CARBON EMISSION DISCLOSURES BY HIGHER EDUCATION INSTITUTIONS IN UK - DETERMINANTS, CARBON REDUCTION TARGET, VOLUMETRIC AND QUALITATIVE DISCLOSURE AND INSTITUTIONAL REPUTATION

SAHA, ANUP,KUMAR

CARBON EMISSION DISCLOSURES BY HIGHER EDUCATION INSTITUTIONS IN UK - DETERMINANTS, CARBON REDUCTION TARGET, VOLUMETRIC & QUALITATIVE DISCLOSURE AND REPUTATION

by

ANUP KUMAR SAHA

SUBMITTED AS PART OF WORK FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

DURHAM UNIVERSITY BUSINESS SCHOOL

UK

Dated: 08/09/2017 12:53:52

Carbon Emission Disclosures by Higher Education Institutions in UK – Determinants, Carbon Reduction Target, Volumetric & Qualitative Disclosure and Reputation
Anup Kumar Saha. 2017.

ABSTRACT

This thesis investigates the determinants of the carbon emission disclosures (CED) in UK higher education institutions (HEI), relationship between such CED in terms of volume and quality and the role of such disclosures on HEIs' green reputation. The study recognises that HEIs are distinct in characteristics from profit seeking organizations, which has been widely researched in literature. Generalizing the research studies on profit-oriented companies for the majorly publicly funded UK HEIs may mislead any outcome. This study examines three questions. *First*, what are the determinant factors for the CED by UK HEIs? (Based on stakeholder theory and institutional theory). *Second*, what is the relationship between CED volume and quality? (Based on stewardship theory). And *finally*, what is the impact of CED on institutional green reputation? (Based on signalling theory). An initial sample of all available UK HEIs in 2012 was taken to study the carbon emission disclosures made in annual reports. Carbon disclosures in standalone reports were also accounted for.

The first part of the research investigates the determinants of CED in annual reports of UK HEIs, with a special concern of the impact of the carbon reduction targets set by the Higher Education Funding Council of England (HEFCE) on such disclosures. A disclosure index was prepared to capture both disclosure categories and types. The relationship between CED and its determinants were examined using TOBIT linear regression analysis, associated by sensitivity tests. Carbon reduction targets by HEFCE were found to have significant positive impact on CED. The results also show that carbon audit and HEI region have significant impact in determining CED volume.

The second part of the study explores the relationship between quality and volume of CED in the UK HEIs, with a special concern of the impact of HEFCE carbon reduction target on such disclosures. CED volume has been criticised as being merely wordy and therefore is not good enough. This study explores the decision usefulness of the CED by HEIs i.e. whether the more CED means more useful it is. A framework was developed to measure the CED quality. The relationship between CED volume and quality were examined using Ordered PROBIT regression model. CED volume in annual reports and HEFCE carbon reduction target were found to have significant positive impact on CED quality.

The third part explores the impact of CED by UK HEIs on their environmental reputation. The study is distinct in investigating whether and how the HEI CED contributes towards the environmental reputation of the institution. The green score was found from the People and Planet organisation database. All universities having a score were entered into the initial sample. The relationship between green score and CED was examined using robust least squared regression model. CED, Carbon emission and audit were found to have significant impact on green reputation. This study clarifies the impact of CED to motivate the HEIs to engage in such disclosure.

This thesis contributes to the existing knowledge by presenting a framework for determinants and consequences of carbon emission disclosure with respect to UK HEIs. There exists a void in research with carbon disclosures by HEIs, which was widely researched for profit seeking organisations. The study adds to the earlier related studies by Godemann et al. (2011), Nejati et al. (2011) and Mazhar et al. (2014) by its own contribution to the disclosure literature. The thesis is distinct in finding causal determinants and impacts different from those found earlier for profit oriented companies and the relationship between the volume and quality of disclosures, which proves the worthiness of the study. Thus, the thesis findings open a fascinating area of investigation and expect to motivate further research in the area.

TABLE OF CONTENTS

ABSTRACT ii
TABLE OF CONTENTS iii
LIST OF TABLES vii
LIST OF FIGURES x
LIST OF APPENDICES xi
LIST OF ABBREVIATIONS xii
DECLARATION xiv
STATEMENT OF COPYRIGHT xv
ACKNOWLEDGMENT xvi
DEDICATION xvii
THESIS RELATED RESEARCH OUTCOMES xviii
CHAPTER 1 2
Introduction 2
1.1 CHAPTER OVERVIEW 2
1.2 BACKGROUND OF THE RESEARCH 2
1.3 MOTIVATION FOR THE STUDY 7
1.3.1 Why Higher Education Institutions? 8
1.3.2 Why Disclose? 9
1.3.3 Why Carbon Emission Disclosures? 10
1.3.4 Extant Literature on Higher Education Institution Carbon Disclosure 11
1.4 ORIGINALITY AND CONTRIBUTION TO KNOWLEDGE 15
1.4.1 Contribution to Extant Literature 16
1.4.2 Contribution to Theory 17
1.4.3 Who will be interested? 17
1.5 RESEARCH PHILOSOPHY 20
1.6 RESEARCH QUESTIONS 21
1.7 STRUCTURE OF THE THESIS 23
Chapter 2 26
Theoretical Framework 26
2.1 CHAPTER OVERVIEW 26
2.2 STAKEHOLDER THEORY 28
2.2.1 Primary and Secondary Stakeholders 30
2.2.2 Normative or Ethical Branch of Stakeholder Theory 32

2.2.3 Managerial Branch of Stakeholder Theory 33
2.2.4 Research Philosophy of Descriptive Stakeholder Theory 35
2.2.5 Epistemological issue of Descriptive Stakeholder Theory 36
2.3 INSTITUTIONAL THEORY 38
2.3.1 Coercive Isomorphism 40
2.3.2 Mimetic Isomorphism 42
2.3.3 Normative Isomorphism 43
2.4 STEWARDSHIP THEORY 45
2.4.1 Stewardship Theory in Disclosure Context 46
2.4.2 Origin of Stewardship Theory 46
2.4.3 Philosophy behind Stewardship Theory 47
2.4.4 Assumptions behind Stewardship Theory 49
2.4.5 Stewardship Theory as Opposed to Countering Theory 50
2.4.6 Application of Stewardship Theory 53
2.5 SIGNALLING THEORY 53
2.5.1 What is a Signal? 54
2.5.2 Origin of Signalling Theory 55
2.5.3 Signalling Theory in the Disclosure Context 56
2.5.4 Assumptions behind Signalling Theory 57
2.5.5 Application of Signalling Theory 58
2.6 JUSTIFICATION FOR THEORIES USED IN THIS THESIS 59
2.6.1 Justification for Stakeholder and Institutional Theories for the First Model 59
2.6.2 Justification for Stewardship Theory for the Second Model 63
2.6.3 Justification for Signalling Theory for the Third Model 68
2.7 CHAPTER SUMMARY 72
CHAPTER 3 74
Determinants of Carbon Emission Disclosures in Higher Educational Institutions in UK 74
3.1 CHAPTER OVERVIEW 74
3.2 LITERATURE REVIEW 77
3.3 HYPOTHESES DEVELOPMENT 94
3.3.1 Carbon Reduction Target and Current Emission 96
3.3.2 Environmental Audit and Investment for Carbon Reduction 96
3.3.3 Institutional Characteristics 97
3.4 RESEARCH METHODS 98
3.4.1 Sample Selection 99
3.4.2 Dependent Variable Definition and Measurement 100

3.4.3 Independent Variables 120
3.4.4 Control Variables 122
3.4.5 Model Specification 123
3.5 EMPIRICAL RESULTS AND ANALYSES 125
3.5.1 Descriptive Statistics 125
3.5.2 Regression Diagnostics 141
3.5.3 Regression Results 152
3.5.4 Sensitivity Analysis 157
3.6 CHAPTER CONCLUSION 164
CHAPTER 4 169
Relationship between Carbon Disclosures Quality & Volume and Carbon Reduction Targets 169
4.1 CHAPTER OVERVIEW 169
4.2 LITERATURE REVIEW 172
4.2.1 Defining Disclosure Quality 173
4.2.2 Positive Relationship between Quality and Volume 173
4.2.3 Superiority of Quality over Volume 174
4.2.4 Information – Need for Decision Usefulness 174
4.2.5 Measuring Disclosure Quality 177
4.2.6 Attributes of Disclosure Quality 181
4.3 HYPOTHESIS DEVELOPMENT 182
4.4 RESEARH DESIGN 185
4.4.1 Sample Design 185
4.4.2 Dependent Variable Definition and Measurement 187
4.4.3 Independent variables 194
4.4.4 Model Specification 197
4.5 EMPIRICAL RESULTS AND ANALYSES 199
4.5.1 Descriptive Analysis 199
4.5.2 Regression Diagnostics 208
4.5.3 Regression Results 215
4.5.4 Sensitivity Analysis 218
4.5.5 Summary of Results 220
4.6 CHAPTER CONCLUSION 220
CHAPTER 5 224
Carbon Disclosures, Carbon Performances and Green Reputation: Evidences from UK Higher Educational Institutions 224
5.1 CHAPTER OVERVIEW 224

5.2 LITERATURE REVIEW 228
5.2.1 Reputation as an Impact 229
5.2.2 CSR Disclosures and Environmental Disclosures in General 230
5.2.3 Higher Education Institutions, CED and Reputation 236
5.2.4 Contributions of this research 238
5.3 HYPOTHESES DEVELOPMENT 239
5.4 RESEARCH METHODOLOGY 240
5.4.1 Sample Selection 241
5.4.2 Dependent Variable Definition and Measurement 242
5.4.3 Independent Variables 243
5.4.4 Model Specification 246
5.5 EMPIRICAL ANALYSES AND RESULTS 247
5.5.1 Descriptive Statistics 248
5.5.2 Research Diagnostics 257
5.5.3 Regression Results 265
5.5.4 Sensitivity Analysis 269
5.5.5 Summary of Results 279
5.6 CHAPTER CONCLUSION 279
CHAPTER 6 282
Conclusion 282
6.1 CHAPTER OVERVIEW 282
6.2 SYNOPSIS AND FINDINGS 283
6.3 IMPLICATIONS OF THE STUDY 286
6.4 LIMITATIONS AND FUTURE RESEARCH 288
6.5 CHAPTER CONCLUSION 290
REFERENCES 291
APPENDICES 324
Appendix A. Two-Way Scatter graphs 324
Appendix B. Augmented Component-Plus-Residual Plot 326
Appendix C. Diagnostic Tests for Negative Binomial Regression 328
Appendix D. Normality Tests of Residuals 328
Appendix E. Test for Heteroskedasticity 329
Appendix F. Durbin-Wu-Hausman Test of Endogeneity 330
Appendix G. Results of Content Analysis 330

LIST OF TABLES

Tables	Page
Table 2.1 Stakeholders and Environmental Stakes of HEIs	**38**
Table 3.1 Empirical Studies on Determinants of Corporate Social Disclosures	**82**
Table 3.2 Empirical Studies on Determinants of Corporate Environmental Disclosures	**89**
Table 3.3 Empirical Studies on Determinant of Carbon Emission Disclosures	**92**
Table 3.4 Constructs Used for Research in Carbon Emission Disclosures	**102**
Table 3.5 Prior Studies using Content Analysis Approach	**105**
Table 3.6 Carbon Emission Disclosures Index / Instruments	**112**
Table 3.7 Checklist of Areas of CED	**113**
Table 3.8 Proportional Analysis for Disclosure by HEIs	**127**
Table 3.9 Descriptive Statistics for Dependent Variable	**131**
Table 3.10 Descriptive Statistics for Independent Variable	**133**
Table 3.11 Frequency Distribution of Categorical Independent Variables	**135**
Table 3.12 Differences in Explanatory Variables between High and Low CED Groups	**140**
Table 3.13 Inter Quartile Range for Residuals	**144**
Table 3.14 Correlation Coefficients between Dependent and Explanatory Variables	**148**
Table 3.15 Pearson and Spearman Correlation Matrix for Explanatory Variables	**149**
Table 3.16 Collinearity Statistics	**151**
Table 3.17 Model Specification Tests	**152**
Table 3.18 Regression Results – TOBIT Model	**153**
Table 3.19 Expected and Empirical Results with Significance	**156**

