourable and focused)

The Sunday Times (London), March 27, 2011 Sunday, BUSINESS; Pg. 2, 127 words, Matthew Goodman

Companies slashing business travel - and carbon footprints (Favourable and focused)

The Bristol Post, March 8, 2011 Tuesday, Pg. 6, 338 words

Recycler clinches green accolade (Favourable and not focused)

Evening Gazette, February 21, 2011 Monday, BUSINESS; Pg. 24, 321 words

Incentive reaps rapid £500m reward (Favourable and focused)

The Times (London), November 30, 2010 Tuesday, BUSINESS; Pg. 43, 434 words, Catherine Boyle

Minister under fire on new rail link proposal (Favourable and not focused)

Lichfield Mercury, September 16, 2010, Pg. 6, 420 words, Alex Keller

Four healthcare firms in 30m wind turbine plan for harbour (Favourable and focused)

Irish Examiner, August 27, 2010 Friday, IRELAND, 383 words