Table 3.20 158
Alternative Regression Model - Negative Binomial Regression
Table 3.21 159
Alternative Regression Model – Ordinary Least Square
Table 3.22 161
Alternative Regression Model – Top and Bottom One-third Group - LOGIT
Table 3.23 163
Alternative Regression Model – Top and Bottom Half – LOGIT Model
Table 4.1 190
Scoring of Disclosure Quality
Table 4.2 200
Descriptive Statistics
Table 4.3 201
Normality of Individual Variables
Table 4.4 204
Frequency Distribution of Categorical Independent Variables
Table 4.5 207
Differences in the Variables between High and Low CED (quality) Groups
Table 4.6 211
Inter Quartile Range
Table 4.7 211
Shapiro-Wilk W Test
Table 4.8 213
Correlation Matrix
Table 4.9 214
Collinearity Statistics
Table 4.10 216
Regression Results – Ordered Probit Model
Table 4.11 219
Regression Results – Robust Least Squared
Table 4.12 220
Summary Results
Table 5.1 249
Descriptive Statistics for Variables
Table 5.2 251
Normality of Individual Variables
Table 5.3 254
Frequency Distribution of Categorical Independent Variables
Table 5.4 256
Differences in Explanatory Variables between High and Low Reputation Groups
Table 5.5
Inter Quartile Range 260

Table 5.6 Shapiro-Wilk W Test	**260**
Table 5.7 Pearson and Spearman Correlation Matrix for Explanatory Variables	**263**
Table 5.8 Collinearity Statistics	**264**
Table 5.9 Regression Results – Robust Least Square with CED Volume	**266**
Table 5.10 Regression Results – Robust Least Square with CED Quality	**267**
Table 5.11 Regression Results – Green Class with CED Volume (Oprobit)	**270**
Table 5.12 Regression Results – Green Class CED Quality (Oprobit)	**271**
Table 5.13 Regression Results – Green Rank with CED Volume (Oprobit)	**272**
Table 5.14 Regression Results – Green Rank CED Quality (Oprobit)	**273**
Table 5.15 Regression – Top and bottom one-third Green Score CED Volume (LOGIT)	**275**
Table 5.16 Regression – Top and bottom one-third Green Score CED Quality (LOGIT)	**276**
Table 5.17 Regression – Top and bottom half Green Score CED Volume (LOGIT)	**277**
Table 5.18 Regression – Top and bottom half Green Score CED Quality (LOGIT)	**278**
Table 5.19 Summary Results	**279**

LIST OF FIGURES

Figures	Page
Figure 1.1 Research Flow	**14**
Figure 1.2 Relationship between Quantity and Quality of Carbon Disclosures	**22**
Figure 2.1 Determinant Framework	**62**
Figure 2.2 Relationship between CED Volume and Quality	**68**
Figure 2.3 Theoretical Framework of CED and Green Reputation	**72**
Figure 3.1 Determinants of CED by HEIs	**98**
Figure 3.2 Types of Disclosure	**128**
Figure 3.3 Areas of Disclosure	**129**
Figure 3.4 Average Carbon Disclosures Based on Region	**137**
Figure 3.5 Average Carbon Disclosures Based on League	**138**
Figure 3.6 Histogram of Residuals	**143**
Figure 3.7 Visual Check for Heteroskedasticity	**145**
Figure 4.1 Relationship between Volume and Quality of Carbon Disclosures	**171**
Figure 4.2 CED Quality, Volume and Carbon Target by HEFCE	**184**
Figure 4.3 Check for Outliers – Box Plot	**209**
Figure 4.4 Histogram Plot of Residuals	**210**
Figure 5.1 CED, Carbon Performances and Reputation	**240**
Figure 5.2 Histogram Plot	**259**
Figure 5.3 Visual Check for Heteroskedasticity	**261**

LIST OF APPENDICES

Appendix A. Two-Way Scatter graphs

Appendix B. Augmented Component-Plus-Residual Plot

Appendix C. Diagnostic Tests for Negative Binomial Regression

Panel C1: Check for Over Dispersion

Panel C2: Check for Negative Binomial Model Fit

Appendix D. Normality Tests of Residuals

Appendix E. Heteroskedasity Test

Panel E1. Breusch-Pagan Heteroskedasity Test

Panel E2. White Test for Heteroskedasticity

Appendix F. Durbin-Wu-Hausman Test of Endogeneity

LIST OF ABBREVIATIONS

AR	Annual Reports
BLUE	Best Linear Unbiased Estimators
CA	Content Analysis
CAR	Corporate Annual Report
CDP	Carbon Development Project
CDSB	Climate Disclosure Standards Board
CED	Carbon Emission Disclosure
CEDI	Carbon Emission Disclosure Index
CEDQ	Carbon Emission Disclosure Quality
CEDV	Carbon Emission Disclosure Volume
CIF	Capital Investment Framework
CMP	Carbon Management Plan
CPA	Certified Public Accountant
CRC	Carbon Reduction Commitment
CSEAR	Centre for Social & Environmental Accounting Research
CSR	Corporate Social Responsibility
ESOS	Energy Savings Opportunity Scheme
ETS	Effluent Treatment System
EU	European Union
GDP	Gross Domestic Product
GHG	Green House Gas
GRI	Global Reporting Initiative
HE	Higher Education
HEI	Higher Education Institution
HEFCE	Higher Education Funding Council of England
HESA	Higher Education Statistics Agency

IAASB	International Auditing and Assurance Standards Board
IASB	International Accounting Standard Board
IFRS	International Financial Reporting Standards
ISO	International Organisation for Standardization
ISR	Independent Sustainability Report
MAC	Most Admired Companies
MDF	Multi-Divisional Form
NGO	Non-Governmental Organisation
NHS	National Health Service
OLS	Ordinary least Square
PRME	Principles for Responsible Management Education
ROA	Return on Assets
ROE	Return on Investment
S&P	Standard and Poor's
SER	Social and Environmental Reporting
UK	United Kingdom
UN	United Nations
UUK	Universities UK
VIF	Variance Inflation Factor

DECLARATION

I declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person, except where due acknowledgment has been made in the thesis. I confirm that no part of the material presented in this thesis was previously submitted by me or any other person for a degree in this or any other institution.

STATEMENT OF COPYRIGHT

ACKNOWLEDGMENT

All praises to God who sent me on earth to learn and grow.

My heartfelt gratitude to my supervisors – *Dr. Aly Salama* and *Professor Rob Dixon* for their relentless support, warm guidance, insightful advices and belief in me and confidence throughout my PhD journey. I really appreciate their kind suggestions and criticism for the improvement of this research. I am highly grateful to the *Commonwealth Scholarship Council* and *Durham University* for their financial support provided for the degree. Without this help the PhD in the UK could not be possible for me. I am also grateful to my current employer – *Jagannath University* in Bangladesh for allowing me the study leave to make my PhD dream possible.

I would also like to thank *Professor Markus Milne, Professor Lee Parker, Professor James Guthrie, Professor Charl de Villiers, Dr. James Hazelton* and other participants at the *14th Australasian Centre on Social and Environmental Accounting Research Conference 2015, Macquarie University, Sydney, 9-11 December* for helpful comments and feedback. I am grateful to *Dr. Amir Michael, Professor Carol Adams, Dr. Dennis Philips* and *Professor Julian Williams* of Durham University Business School for their expert comments on different parts of the thesis. I also thank *Mr Gordon Franks* and *Mr Andrew Smith* of *HEFCE*; *Mr Matt Clarke* of *HESA* and *Mr James Bisset* of *Durham University Library* for their invaluable assistance in data collection.

I am indebted to all great friends and fellows I met from the first day in the UK. Few to name amongst numerous –*Dr. Sumon Das and family* for their warmth in this foreign land during the early days; *Dr. Habiba-Al-Shaer* for her encouraging comments and help and all *friends in Ustinov College* where I used to live. I feel fortunate to be in touch with these beautiful people.

Lastly and mostly I deeply appreciate the sacrifice made by *my family, my father, mother, my brother and my loving wife* for all love, encouragement and support they have given me. Without their support my doctoral study in the UK could never be possible. *My wife* was with me at every moment of joy, sorrow, pain, and hope. I could never complete this PhD without them by my side.

May God reward them all.

DEDICATION

To my family who were there to support and encourage me both in my good days of success and bad days of frustration. They are the greatest assets in my life.

THESIS RELATED RESEARCH OUTCOMES

Saha, A. K., Salama, A. and Dixon, R. (2015). "Determinants of Carbon Emission Disclosures in Higher Educational Institutions in UK". Presented The 14th Australasian Centre on Social and Environmental Accounting Research (A-CSEAR) Conference 2015, Macquarie University, Sydney, 9-11 December.

Saha, A. K., Salama, A. and Dixon, R. (Waiting to be Submitted). "Determinants of Carbon Emission Disclosures in Higher Educational Institutions in UK".

Saha, A. K., Dixon, R. and Salama, A. (Waiting to be Submitted). "Relationship between Carbon Disclosures Quality & Volume and Carbon Reduction Targets".

Saha, A. K., Dixon, R. and Salama, A. (Waiting to be Submitted). "Carbon Disclosures, Carbon Performances and Green Reputation: Evidences from UK Higher Educational Institutions".

CHAPTER ONE

INTRODUCTION

CHAPTER 1

Introduction

1.1 CHAPTER OVERVIEW

This chapter sets out the context for the thesis. The focus of the thesis is the singular topic of carbon emissions disclosure (CED) by the higher educational institutions (HEI) in the UK. The thesis investigates the CED determinants, relationship between the volume and quality of CED and CED impact on organizations' green reputation. The social pressure to act according to social norms motivates the organizations to disclose its response to society. In this way, organizations align their position with society's norms by voluntarily disclosing their favourable activities (Gray et al., 1988). Organizations have the responsibility to ensure that their activities are aligned with social norms and expectations and they report this alignment through various disclosures (Garriga and Melé, 2004). Carbon reduction and controlling activities are one such set of actions, and organizations tend to disclose these in the most formal and authentic media of communication: the annual report. This is the focus of the thesis.

This chapter is structured as follows: the next section (1.2) discusses the background of current research. Section 1.3 describes the motivation for the study, while section 1.4 presents the key research questions investigated in the research. Section 1.5 provides an explanation of the originality of the contribution made by this study to the existing knowledge. Finally, section 1.6 presents the overall structure used in this thesis.

1.2 BACKGROUND OF THE RESEARCH

The research studies the CED practices of the British HEIs. The national objectives for carbon reduction are influential, and the higher education (HE) sector wants to contribute. Universities have been doing carbon reduction for some time but it was often hidden. Higher Education Funding Council of England

(HEFCE[1]) is keen to highlight this significant activity as part of a wider consultation on carbon and how the sector could do more. HEFCE consulted and asked institutions to introduce carbon management plans and provided a collective sector target as part of the Capital Investment Framework – CIF-2 in 2011(There were penalties if HEIs did not conform to requirements, but all universities are on board). This is not legislated, but as access to capital payment funds required conformity, there was a substantial incentive. There may be a CIF-3, but this has not been discussed as yet. However, universities are autonomous organizations and make their own decisions concerning priorities and approach to carbon management.

Climate change is widely acknowledged by leading researchers as one of the greatest challenges facing the world. Universities and colleges have a big role to play in tackling it as they influence policy making through their research and also educate the future leaders. As a sector, HEIs are in a unique position to lead the way. Many institutions are already reducing their own carbon footprint through energy efficiency and better environmental management. Researchers in HEIs are not only investigating the potential impact of climate change, but also they are working with industry and the public sector to develop innovative solutions to the challenges it creates. Students and graduates are shaping and leading the debate and the responses to it at every level of society. As a sector, HEIs can be leaders in its response at all levels.

There is no doubt about the seriousness of the issue. The overwhelming view of scientists is that unless we make deep inroads into our carbon emissions, we are likely to see adverse climate change with severe impacts on coastal communities, food supplies and the number of species in the world. HEFCE has secured the commitment of the sector to reduce its carbon emissions, in many cases building on work already under way. Of course, this is one important aspect of sustainable development. HEFCE, Universities UK (UUK) and GuildHE are working together

[1]HEFCE funds and regulates universities and colleges in England. It invests on behalf of students and the public to promote excellence and innovation in research, teaching and knowledge exchange. It distributes public money to universities and colleges in England, incentivising excellence in research, learning and teaching and knowledge exchange. It collects, synthesizes and benchmarks data to provide a unique authoritative voice on higher education.

on this and other initiatives to ensure a strong future not only for the environment but also for the sector.

The sector targets for carbon emission reductions in scopes[2] 1 and 2 are 34 per cent by 2020 and 80 per cent by 2050 against a 1990 baseline. Against a 2005 baseline, this is equivalent to a reduction of 43 per cent by 2020 and 83 per cent by 2050. The requirement for institutions to set their own targets for 2020 for scope 1 and 2 emissions against a 2005 baseline[3] is being used because it is used for reporting against UK targets. Also, the work done for HEFCE by SQW[4] Consulting demonstrated that robust data for scope 1 and 2 are available for that year at institutional level. This will provide consistency across the sector against which progress can be monitored and reported.

In July 2009 HEFCE, Universities UK and GuildHE jointly published a consultation on developing a carbon[5] reduction target and strategy for higher education (HE) in England -'Consultation on a carbon reduction target and strategy for higher education in England'(HEFCE, 2009a). In February 2009 HEFCE published an updated strategic statement and action plan on sustainable development - 'Sustainable development in higher education: 2008 update to strategic statement and action plan'(HEFCE, 2009b). This recognised how individual HEIs could play their part as centres of teaching and research, as campus managers, as employers and as major influencers and participants in their local communities. Graduates will occupy future management and leadership roles and will need the knowledge and skills to make informed decisions, taking account of complex social, economic and environmental issues. Our researchers can work in partnership to help the society to find social and technical solutions to these

[2]The World Resources Institute developed a classification of emission sources around three 'scopes': 'scope 1' emissions are direct emissions that occur from sources owned or controlled by the organisation, for example emissions from combustion in owned or controlled boilers/furnaces/vehicles; 'scope 2' accounts for emissions from the generation of purchased electricity consumed by the organisation; 'scope 3' covers all other indirect emissions that are a consequence of the activities of the organisation, but occur from sources not owned or controlled by the organisation – for example, commuting and procurement.

[3] All baselines mentioned in this report are measured on an academic year. For example, a 1990 baseline measures emissions from August 1990 to July 1991 and a 2005 baseline measures emissions from August 2005 to July 2006.

[4] 'Research into a carbon reduction target and strategy for Higher Education in England: a report to HEFCE' (SQW Energy, SQW Consulting, July 2009) can be read at www.hefce.ac.uk under Publications/Research & evaluation.

[5] In this document 'carbon' is used as shorthand for carbon dioxide equivalents (CO_2e).

challenges. Our campuses can also lead by becoming more sustainable and efficient, for example reducing consumption of fossil fuels.

Tackling climate change is a challenging agenda and the UK HEIs need to move quickly to do it. Feedback to HEFCE 2008/18 shows that there is now widespread agreement in the sector that sustainable development is important (HEFCE, 2009c). It is a growing political priority both nationally and internationally. The United Nations' Intergovernmental Panel on Climate Change has concluded that warming of the climate system is unequivocal and that human activities make a substantial contribution[6]. Lord Stern's review of climate change[7] in 2006 concluded that the benefits of strong and early action will far outweigh the economic costs of not acting(HEFCE, 2010). In June 2008 Lord Stern said that the costs of stopping greenhouse gases rising to dangerous levels had already doubled since 2006 to 2 per cent of GDP. HE makes an important contribution to the UK's sustainable development strategy, updated in 2005[8].

The Climate Change Act 2008[9] aims to improve carbon management and help the transition towards a low-carbon economy in the UK. It sets the world's first legally binding targets for greenhouse gas emissions of at least 80 per cent by 2050 and at least 34 per cent by 2020[10], against a 1990 baseline. Major parts of the public sector such as the NHS[11] and schools[12] have developed carbon reduction strategies. In summer 2009 the Government published the UK Low Carbon Transition Plan[13], which sets out how the UK will meet the 34 percent cut in emissions on 1990 levels by 2020. Nationally, emissions have already been reduced by 21 per cent (HEFCE, 2010). HEI sector needs to play its part in meeting national targets for carbon reduction. It is uniquely placed to lead the way with its role in teaching

[6] 'Climate change 2007: the physical science basis', available at www.ipcc.ch under Publications and Data/Reports.
[7] 'Stern Review on the Economics of Climate Change', available at www.hm-treasury.gov.uk under Independent reviews.
[8] 'Securing the future: the UK's sustainable development strategy', available at www.sustainable-development.gov.uk under Publications.
[9] Further information is available at www.decc.gov.uk under Legislation/Climate Change Act 2008.
[10] The 2009 Budget set the first carbon budgets, as required by the Climate Change Act. This increased the level of the 2020 target from 26 per cent to 34 per cent.
[11] 'Saving Carbon, Improving Health: NHS Carbon Reduction Strategy for England' may be read at www.sdu.nhs.uk under Carbon reduction strategy.
[12] 'Carbon Emissions from Schools: Where they arise and how to reduce them' may be read at www.sd-commission.org.uk under 'Our work/Education, Young People and skills/Schools'.
[13] The plan is available at www.decc.gov.uk under Publications.

and research, it aspires to go further and achieve carbon reductions in excess of the sector-level targets.

Cutting carbon emissions as part of the fight against climate change should be a key priority for Universities and Colleges – to get their own house in order and lead by example. The UK government has identified the Higher Education sector as key to delivering carbon reduction across the UK in line with the Climate Change Act targets, and the Higher Education Carbon Management programme is designed in response to this (Brandy and Honey, 2007). It assists HEIs in making a positive contribution to the environment by lowering carbon emissions whilst saving money on energy and putting it to better use elsewhere. HEIs will suffer financially and reputationally if they do not meet the targets (Eccles et al., 2007). The Carbon Reduction Energy Efficiency Scheme will cost the emitting universities; the more carbon emissions they cause the more they pay to Government - £12 per tonne presently. An annual public league table will publish our performance based on the actual CO2 year on year reduction, so it is important to demonstrate continuous improvement. HEFCE Capital grants are linked to the production of Carbon Management Plans and the rising cost of energy is a further financial incentive. HEFCE also requires a Carbon Management Plan for CIF-2 funding in 2011 and Government targets on carbon reduction made it necessary to have a plan which sets out the projects specifically for Carbon Reduction.

While HEFCE is implementing a tool to keep in pace and possibly to take the lead in the climate change effort by the Government, it must be understood that HEFCE does not apply any bindings on the HEIs. They comply with the Climate Change Act 2008 and meet the target for qualifying for the CIF-2 fund. Additionally, the 'Energy Savings Opportunity Scheme' (ESOS) is the Government's proposed approach to implement the requirement of all large businesses in the UK to undertake mandatory assessments looking at energy use and energy efficiency opportunities at least once in every four years. Originally, the ESOS is a new piece of EU legislation which requires member states to introduce a mandatory programme of energy audits for 'large enterprises'. The ESOS Regulations 2014[14] bring into force Article 8 of the EU Energy Efficiency Directive with the

[14]http://www.legislation.gov.uk/uksi/2014/1643/contents/made

deadline for the first compliance period is 5 December 2015. This means that before this date, businesses that meet the qualification criteria will have to achieve compliance with the regulations and notify the scheme administrators; the Environment Agency. Audits must be undertaken then at least every four years from the date of the previous audit. It will help to drive the take-up of cost-effective energy efficiency measures by participants, benefiting their competitiveness and contributing to the wider growth agenda. At the moment the requirement under ESOS may have some influence but HEIs are already doing much of the work anyway as part of the HEFCE target. However, government believes that this programme offers a significant opportunity for the UK.

Thus policy changes in the UK, with introduction of HEFCE target during 2008-09 and the Climate Change Act 2008 and the Climate Change (Scotland) Act 2009inspired this research to explore the impact of such change in the relevant sector. Additionally, the very recent ESOS Regulations 2014 make this research more important. These recent phenomena related to climate change motivates to this research to investigate the determinants of carbon emission disclosures by the UK HEIs.

1.3 MOTIVATION FOR THE STUDY

The concept of corporate social responsibility (CSR) was introduced in 1972 at the first Earth Summit in Stockholm. And education was identified as a fundamental to successful achievement of sustainable development in the meeting of governmental representatives and nongovernmental organizations. Since then lots of academic papers have been published (for example, Ullman, 1976 & 1985; Ingram, 1978; Abbott & Monsen, 1979; Belkaoui, 1980; Ingram & Frazier, 1980; Jones, 1980 & 1982; Trotman & Bradley, 1981; Tinker, Merino, & Neimark, 1982; Mathews, 1984; T. Tinker, Lehman, & Neimark, 1991), but policy implications were variable and quite slow. However, the international community committed to ensure the sustainable development of the world with 1992 RIO declaration on Environment and Development. Later in 2002, the importance of education for sustainable development was reaffirmed in the World Earth Summit in Johannesburg.

1.3.1 Why Higher Education Institutions?

Progressively, HEIs have been incorporating sustainable practice in their core activities of teaching and research, institutional management and operational system (Forum for the Future, 2007). Two unique opportunities have been pointed out by UNESCO (2004) for HEIs to engage themselves in sustainable development. First, universities form a link between knowledge generation and the transfer of knowledge to society. Second, they actively contribute to the societal development through outreach and service to society. In this regard, there has been hardly any research to measure whether the HEIs integrate this concept of social disclosures in their business model. Nejati, Shafaei, Salamzadeh, and Daraei (2011)analysed the world top 10 universities to identify how much they disclose regarding their sustainability issues. Thus, there is a real scope for contributing to the field to explore the social responsibility attributes in HEIs, which can be demonstrated by various functions and operations of the HEIs, including teaching and research, infrastructure, course content, biodiversity, the local and regional community, purchasing practices and waste management (Forum for the Future, 2007). The "Green Growth Declaration" agreed that economic growth can be achieved using sustainable and cleaner technologies and maintaining low-carbon emissions (Forum for the Future, 2007). Because of HEIs' role in increasing familiarity with sustainable development concepts and to accentuate areas for research and development, it is particularly relevant to them.

Since the seventies the concept of sustainability and climate change has found a great public awareness (Gamble et al., 1995). This raising public awareness regarding climate change and stricter government intervention and regulation has resulted in an increased pressure on organisations to report their activities to their stakeholders (e.g. students, employees, suppliers, environmental groups, government etc. for HEIs) through different media (Wilmshurst and Frost, 2000), including annual reports (Yekini and Jallow, 2012). Reporting this issue in response to the awareness is also used by them as a tool to have increased competitive advantages (Hart, 1995) as the activities related to reduction of carbon emission are highly likely to be valued by stakeholders.

This increased public awareness has also resulted in increased motivation, additional regulation and intervention from the institutional stakeholders in the UK (de Villiers et al., 2011). For example, the HEFCE target during 2008-09, the Climate Change Act 2008, the Climate Change (Scotland) Act 2009, and the ESOS Regulations 2014 etc. The mandatory climate change reporting requirement in Scotland also impacts the HEIs need to report carbon emission disclosures in the annual reports (Porter and Kramer, 2006). The targets and requirements by the powerful institutional stakeholders results in the expectation of HEIs to become more transparent than ever regarding their carbon emission and activities. It is expected that the change in guidelines and action should result in disclosure, reporting and statement in the annual report, which is one of the most formal media by the organization for communicating facts and figures to various stakeholders.

1.3.2 Why Disclose?

The carbon reduction initiatives by the UK HEIs in response to public awareness and governmental requirements need to be communicated to ensure transparency in their activities. Even though the conventional accounting practice fails to address the issue directly and systematically (Samuels, 1990), HEIs need to maintain their transparency through proper voluntary disclosures (Bebbington, 1997). While various media can possibly be engaged regarding this issue, this study confines itself to annual reports, independent sustainability reports referred in annual reports and carbon management plans. The evident information asymmetry amongst various stakeholders and HEIs calls for extra effort for voluntary disclosures (Gray and Collison, 2002), being motivated by the fact that majority UK HEIs share a uniform background that they majorly run on public money. The limitation of conventional accounting to address information required for transparency and accountability, raise the issue of disclosing information in addition to the mandatory requirements (Beattie et al., 2004; Beretta and Bozzolan, 2008). Beattie et al. (2004) also remarks that the quality of the voluntary disclosures need to monitored, which leads to the fact that current state of disclosures need to be more transparent (Boesso and Kumar, 2007) to reduce the information asymmetry. The demand for this CED has been reinforced by the

stakeholder and institutional approach to satisfy wide range of stakeholders and institutional expectation taken place in form of targets, requirements, acts and regulations (Clarkson et al., 2011). Additionally, concern for the relevance and quality of CED have been of academic interest (Daub, 2007; Smith et al., 2005) since the ability of satisfy the information need of the stakeholders is still questionable (Cormier et al., 2011).

1.3.3 Why Carbon Emission Disclosures?

The climate change and carbon disclosures seem to reflect public awareness, respond to regulatory pressure, and accommodate social concern to protect institutional reputation (Guthrie and Parker, 1990, pp. 171–172). Organisations are found to respond to the increased awareness and regulation and thereafter, inform the stakeholders and institutional bodies regarding those response and activities through appropriate CED (Gray et al., 1995a; Hughes et al., 2001). Due to the rise of such awareness over the green issues CED in annual reports is of substantial academic interest and resulted in call for additional CED (Roberts, 1991). Similar prior studies on social disclosures show substantial concern about such voluntary disclosures in the annual reports (Gray et al., 1996). The UK HEIs sharing similar characteristics and background of being majorly public funded[15] should possess similar motivation for the CED. Additionally, government intervention and stakeholder expectation should have comparable and equal impact on the HEIs. This common ground facilitates for further investigation on the causation of HEI CED in the UK, quality of the HEI CED and their impact on the HEI reputation.

HEIs being different from profit seeking organizations possess distinguished characteristics different from profit-oriented companies. This calls for specific academic and research attention for HEIs. Generalising the research study for profit-oriented companies for the majorly publicly funded UK HEIs should mislead any outcome. Thus, studying CED of UK HEIs is very much important in the existence of the uniqueness of the research. This research thus considers

[15] The vast majority of United Kingdom universities are government financed, with only four private universities (the charitable University of Buckingham, Regent's University London and profit-making University of Law and BPP University) where the government does not subsidize the tuition fees.

unique explanatory variables, for example carbon emission target by the HEFCE to be achieved by the year 2020, which is actually different for each HEIs, the current year emission for the year 2012, carbon audit score, spending on facilities improvement by respective HEIs have been taken to consideration among others.

1.3.4 Extant Literature on Higher Education Institution Carbon Disclosure

The research studies the CED practices of the British HEIs. Limited literature exists on CED practices profit-seeking UK organizations seeking for the legitimization from the society. Additionally, in case of CED by the HEIs, particularly in the UK hardly any literature exists. Thus, an apparent vacuum exists in the study of dynamics of CED by HEIs. Moreover, none of the existing literature related to HEI social reporting studied the determinants or impact of such voluntary reporting. Nejati et al. (2011) studied top 10 world universities and found that almost all the universities covered in their sample disclose about CSR on their web pages. This study was based on a very small sample limited to ten, which is not enough to come up to any conclusion. This study did not focus on analysing the motivation for such disclosure by the universities. Godemann et al. (2011) in their research paper series on 100 business schools who signed in UN PRME (United Nations Principles for Responsible Management Education) found that the signatory universities worldwide proactively follow sustainable behaviour and disclose it. This study also lacks in analysing the motivation behind such proactive behaviour of HEIs regarding sustainable behaviour. Mazhar et al. (2014) did a qualitative exploratory study on the strategic carbon management of HE sector. They proposed thematic framework including – understanding carbon management, leadership, funding & resources, carbon management planning, carbon reduction targets, communication, stakeholders' engagement – staff and students, ownership & governance, strategic decision-making, benchmarking and space management. However, this study only explores key factors regarding strategic carbon management, without any back up of empirical analysis. Thus, an investigation to find the determinants of HEI CED can add to the existing knowledge.

In case of companies, there are quite a few studies which finds out the dynamics of voluntary social disclosures and its impact on organizational reputation.

Hasseldine, Salama, & Toms (2005), and Toms (2002) studied the impact of corporate social and environmental disclosure on the organizational reputation. However, all these studies were limited to profit oriented companies. Moreover, study of CED is very limited in UK and to my best knowledge, no study so far investigated the determinants or impact of CED for UK HEIs. This vacuum in the social disclosure literature calls for an extensive study in this area, in the sense that HEIs have distinct characteristics and hence motivation and impact of such disclosure would be different from profit-seeking organisations. Moreover, CED in UK definitely call for academic and research attention for its motivation and impact.

Again, suffice to say that lack of generally accepted theory has not helped the research and explanation of HEI CED and thus, leading to apparently continuous debate in social disclosure literature (Bebbington et al., 2008a). This led to thirty different groups of theories being used to explain social disclosure by different authors at different times (Thomson, 2007 cited in Gray, Owen, & Adams, 2010). Though social reporting has been theorized by many authors in the past (see for example, Gray, Kouhy, & Lavers, 1995;Milne & Patten, 2002; Neu, Pedwell, & Warsame, 1998) but HEI CED has never been approached to theorize till now. So, there is a motivation to know whether it is possible to explicitly theorize the CED in the HEIs. However, Gray et al. (2010) suggests no single theory to come up with the full explanation of the disclosure phenomena; they argued that intersections between theories might lead to more intellectual explanation and thus supporting theoretical openness and use of multiple theories (Bebbington et al., 2008a, 2008b) to explain the phenomena. Backed by this argument, the researcher investigates HEI CED in the UK in annual reports as a singular topic, although discussed under social disclosures, by exploring stakeholder theory, institutional theory, stewardship theory, and signalling theory in line with Bebbington et al. (2008a, 2008b) and Gray et al. (2010). The scope of this research will be exploratory (with multiple theoretical approach), empirical (with test of hypothesis) and evaluative. It focuses on the carbon emission disclosures in the voluntary section of the annual reports by the UK HEIs, which is the most authentic media of communication recognised and acceptable to stakeholders (Adams et al., 1998; Guthrie and Parker, 1990) and only document routinely sent

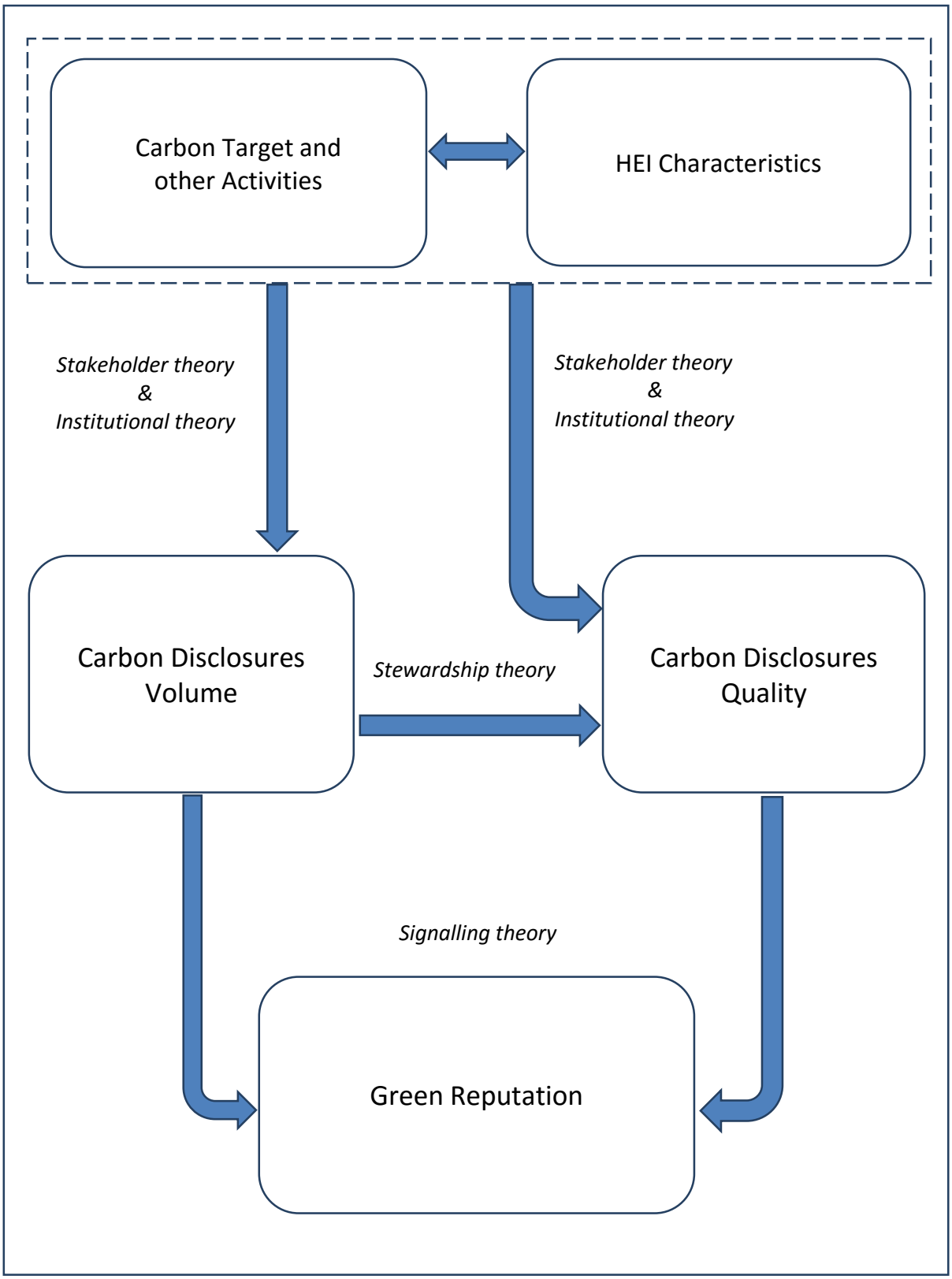
out to the stakeholders (Adams et al., 1998). It will also consider independent sustainability reports to supplement.

The issue with prior literature to choose from volume and quality of CED is much debated. Both volumetric and qualitative CED have their own limitations without proper consideration of the context. The content analysis approach is the most standard tool used by majority of prior literature to measure the volume (Gray et al., 1995b; Hackston and Milne, 1996) or quality (Freedman and Stagliano, 2008; Rankin et al., 2011; Yekini and Jallow, 2012) of social disclosures. However, the approach used with content analysis is widely debated in the existing literature. This research comes up with a unique index for HEIs to measure the volume of their CED in annual reports allowing for the distinct characteristics of HEIs.

This research aims to examine three aspects as depicted in Figure 1.1. The first study examines the HEFCE target as the determinant of the amount of HEI CED. Second aspect studies the relationship between volume and quality of CED and also the impact of HEFCE target on the quality of such HEI CED. The impact of the CED on the organizational reputation will be sought for in the third study.

The outcome of the research will be of interest to stakeholders of the universities, HEFCE and other policymakers. This study may also work as the reference of best practices to attract other universities which are following in the ranking from developing countries (Godemann et al., 2011) and trying to improve their standards through a holistic approach.

Figure 1.1
Research Flow



1.4 ORIGINALITY AND CONTRIBUTION TO KNOWLEDGE

This thesis aims to contribute the social disclosure knowledge mainly in following areas.

First, this is the first ever research on HEI CED, studying determinants and impact of such disclosures. Though there exist decades of research on social and environmental disclosures in annual reports, study on HEI social disclosures is really limited. Moreover, no study actually measured the cause and effects of such HEI social disclosures, considering HEI is distinct from other organisations.

Second is that the limited existing literature studies the compliance, nature and extent of social disclosures by HEIs. None attempted to measure the causation of such disclosures. The existing study investigates the cause and effect of HEI CED as a singular topic, which generally discussed as part of social disclosure.

This leads to the third importance that the research finds for the impact of HEFCE target to be achieved by the year 2020, set out for the HEIs during the year 2009. This research has the potential to impact policy evaluation and formulation in this regard. Basis for this research here is that the more critical particular stakeholder resources are to the existence and success of an organization, the more authoritative the stakeholder is and more likely the expectation of such stakeholder are to be fulfilled. This demand may relate to the provision of organisational carbon reporting (Ullman, 1985).

Fourth, very few studies considered volume and quality of social disclosure systematically in past, thus, missing an important link between volume and quality of such disclosure. Whether disclosures are meant only for verbal signals in order to have positive impact on reputation or the disclosed information truly reflects the carbon reduction promise.

Fifth, the study investigates how the volume and quality of CED impact HEI green reputation. How the HEIs signal their carbon reduction performance to the major stakeholders, e.g. HEFCE? Whether this signalling adds to their green reputation?

1.4.1 Contribution to Extant Literature

This is the first known research on CED of HEIs, which studies the determinants of the volume and quality of HEI CED and its impact on organizational reputation. There has been decades of research on social reporting (Gray, Kouhy, & Lavers, 1995b; Ullman, 1985), however research on CED is comparatively new (Bebbington and Larrinaga-González, 2008; Rankin et al., 2011). However, existing research are primarily on the corporate side, leaving a vacuum of literature on CED in the HEIs. The existing literature mainly talks about the ways to integrate social reporting in the existing curriculum (Bebbington, 1997; Boyce et al., 2012; Brown and Cloke, 2009; Christensen et al., 2007, 2009; Dale et al., 2010; Dellaportas and Hassall, 2013; Dlouhá et al., 2013; Gray et al., 1994; Humphrey et al., 1996; Jongbloed et al., 2008; Lewis et al., 1992; Lockhart and Mathews, 2000; Mathews, 1984, 1997; Morgeson et al., 2013; Wright, 2010; Wu et al., 2010; Zhang et al., 2011; Zilahy and Huisingh, 2009). Proponents also suggest completely redesigning the course structure. But there is hardly any study which deals with the social reporting, particularly CED by HEIs.

Nejati et al. (2011) studied top 10 universities websites and found that these are disclosing almost all sustainability information according to ISO 26000: 2009. But this study is constrained by too small sample size and also does not look for any inside into integration or motivation behind such disclosure on voluntary basis. The sample size gets even smaller when it looks at the result by region. Godemann et al. (2011) also studied the Sharing Information Progress (SIP)[16] reports of 100 UN PRME signatory business schools and found that the UN PRME signatory business schools are already aware of sustainable development and disclosing on their activities and achievements. Their sample is also compromised as they selected business schools only rather than whole HEI representatives. This study also does not say anything about the motivation regarding such disclosing practices by the business schools. Mazhar et al. (2014) did a qualitative exploratory study on the strategic carbon management of HE sector. They came up with 17 semi-structured interviews with middle and senior managers in HEIs

[16]Signatories are expected to communicate their progress at least every 24 months through a "Sharing Information on Progress" （SIP） document.

to investigate the issues related to HEI carbon management. Their proposed thematic framework includes – understanding carbon management, leadership, funding & resources, carbon management planning, carbon reduction targets, communication, stakeholders' engagement – staff and students, ownership & governance, strategic decision-making, benchmarking and space management. They pointed out that there exists a 5% gap between aggregate individual HEI carbon target (38%) and sectors' overall target (43%), which is acknowledged by HEFCE in their publication (HEFCE, 2013). In justifying the argument in favour of further strengthening sector role, Mazhar et al. (2014) displayed interview results with a responsible person from each of their sample 17 HEIs in a logical manner. However, this study only explores key factors regarding strategic carbon management, without any back up of empirical analysis. Thus an investigation to find the determinants of HEI CED can add to the existing knowledge.

1.4.2 Contribution to Theory

The current study investigates how the CED is integrated in the HEI, existence of any causal factor behind such disclosure, such as impact of HEFCE target and whether it is possible to explicitly theorize the CED in HEI. In relation to theoretical contribution, this study constitutes the first known research that holds the complementary perspectives of stakeholder theory, institutional theory, stewardship theory and signalling theory to provide a richer explanation of the perception and driving factors for management regarding CED. While some of the above theories have typically been applied for CSR in corporate sectors, this study applies them in the context of HEI CED.

1.4.3 Who will be interested?

This study will be of interest to its various stakeholders. Organisations disclose voluntary information to better manage its stakeholders' expectation, discharge institutional responsibility, legitimise its existence and build reputation base; also managers use this to ensure their own benefit through managing stakeholders. Specifically, in this research CED should help HEIs to manage the expectation of the HEFCE, society and other stakeholders given the target set on the motivation to have a reduced carbon emission. Future policies also evolve from this information. Universities, which are less recognized, can follow this behaviour

through well disclosure practice. Though they may wish to modify it according to their socio-cultural situation, but it is always helpful to have examples of best practice to get motivations and directions from others. This can be well facilitated through the research findings. Sustainability reporting helps universities to gain public acknowledgement (Grunig, 1989) and to achieve legitimacy (Aldrich and Fiol, 1994).

The originality of the study stems from the fact that this is the first research of its kind examining the cause and effect of HEI CED. With regards to that all the HEIs were included in the study as primary sample. Additionally, this thesis uses multiple theoretical underpinnings to understand how and why HEIs produce CED in the annual reports and therefore enriches our knowledge of determinants for and impact of HEI CED. In doing so, the research distinguishes among various areas and types of CED related activities. The areas include Carbon policies, vision and strategies claim (Beck et al., 2010; Gray et al., 1995b; GRI, 2013; Hackston and Milne, 1996; ISO 14064-1, 2012; Prado-Lorenzo et al., 2009; Rankin et al., 2011; Salama, 2003); Carbon governance and management systems (Beck et al., 2010; GRI, 2013; ISO 14064-1, 2012; Rankin et al., 2011); Regulatory compliance (e.g. mention of HEFCE) (Hackston and Milne, 1996; ISO 14064-1, 2012; Rankin et al., 2011; Salama, 2003); Credibility, auditing and external assurance (Beck et al., 2010; Gray et al., 1995b; GRI, 2013; ISO 14064-1, 2012; Prado-Lorenzo et al., 2009; Rankin et al., 2011; Salama, 2003); Carbon profile ; Carbon initiatives, processing, reduction and abatement (Gray et al., 1995b; GRI, 2013; ISO 14064-1, 2012; Prado-Lorenzo et al., 2009; Rankin et al., 2011; Salama, 2003; Wiseman, 1982); Carbon spending and financial data (GRI, 2013; Wiseman, 1982); Carbon focus on curriculum and education for carbon sustainability; Community engagement in carbon initiatives (staff-student engagement); Other carbon disclosures (Beck et al., 2010; Hackston and Milne, 1996; Salama, 2003; Wiseman, 1982). The types include whether they are monetary, non-monetary, declarative, diagram, good, bad and neutral (Gray et al., 1995b; Hackston and Milne, 1996; Salama, 2003). CED is likely to be better understood adopting a disaggregated view, distinguishing among different areas and types rather than only an aggregated concept (Beattie et al., 2004). They add that this would ensure richer insight into CED quality. The thesis also develops a

disclosure index for measuring quality of CED (Beck et al., 2010; ISO 14064-1, 2012; Rankin et al., 2011). This allows to measure the quality of the HEI CED in an acceptable and suitable manner (Yekini and Jallow, 2012).

The thesis recognises the pressure from various stakeholders on organizations (in the context of this research, HEIs). HEFCE, government and such organizations, being influential stakeholders, are critical to the existence and success of an HEI. This thesis argues that according to both institutional theory and managerial branch of stakeholder theory, HEIs need to address the HEFCE target set to be achieved by 2020 in order to qualify for CIF-2 funding; also the Climate Change Act 2008, Climate Change (Scotland) Act 2009, ESOS Regulations 2014 induce HEIs to disclose CED in their annual reports as formal means of communication along with other forms. The annual report, here, ensures the use of most formal and acceptable way of communication accessible by the society. Institutional theory suggests here that HEIs need to be transparent here that they are incorporating the institutionalized norms and rules to maintain conformity in the broader society (Deegan, 2002; Islam, 2009). HEIs are expected to act in accordance to broader societal expectations and disclose appropriately of such conformity (DiMaggio and Powell, 1983). This social disclosure is well explained with institutional theory. According to Deegan (2002), organisations (HEIs, for this thesis) largely conform to the institutional norms in response to societal expectation. Additionally, stakeholder theory argues that there might be different expectations from wide range of stakeholders (Gray et al., 1996). However, expectations of powerful stakeholders are most common to be addressed and disclosed. Yet the disclosures need not be restricted as long as the institutional norms are in conformity with societal expectation. CED is reported in media most strategically to manage stakeholders (Roberts, 1991; Ullman, 1985, p. 554). This essentially directs to the explanation that carbon reduction target by HEFCE and the government are addressed by the HEIs and disclosed to them and wider society with voluntary disclosure in annual reports, along with other media.

1.5 RESEARCH PHILOSOPHY

Theorizing social phenomena of business by a definite law, unlike natural sciences, is much more complex (Rizk, 2006). Research philosophy links the research to the source and nature of knowledge. Objective of research to the development of new knowledge, which is guided by the philosophy. Ontology is a system of belief that reflects an interpretation of an individual about what constitutes a fact. It is associated with a central question of whether social entities need to be perceived as objective or subjective. Accordingly, positivism (or objectivism) and subjectivism can be specified as two important aspects of ontology. This research follows positivist research philosophy and quantitative research method.

Positivism "portrays the position that social entities exist in reality external to social actors concerned with their existence" (Saunders et al., 2008). Positivism is an ontological position that asserts that social phenomena and their meanings have an existence that is independent of social actors (Bryman, 2015). It is based on the idea that science is the only way to learn about the truth. It believes that only observable phenomena can provide credible data and facts. It focuses on causality and law-like generalisations. Thus it is possible to reduce phenomena to simplest elements. Positivism believes that researcher is external to the research and does not take part in the process. Thus researcher is objective and independent of social actors. Data collection method also differs under positive research philosophy. Data collection becomes highly structured, includes large samples, objective and independent measurement.

Positivism ideally leads to quantitative research, but can be qualitative as well. The main emphasis of quantitative research is on deductive reasoning which tends to move from the general to the specific. Bryman (2015) defined quantitative research which entails the collection of numerical data and exhibits the view of relationship between theory and research as deductive, a predilection for natural science approach, and as having an objectivist conception of social reality. This research uses the quantitative data for analysis and regression analysis, which is one of the most popular research methods of quantitative category. To understand the fact in a scientific way – the laws of cause and effect in a scientific method a mechanistic approach was taken. Deductive reasoning is done to postulate the

theories and was tested. Empirical data is collected to have the observation, measurement and experiment.

Following a positivist philosophy, this thesis therefore seeks to investigate the objective reality of HEI CED in order to find out the determinants of such CED, relationship of CED volume and quality, and effect of CED on environmental reputation in a way that is meaningful in the proposed research environment.

1.6 RESEARCH QUESTIONS

Prior literature has investigated the effects of a number of variables (such as- size, profitability, industry etc.) on social disclosure, which is concerned specifically with the corporate sector (Alnajjar, 2000; Cowen and Carolina, 1987; Gray et al., 2001; Hackston and Milne, 1996; Patten, 1991; Roberts, 1992). But there is absolutely no study known to the researcher which deals with identifying such variables which determines the Carbon disclosures of HEIs in their CAR. This instigates to following research questions-

Research Question 01. What are the determinants of HEI CED? Especially, what is the impact of HEFCE target on HEI CED?

Overall social reporting debate in last decade shifted from the question whether to report to a mature concern of scope, quality, type (both quantity and quality), length or quantity of such disclosure (Yekini and Jallow, 2012). Hasseldine et al. (2005) and Toms (2002) have supported the importance of quality measure as a valuable tool in the signalling theory of social reporting. Whilst debate exists on the definition and measurement technique of quality of voluntary social reporting (Beattie et al., 2004), a definite importance of attention to the quality is evidenced in this study.

Figure 1.2

Relationship between Quantity and Quality of Carbon Disclosures

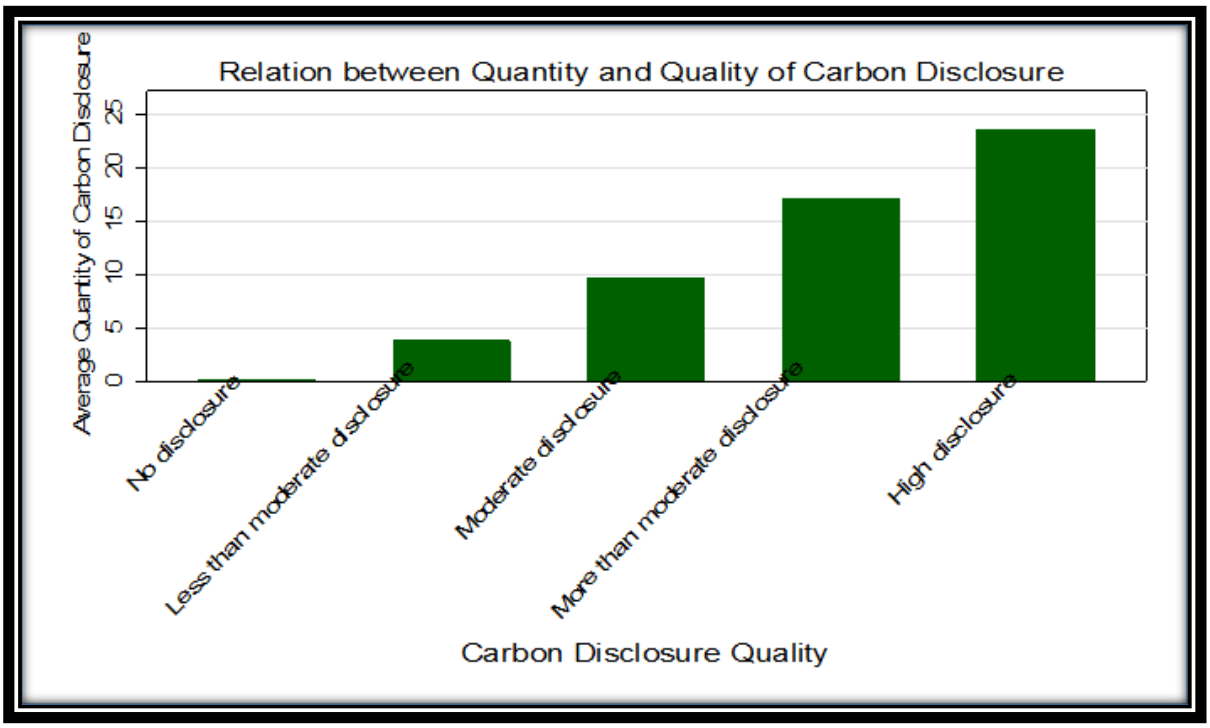


Figure 1.2 shows an interesting correlation among the volume and quality of CED with a high positive correlation (Spearman) of 0.8005 (Pearson = 0.6685), which calls for further investigation on the relationship shared among CED volume, CED quality and HEFCE intervention (Hooks and van Staden, 2011). This is going to be researched more in depth in chapter three.

Research Question 02. What is the relationship between HEI CED quality and volume?

While CSR gives an opportunity to contribute towards the well-being of the society, it also offers the organizations to have a wise contribution towards their reputation (Dahan and Senol, 2012; Porter and Kramer, 2006; Smith, 2007). CSR reporting can enhance brand reputation (Ballou et al., 2006; Gray, 2006; Woods, 2003). D. L. Brown, Guidry, & Patten (2010, p. 86) argued that corporate reputation can lead to substantial institutional benefit. This instigates to following research question-

Research question 03. What is the impact of HEI CED on environmental reputation of the organisation?

The answer to this question may provide foundation for CED information reported by the UK HEIs.

1.7 STRUCTURE OF THE THESIS

Chapter one briefly outlines the rest of the thesis and summarizes the research.

Chapter two explains the theoretical framework used in this thesis to understand the relationship found from the analyses on carbon emission disclosures (CED) by higher education institutions in the UK - determinants of CED, carbon reduction target, volumetric &qualitative disclosures and reputation. The theoretical framework includes - stakeholder theory, institutional theory, stewardship theory and signalling theory.

Chapter three investigates the determinants of carbon emission disclosures (CED) of higher education institutions (HEIs) in the UK, with special concern of the impact of the Higher Education Funding Council of England (HEFCE) carbon reduction target on such disclosures. For this, a content analysis has been done on the annual reports and independent sustainability reports of the HEIs. The sustainability report, vice chancellors forwarding, operating review are the key areas in the annual reports for the purpose of our study. A disclosure index was prepared to capture both disclosure categories and types in the 2012 annual reports of all HEIs in UK. The association CED and its determinants were examined using TOBIT linear regression analysis, associated by sensitivity test with negative binomial and OLS models. Carbon reduction target imposed by HEFCE was found to have significant positive impact on CED. The results also show that carbon audit and HEI region have significant impact in determining CED volume in annual reports.

Chapter four explores the determinants of carbon emission disclosures quality of HEIs in the UK, relationship between volume and quality of CED, with special concern of the impact of HEFCE carbon reduction target on such disclosures. A disclosure index has been prepared to capture disclosure quality in the 2012 annual

reports of all HEIs in UK. Ordered PROBIT regression model has been used to find the relationship between CED volume and quality. CED volume has been criticised arguing that mere wordy CED is not good enough. This study explores the decision usefulness of the CED by HEIs i.e. this study investigates whether the more CED means more useful it is. This chapter also investigates the questions- Does the HEFCE target have the same impact on the quality of HEI CED? Whether the carbon disclosures in the annual report reflect true reflection of HEI carbon reduction activities? CED volume and Carbon reduction target given by HEFCE was found to have significant positive impact on CED. Investment in newer technology was also found to be a significant determinant of quality of CED, whilst current carbon emission and carbon audit were not found to have any significant causal effect on CED quality in annual reports of HEIs.

Chapter five explores the impact of CED and carbon performances by UK HEI on their environmental reputation. The green score has been taken from the People and Planet organisation. Initial sample includes all universities having a green score in the database. The association between green reputation, CED and carbon performances was examined using robust least squared regression model. CED, carbon emission and carbon audit were proved to have highly significant causal relationship with HEI green reputation at 1% significance level. Impact of independent sustainability reporting was found to have very weak significance in determining HEI reputation. The study is distinct in investigating the impact of CED and carbon performances by UK HEIs on their environmental reputation. The study shows whether and how the HEI CED and carbon performances contribute towards the environmental reputation of the HEIs.

Chapter six is the concluding chapter which summarizes the whole study and opens the avenue for future research.

CHAPTER TWO

THEORETICAL FRAMEWORK

Chapter 2
Theoretical Framework

2.1 CHAPTER OVERVIEW

Theories are formulated to explain, predict, and understand phenomena and, in many cases, to challenge and extend existing knowledge within the limits of critical bounding assumptions. The theoretical framework is the structure that can hold or support a theory of a research study (Swanson and Chermack, 2013). The theoretical framework introduces and describes the theory that explains why the research problem under study exists. This chapter explains the theoretical framework used in this thesis to understand the relationship found from the analyses on carbon emission disclosures (CED) by higher education institutions in the UK related to the following: determinants of CED, carbon reduction target, volumetric & qualitative disclosures, and reputation. The theoretical framework includes several key theories: stakeholder theory, institutional theory, stewardship theory and signalling theory.

Theorizing social phenomena of business are allegedly more complex than theorizing anything in natural science (Rizk, 2006). The philosophy of the research suggests a link between the source and nature of knowledge that is being discussed. Hence, from the philosophy, the objective of research is derived to be the development of newer knowledge. This research will follow after the positivist research philosophy with the verifiability of quantitative research method. A theory is a network of hypotheses or a widely inclusive notion that supports at least one or more theories. Again, a theory is also “a set of tentative explanations”, in other words, an arrangement for provisional clarification to justify diverse set of observations. A theory is needed to legitimize a relationship between the variables of the research. The relationship should exist with a specific end goal in order to prevent any of the hypotheses from becoming disputable. The diversity of observations can be a key for the researchers to establish a set of tentative explanations. This can help them define the ambiguity and can hence make sense of the diversity by connecting the loose ends of the research.

There is currently a lack of generally accepted theory in the research and explanation of HEI CED which has led to ongoing debate in social disclosure literature (Bebbington et al., 2008a). Social reporting has been theorized by many authors in the past (see for example, Gray, Kouhy, & Lavers, 1995; Milne & Patten, 2002; Neu, Pedwell, & Warsame, 1998). Thirty different groups of theories were found explaining social disclosure in literature by different authors at different times (Thomson, 2007 cited in Gray, Owen, & Adams, 2010). Gray et al. (2010) suggests using several contemporary theories to come up with a full explanation of the disclosure phenomena arguing that intersections between theories might lead to better intellectual explanation. Bebbington et al. (2008a, 2008b) support theoretical openness and the use of multiple theories in explaining the phenomena.

There is very limited available research on carbon emission disclosures which used theories explicitly to explain their findings regarding such disclosures. Theories applied to carbon emission disclosures literature include Gallego-Álvarez et al. (2011), who used legitimacy theory to find and explain the factors behind the disclosure of corporate information of issues related to opportunities arising from climate change worldwide. Whilst Rankin et al. (2011) took help of institutional governance theory to explain the association between greenhouse gas disclosures and internal organizational systems factors, such as environmental management systems, corporate governance quality, environmental committees, and external private guidance (e.g. GRI, CDP). Later, Hrasky (2012) used legitimacy theory in his investigation of whether Australian companies have adjusted their footprint-related disclosure responses and whether this adoption reflects symbolism or apparent behaviour.

This chapter introduces the theories to be used in explaining different models later on in this thesis. Next few sections introduce the theories, followed by justifications for using specific theory or theories for specific models.

2.2 STAKEHOLDER THEORY

Stakeholder theory has been widely employed in accounting literature for providing a strong justification for both corporate social and environmental disclosure practices and corporate governance mechanisms. Stakeholder theory involves the recognition and identification of the relationship between the company's behaviour and the impact on its stakeholders. Therefore, "the corporation's continued existence requires the support of the stakeholders, their approval must be sought, and the activities of the corporation adjusted to gain that approval. The more powerful the stakeholders are, the more the company must adapt" (Gray et al., 1995a, p. 53). According to Gray et al. (1996), an organization has many stakeholders; hence, it owes accountability to all its stakeholders, referring to the wide range of responsibilities assigned to corporate decision-makers. In addition, the more important the stakeholders are to the organization, the more effort the organization will make to manage and manipulate this relationship. Managing such a relationship can be achieved by providing more information through voluntary disclosures, in order to gain the support and approval of these stakeholders.

The historical context of the current stakeholder theory was formed through three major developments in the intellectual, political and economic life of the 1970s and 1980s (Hendry, 2001). One of these was the introduction of a new economic theory of the firm, in which the firm was defined as a nexus of contracts, of which the principal-agent contract between shareholders and managers is a primary one. The interpretation of the principal-agent relationship, which is sometimes referred to as "stockholder theory", was reinforced by the second key development of the period, the rise of the free-market private-property economic policies characteristic of the 1970s and 1980s. Earlier debates existed about the legitimate role of management, challenging the concept of the social responsibility of business by arguing that the moral responsibility of managers was to serve the interests of shareholders, which generally will be to make as much money as possible. The third key development of the period was the rapid growth of capital markets and takeover activity. This led to both legal and political engagement between managers and shareholders. The managers, who were rewarded on the

basis of short-term stock market returns, were ready to embrace the new principal-agent concept and declare allegiance to their shareholders' objectives (Hendry, 2001).

Stakeholder theory first appeared, in the context of these developments, as a defence of the social responsibilities of the business and as a declaration that managers must have moral responsibilities to other interested parties, not just to its shareholders (Hendry, 2001). These interested parties are the stakeholders who have an interest or a stake in the corporation and who are a critical factor in determining the corporation's success or failure. Based on stakeholder theory, varieties of stakeholders are involved in the organization and each of them deserves some return for their involvement. In the early 1980s, Freeman (1984), was instrumental in laying the foundation or groundwork for the development of this stakeholder theory.

Stakeholder theory begins with the assumption that values are a necessary part of doing business and rejects the separation of ethics and economics (Freeman, 1994). According to Freeman, Wicks, & Parmar (2004), stakeholder theory "asks managers to articulate the shared sense of the value they create and what brings its core stakeholders together. It also pushes managers to be clear about how they want to do business, specifically what kinds of relationships they want and need to create with their stakeholders to deliver on their purpose". An organization's activity is embedded in a network of stakeholder relationships (Darnall et al., 2010). Stakeholder theory development has centred around two related streams: (1) defining stakeholder concept, and (2) classifying stakeholders into categories that provide an understanding of individual stakeholder relationships (Rowley, 1997).

Several attempts have been made to define stakeholders. Freeman (1984, p. 25) defines a stakeholder as "any group or individual who can affect or is affected by the achievement of the firm's objectives". Hill & Jones (1992, p. 133) define stakeholders as "constituents who have a legitimate claim on the firm". This legitimacy is established through the existence of an exchange relationship. Gray et al. (1996, p. 33) define a stakeholder as "any human agency that can be influenced by, or can itself influence, the activities of the organization in

question". These definitions provide the core boundaries of what constitutes a stake. An organization is, therefore, likely to have many stakeholders such as shareholders, customers, suppliers, employees, creditors, competitors, public interest groups, local communities, governmental bodies, stock markets, industry bodies, national and international society and the general public. Each of the stakeholders can be seen as supplying the firm with critical resources and in exchange each expects its interests to be satisfied (Hill and Jones, 1992).

Stakeholders' classification can take various forms. For example, internal or external; primary or secondary; owners or non-owners of the firm; owners of the capital or owners of less tangible assets; actors or those acted upon; those existing in a voluntary or an involuntary relationship with the firm; and resource providers to or dependents of the firm. Different stakeholders influence organizations in different ways; some stakeholders have more influence over organizations than others do. This depends on the following: (1) the structural nature of the organization/stakeholder relationship; (2) the contractual forms existing; and (3) the institutional support available (Friedman and Miles, 2002). A useful differentiation, however, has been made between primary and secondary stakeholders (Freeman, 1984; Mitchell et al., 1997).

2.2.1 Primary and Secondary Stakeholders

A primary stakeholder group is one without whose continuing participation the corporation cannot survive as a going concern. Primary stakeholders have a direct economic stake in the organization (Donaldson and Preston, 1995). Accordingly, primary stakeholders include those who are directly related to an organization and have the ability to influence its bottom line directly such as shareholders, creditors, managers and employees, customers, suppliers, regulatory stakeholders and community stakeholders. Shareholders provide the firm with capital and, in exchange, they expect to receive a satisfactory risk-adjusted return on their investments and to realize an appreciation in stock market value over time. Creditors provide the firm with finance and, in exchange, expect their loans to be repaid on schedule. Managers and employees provide the firm with time, skills,

and human capital commitments. In exchange, they expect a fair income and adequate working conditions. Customers supply the firm with revenue and expect value for money in exchange. Suppliers provide the firm with input and seek fair prices and dependable buyers in exchange. Regulatory stakeholders, mainly governmental bodies, are interested in influencing business by exerting political, legal, social, and governmental pressures on companies to act in an environmentally responsible behaviour. Community stakeholders include local community groups, environmental organizations and other political lobbies. Local communities provide the firm with locations, a local infrastructure, and perhaps favourable tax treatment, and, in exchange, they expect corporate citizens who enhance and/or do not damage the quality of environment (Clarkson, 1995; Donaldson and Preston, 1995; Freeman, 1984; Henriques and Sadorsky, 2008; Hill and Jones, 1992; Mitchell et al., 1997; Waddock and Graves, 1997).

Secondary stakeholders are those who influence or affect, or are influenced or affected by the corporation, but they are not engaged in transactions with the corporation and are not essential for its survival. Secondary stakeholders are not directly involved in the firm's economic transactions (Mitchell et al., 1997). Secondary stakeholders can benefit or damage a firm through their influence on primary stakeholders. Accordingly, secondary stakeholders include the general public and media. The general public, as taxpayers, provide the firm with a national infrastructure, and in exchange, they expect corporate citizens who enhance or do not damage the quality of the environment and do not violate the rules of the game established by the public through their legislative agents. The media, through mass communication technology, can influence society's perception of a company. Hence, it can mobilize public opinion in favour of or against a corporation based on their environmental performance (Clarkson, 1995; Donaldson and Preston, 1995; Freeman, 1984; Henriques and Sadorsky, 2008; Hill and Jones, 1992; Mitchell et al., 1997; Waddock and Graves, 1997).

The main advantage of stakeholder theory is that it provides a means of dealing with multiple stakeholders with multiple conflicting interests. It has been argued that the satisfaction of interests of the different stakeholders is achieved using system-centred theory (Freeman, 1984). Stakeholder theory offered a new

perspective in the context of corporate social responsibility research by suggesting that the needs of shareholders cannot be met without satisfying the needs of other stakeholders (Foster and Jonker, 2005; Jamali, 2007). Hence, stakeholder theory provides a useful framework to evaluate corporate social and environmental reporting activities (Snider et al., 2003). Stakeholder theory has two different categories (Deegan, 2000). The first category relates to the ethical or normative branch (which is prescriptive) and the second category relates to the managerial branch (which is descriptive).

2.2.2 Normative or Ethical Branch of Stakeholder Theory

The ethical or normative perspective of stakeholder theory argues that all stakeholders have certain minimum rights that must not be violated and should be met regardless of the power of the stakeholders involved. Accordingly, and in conformity with the concept of social contract, all stakeholders have a right to be provided with information about the organization's impact on them, regardless of whether or not such information would be utilized (Deegan, 2000). Taking into account the notion of rights to information, Gray et al. (1996, p. 38) define accountability as "the duty to provide an account (by no means necessarily a financial account) or reckoning of those actions for which one is held responsible". They argue that such accountability involves two responsibilities or duties: (a) the responsibility to undertake certain actions; and (b) the responsibility to provide an account of those actions.

The accountability model developed by Gray et al. (1996) hypothesizes a two-way relationship between the management of an organization and stakeholders. Applying the accountability model necessitates the existence of a reporting system of the organization's activities. Hence, there is a need for additional information, voluntarily disclosed, about social and environmental performance to inform stakeholders about the extent to which managers' responsibilities have been fulfilled (Gray et al., 1991), as is implied by the corporate governance principal of disclosure and transparency. Under the accountability model, the argument is that the principal can choose to ignore the information provided by the agent, who,

nevertheless, is still required to provide an account (Gray et al., 1991) to fulfil the principles of best practice of corporate governance.

The normative stakeholder theory can be further distinguished into three different kinds (Hendry, 2001). The first kind maintains that in a just society a business should be managed in the interests of all stakeholders, not only shareholders. Any consideration of the actual state of the laws and institutions is relevant only to the extent that these laws and institutions conform to the ethical ideals of a just society. Normative stakeholder theory of the second kind maintains that the laws and institutions of society should be modified to reflect the greater managerial responsibility toward stakeholders. This second kind may appear as a corollary to the first kind, in that structuring an ideal society setting permits comparison with existing realities and the suggestion of modifications. The third kind of normative stakeholder theory maintains that managers should not only take the interests of all stakeholders into account, but also consult those stakeholders and allow their participation in the decision-making processes of the firm (Hendry, 2001).

2.2.3 Managerial Branch of Stakeholder Theory

This category of stakeholder theory relates to the managerial branch. Unlike the normative ethical branch of stakeholder theory, the managerial perspective of stakeholder theory argues that organizations will tend to satisfy the information demands of those stakeholders who are important to the organization's ongoing survival. Some stakeholders have more influence over the organization than others (Friedman and Miles, 2002). Whether a particular stakeholder receives information will be dependent upon how powerful that stakeholder is perceived to be (Deegan, 2000). Mitchell et al. (1997) argued that stakeholder identification and salience is a function of whether stakeholders possess one or more relationship attributes: power, legitimacy and urgency.

A stakeholder's power to influence corporate management is viewed as a function of the stakeholder's degree of control over resources required by the organization (Ullman, 1985). Power, in this sense, means the ability to use resources to make an event happen or to secure a desired outcome. For example, the UK Corporate

Governance Code (2012) gives shareholders the legitimate right to cast a vote, thereby influencing company policy and hence protecting their investment. Another important notion of power in the corporate environmental responsibility literature is the political power by which governments – or other stakeholders using their resources to pressure government – create legislation, make regulations, or bring lawsuits against corporations. A stakeholder group achieves legitimacy if it has a legitimate standing in a society or legitimate claims on the firm. The urgency attribute incorporates both the notion of time sensitivity – the pressing need on the part of the stakeholder that its concerns/claims be given immediate attention – and the notion of criticality – the belief on the part of the stakeholder that its claims are critical and highly important (Mitchell et al., 1997).

According to Ullman (1985), the more critical the stakeholder resources are to the continued viability and success of the organization, the more powerful the stakeholders and the greater the probability that the stakeholder demands will be incorporated within the organization's operations. Some of these demands may relate to the provision of environmental information that is directly related to the expectations of particular stakeholder groups. Donaldson & Preston (1995, p. 67) also argued that stakeholder theory is managerial in that "it does not simply describe existing situations or predict cause-effect relationships; it also recommends attitudes, structures and practices that, taken together, constitute stakeholder management. Stakeholder management requires, as its key attribute, simultaneous attention to the legitimate interests of all appropriate stakeholders, both in the establishment of organizational structures and general policies and in case-by-case decision making". However, managerial stakeholder theory does not imply that all stakeholders should be equally involved in the decision-making process.

Based on the above discussion, it is worth mentioning that the normative approach of stakeholder theory, which relates to accountability, cannot be sufficient in providing explanations for corporate social and environmental disclosure undertaken by organizations (Gray et al., 1996) and thus, cannot provide predictions as to managerial behaviour in terms of practices (Deegan, 2002). Under the managerial approach of stakeholder theory, however, corporate social

and environmental disclosure can be seen as part of the dialogue between the organization and its stakeholders (Gray et al., 1995b). Hence, such disclosure is regarded as a means by which stakeholders are managed in order to gain support and approval for the organization's continued existence (Gray et al., 1995b), as well as to distract stakeholders' possible opposition and disapproval (Gray et al., 1996), rather than to discharge accountability (Deegan, 2002). Nevertheless, since accountability in this model is based on management's own perceptions of the significance of particular stakeholders, the information needs of important but less powerful individuals and groups may be overlooked. Therefore, stakeholder theory can help with providing an indicative interpretation as to which stakeholder groups are considered by the organization to be more powerful and important and, accordingly, the organization would seek to influence through disclosure practices (Gray et al., 1996).

2.2.4 Research Philosophy of Descriptive Stakeholder Theory

Stakeholder theory has been presented and used in three different and distinct ways as to methodologies, types of evidence, and criteria of appraisal. Donaldson & Preston (1995, p. 65) argued that stakeholder theory has been advanced and justified in the literature explicitly or implicitly "on the basis of its descriptive accuracy, instrumental power, and normative validity". The descriptive or empirical approach is used to describe and/or explain specific corporate characteristics and behaviours. For example, it has been used to describe the nature of the firm, the way managers think about managing, how board members think about the interests of corporate constituents, and how corporations are actually managed. The instrumental approach is used to identify the connections, or lack of connections, between stakeholder management and the achievement of traditional corporate objectives. This theory has been widely used in studies of corporate social responsibility, suggesting that adherence to stakeholder principles and practices achieves conventional corporate performance objectives. The normative approach is used to interpret the function of the corporation, including the identification of moral or philosophical guidelines for the operation and management of corporations. Normative concerns dominated the classic

stakeholder theory and continued to dominate in its most recent versions (Donaldson and Preston, 1995).

Descriptive stakeholder theory proposes stakeholder answers to questions of fact; instrumental stakeholder theory proposes stakeholder-oriented answers as to how managers meet specific objectives, which may or may not have ethical elements; and normative stakeholder theory draws on ethical perceptions to propose stakeholder-oriented answers to questions of corporate governance (Hendry, 2001). Briefly stated, the three theories address the questions of 'what happens?', 'what happens if?' and 'what should happen?' respectively (Jones, 1995). In other words, "Proponents of stakeholder theory strive to describe what managers actually do with respect to stakeholder relationships, what would happen if managers adhered to stakeholder management principles, and what managers should do vis-à-vis dealing with firm stakeholders" (Jones, 1995, p. 406).

2.2.5 Epistemological issue of Descriptive Stakeholder Theory

Donaldson & Preston (1995) argued that the underlying epistemological issue in the literature is the problem of justification: Why should the stakeholder theory be accepted or preferred over alternative theories? The answer to this question is related to the distinct purpose that the theory is intended to serve. Descriptive justifications attempt to show that the concepts underlying the theory correspond to observed reality, instrumental justifications attempt to show evidence of the connection between stakeholder management and corporate performance, while normative justifications attempt to explain underlying concepts such as individual or group rights, social contract, and/or corporate social responsibility (Donaldson and Preston, 1995). They concluded that normative aspects underpin stakeholder theory in all of its three forms.

Regarding the explanation of corporate social and environmental disclosure practices, it can be concluded that stakeholder theory explains the observable relationships in the real world based on its descriptive aspect (Donaldson and Preston, 1995). Using the managerial branch of the stakeholder theory, corporate social and environmental disclosure is regarded as a means by which stakeholders

are managed in order to gain support and approval for the organization's continued existence (Gray et al., 1995b) as well as to distract stakeholders' opposition and disapproval (Gray et al., 1996). Stakeholder theory recognizes that there are a broad range of stakeholders who are interested in the environmental behaviour of companies and, consequently, demand information regarding the impact of their activities on the environment (Moneva and Llena, 2000). To the extent that firms recognize the rights of their stakeholders' interests, they tend to voluntarily report more environmental information in order to meet their requests (Monteiro and Aibar-Guzman, 2010).

Various stakeholders are demanding more disclosure of corporate environmental information due to their interest in environmental issues and related costs and liabilities (Mastrandonas and Strife, 1992). In respond to this demand, many corporations are issuing voluntary separate environmental reports in addition to the traditional annual financial reports. Moreover, environmental issues are taken into consideration when assessing stakeholders' risk and return (Neu et al., 1998). Furthermore, stakeholders are increasingly demanding that environmental disclosures truly and fairly represent the past and future achievements of companies (Gray, 2000). Therefore, developing stakeholder theory provides a structure for how environmental issues affect the relationship between stakeholders and business corporations (Joseph, 2007).

HEIs are to-date fully supported by society in general and they have very little challenge (if any) to their existence. Hence, the legitimacy theory, which is popular for theorizing social disclosures of profit-oriented companies, would not apply with the HEIs. Rather, HEIs have a strong commitment towards society and have a responsibility to measure up to this expectation. This gives rise to the responsibility towards their stakeholders and, thus, carbon emission disclosures by HEIs would be better theorized on the basis of stakeholder perspectives.

Table 2.1 points out the stakeholders of HEIs who might have an interest in the carbon disclosures by the HEIs, which may be put into annual reports. Table 2.1 also shows the interests of such stakeholders groups.

Table 2.1
Stakeholders and Environmental Stakes of HEI

Regulatory Bodies	Employees	Community Involvement	Students' Issues
– Government – HEFCE	– Environmental Responsibility (e.g. Low Carbon Outcomes), Sustainability Initiatives	– Philanthropic Activities & the Environment	– CSR / Sustainability Education in Academic Programmes

All these stakeholders may be interested in the findings of this study and are likely to be benefitted. Social disclosure has been theorized by many authors in the past (see for example, Gray et al., 1995b; Milne & Patten, 2002; Neu et al., 1998) but the carbon emission disclosure by HEIs, which is completely different in nature, has never been approached to theorize yet. This is therefore the motivation to explore this area, to know whether it is possible to explicitly theorize the carbon emission disclosures by HEIs.

2.3 INSTITUTIONAL THEORY

Another theoretical explanation with similarities to stakeholder theory in terms of how and why organisations behave the way they do is institutional theory. Institutional theory is concerned with examining and explaining how institutionalized norms and pressures affect social change among organisations. This theory is slowly but steadily emerging as a useful theoretical framework in relation to the social and environmental implications of an organisation's operations and behaviours. A detailed discussion of this theory follows.

The origins of institutional theory are found in sociologist Philip Selznick's study of organisations which revealed that organisations adapt not only to their internal actors, but to the expectations of external parties (Selznick, 1967). Several researchers have taken Selznick's study about organisational adaptation to the

expectations of external parties and have sought to further explain how this process actually works. Scott (1987) argues that institutional theory shifts attention from Keynesian economic models of organisational change, which focus on markets, customers and the power of competitors, towards an emphasis on the role of actors that shape organisations by imposing restraints and requirements. DiMaggio & Powell (1983) assert that organisations are by definition impacted by the organisational environment in which they operate.

Institutional theory operates across several fields in the social sciences. J. L. Campbell & Pedersen (2001, p. 3) assert that the explanatory power of institutional theory is put to the test in the social science fields of political economy, historical sociology, comparative politics, international relations and organisational analysis[17]. The organisational sociologists who played major roles in accelerating and deepening the theory's application include but are not restricted to the following: Paul DiMaggio, Walter Powell, Richard Scott, John Meyer, Brian Rowen and Neil Fligstein.

According to institutional theory, organisational action is limited by a variety of external pressures (DiMaggio and Powell, 1983; Pfeffer and Salancik, 1978). An underlying assumption of this theory is that organizations must be responsive to external demands and expectations in order to maintain their legitimacy (Meyer and Rowan, 1977; Oliver, 1991; Pfeffer and Salancik, 1978). DiMaggio & Powell (1983) argue that an organisational response is not derived from the imperative to make organisations more efficient, but rather driven by the desire to make them conform to expectations in their organisational field. DiMaggio & Powell's (1983) version of institutional theory has been termed neo-institutional theory and focuses on:

> *[…] the way action is structured and order made possible by shared systems of rules that both constrain the inclination and capacity of actors to optimise as*

[17]A number of studies across several fields use institutional theory, which include, but are not limited to, that of (Campbell and Pedersen, 2001; Carpenter and Feroz, 2001; D'Aunno et al., 1991; Dillard et al., 2004; Frumkin and Galaskiewicz, 2004; Galaskiewicz and Wasserman, 1989; Ghoshal and Bartlett, 1990; Guler et al., 2002; Halliday et al., 1993; Haunschild and Miner, 1997; Holm, 1995; Kraatz, 1998; Levitt and Nass, 1989; Meyer et al., 1987; Rosenzweig and Singh, 1991; Tolbert and Zucker, 1983; Tuttle and Dillard, 2007).

well as privilege some groups whose interests are secured by prevailing rewards and sanctions. (p. 11).

DiMaggio & Powell (1983) observed a striking degree of structural similarity among organisations that are members of the same field. They have been intrigued by the degree of homogeneity in organisational environments and have sought to explain some of the institutional forces that cause organisations to become similar over time. Hence, for example, in health care, all hospitals tend to be structured along the same hierarchical lines; the same is true for public high schools. Organisations look similar because they adopt similar structures. As DiMaggio & Powell have posited, there are processes in place which make modern organisations "more similar without necessarily making them more efficient" (DiMaggio and Powell, 1983, p. 147). The authors termed this phenomenon "institutional isomorphism". As a concept, isomorphism refers to a homogenisation process that occurs when organisations structurally conform to other organisations in their environment, or field. As DiMaggio & Powell (1983, p. 149) explain:

The concept that best captures the process of homogenisation is isomorphism. In Hawley's (1968) description, isomorphism is a constraining process that forces one unit in a population to resemble other units that face the same set of environmental conditions.

Such a process compels organisations to adopt structures which are perceived as legitimate, that is, socially acceptable, thus sidestepping any consideration of efficiency. This is useful to organisations in terms of enhancing their likelihood of survival (Oliver, 1991). DiMaggio & Powell (1983) found three primary mechanisms that are responsible for isomorphism – *coercive*, *mimetic*, and *normative* – each of which is briefly discussed below.

2.3.1 Coercive Isomorphism

According to DiMaggio & Powell (1983), coercive isomorphism "results from both formal and informal pressures exerted on organisations by other organisations upon which they are dependent and by cultural expectations in the society within which organisations function". Coercive isomorphism refers to the

similarity within a population of organisations, which is a response to political influence and/or a search for organisational legitimacy. As Tuttle & Dillard (2007, p. 393) mention:

> *Change is imposed by an external source such as a powerful constituent (e.g., customer, supplier, and competitor), government regulation, certification body, politically powerful referent groups, or a powerful stakeholder. The primary motivator is conformance to the demands of powerful constituents and stems from a desire for legitimacy as reflected in the political influences exerted by other members of the organisational field. These influences may be formal or informal and may include persuasion as well as invitations to collude. If the influencing group has sufficient power, change may be mandated.*

This conceptualisation suggests that an organisation changes because standards of behaviour or elements of structure are imposed on it externally. It can be inferred that there exist two classes or levels of coercive isomorphism: one that results from sociocultural expectations which simply exist and are taken for granted; and the other arising as a function of dependencies or direct pressures for compliance or conformance stemming from organization–organization relations. The work of Meyer & Rowan (1977) predominantly considers the influence of socio-cultural expectations while DiMaggio and Powell's emphasis is on coercion that is achieved through both interdependencies and "the problem of legitimacy" (DiMaggio and Powell, 1991, p. 67).

Coercive isomorphism arises when organisations are subject to influence from societal and cultural expectations within the broader social systems. Organisational conformity to these expectations and norms results in the acquisition of legitimacy, which in turn enhances the organisation's survival prospects. Meyer & Rowan (1977) assert that organisational legitimacy is the outcome of an implicit 'social contract' between an organisation and its broader social context. The need for legitimacy is seen as a force that drives organisations to adopt socially appropriate practices and goals. Meyer & Rowan's (1977) work on the influence of sociocultural expectations is consistent with legitimacy theory, which suggests an implicit "social contract" between an organisation and the broader community in which it operates.

Coercive isomorphism also often arises as a function of dependencies among organisations. DiMaggio & Powell (1983) assert that such pressures are often mandated as state or regulatory requirements or as a result of dependencies arising from much-needed critical resources. Coercive pressures are exerted upon organisations by other more dominant organisations upon which they find themselves dependent. Thus, organisations strive to become isomorphic with the policies, mandates and beliefs of the dominant organisation/s. An interesting aspect of this theory is that the managerial branch of stakeholder theory (discussed previously) provides equally plausible explanations for the observed phenomena.

Within the social and environmental accounting literature, less emphasis (relative to legitimacy theory and stakeholder theory) has been given to applying institutional theory to provide an understanding of the social responsibility initiatives and associated disclosure practices of an organisation.

2.3.2 Mimetic Isomorphism

Mimetic isomorphism occurs when structures within organisations occupying the same field begin to resemble each other because of "standard responses to uncertainty" (DiMaggio and Powell, 1991, p. 67). Under conditions of uncertainty, organisations look to other organisations that are considered "successful", as well as similarly sized organisations, as role models. The presence of "successful" organisations is predictive of mimicry within an organisational population; they are structural agents of mimicry. This mimetic behaviour can occur explicitly via transfer of personnel or through the use of consultants or trade associations. Over time, specific organisational features come to be legitimated and adopted at an increasing rate by virtue of the fact that certain characteristics are possessed by many similar organisations. As Tuttle & Dillard (2007, pp. 392–393) assert:

> *Change is voluntary and associated with one entity copying the practices of another. Mimetic pressures include benchmarking and identifying of best practices and leading players in the field. Mimetic isomorphism occurs when the processes motivated by these pressures become institutionalised so that*

copying continues because of its institutional acceptance rather than its competitive necessity.

A great deal of research[18] uses the notion of mimetic isomorphism to explain changing institutional practices. Mizruchi & Fein (1999) have conducted an extensive study of the use of this theory, and they have found that while the original article by DiMaggio & Powell has been cited at least 160 times, most of these studies tend to concentrate specifically on the impact of mimetic pressures, which they attribute to a tendency among North American organisational sociologists to emphasise cognitive decision-making over intergovernmental power and coercion.

2.3.3 Normative Isomorphism

According to DiMaggio & Powell (1983), normative isomorphism indicates that if a given industry is increasingly professionalised, one could expect to observe greater homogeneity among organisational characteristics as a result of personnel transfer, standardised training and education of workers, as well as efforts on the part of these firms to ensure that they provide comparable services to their competitors. Hence, for example, the practices of accounting departments in different firms are not determined by the management of those firms but rather the standards and norms of the accounting profession. A good example within the research on normatisation was provided by Palmer, Jennings, & Zhou (1993) whose study showed a strong relationship between CEOs who had attended elite business schools and those executives' companies adopting a multi-divisional form (MDF). The multi-divisional form strategy has been taught as part of conventional wisdom in elite schools, and thus this has been passed on to students who later became CEOs. The actions of these similarly trained executives resulted in organisational similarity within fields. Torres (1988) also found that professionalization eliminated potential variation among structural forms within a niche.

[18]A number of studies use the concept of *mimetic* isomorphism which include, but are not limited to, that of Edelman (1990); Fligstein (1985); Galaskiewicz & Wasserman (1989); Han (1994); Oliver (1988); Starr (1982); Tolbert & Zucker (1983).

What is common among coercive, mimetic and normative pressures is that they make organisations conform to the expectations of their environment. All three perspectives indicate that institutions are important because they constitute restrictions on the behaviour of societal and political actors. Indeed, although they usefully identify three different mechanisms of influence operating among organisations in the same environments, coercive, mimetic and normative pressures are all predicted to have the same effect of increased structural isomorphism[19]. Carpenter & Feroz (2001) argue that empirically it may be difficult to distinguish the three forms of isomorphic pressures, as it is possible that two or more forms will be acting at the same time. This argument is consistent with the views of Tuttle & Dillard (2007), who state that coercive, mimetic and normative isomorphism may occur simultaneously.

As noted previously, institutional theory is a widely applied theory in social science and organisational research. It has also been utilised by a number of accounting researchers to explain management accounting techniques (see Brignall & Modell, 2000; Broadbent, Jacobs, & Laughlin, 2001; Covaleski & Dirsmith, 1988), to investigate aspects of audit (see Rollins & Bremser, 1997), to explain the role of the accounting profession (see Fogarty, 1992), and to explain similarity within accounting research (see Tuttle & Dillard, 2007). Social and environmental accounting researchers argue that it can be applied to explain the reasons why organisations adopt particular social and environmental disclosure practices. They contend that organisations may be coerced into adapting their social and environmental performance and associated reporting practices. As Deegan (2006, p. 307) argues:

> *A company could be coerced into adapting its existing voluntary corporate reporting practices (including the issues upon which they report) to bring them into line with the expectations and demands of its powerful stakeholders*

[19]In contrast, Scott & Meyer (1991) argue that under some conditions, more highly structured organisational environments may create increased diversity of form. For example, they suggest that in environments which lack much centralised authority, organisational forms may exhibit increased similarity (because of competitive and mimetic processes), but as authority becomes more centralised, decision-makers may decide to create a variety of more specialized organisational forms, thus increasing organizational diversity by design coercion (Scott and Meyer, 1991).

(while possibly ignoring the expectations of less powerful stakeholders). Because these powerful stakeholders might have similar expectations of other organisations as well, there will tend to be conformity in the practices being adopted by different organisations—institutional practices will tend towards some form of uniformity.

Institutional theory is not free from criticisms. Institutional theory has tended to de-emphasise both the ability of organisations to dominate or defy external demands and the usefulness to organisations of pursuing particular strategies (Oliver, 1991). The isomorphic process poses a direct challenge to the view of institutional change that recognises the contribution of rational choice in the sense that organisations respond to social and cultural pressures when they consider change. On this account, preferences for institutional change are not determined by a computation[20] of cost and benefits, rather they are determined by the perceptions of legitimate behaviour which are present both in the field and in the society more generally. Further, when testing the concept of isomorphism, Paradis & Cummings (1986) argued that institutional isomorphism is an analytic strategy the components of which may not be empirically distinct, which in turn has proven to be a principal challenge to organizational researchers.

2.4 STEWARDSHIP THEORY

Stewardship theory, developed by Donaldson & Davis (1991, 1993) is a new perspective on understanding the existing relationships between ownership and management of the institution. This thesis uses stewardship theory to answer the second research question, which is – *What is the relationship between HEI CED volume and quality?* The findings of research question 02 explain the relationship between volume and quality of CED by HEIs. The researcher believes that stewardship theory best describes the positive relationship between CED volume and quality found in the thesis as HEI managers act as stewards for society and report honestly without misguiding any parties involved and thus act as responsible stewards. Thus, the researcher has chosen this theory in preference to

[20]Such a computation would aim at increasing efficiency, which is not the case in this context.

stakeholder and institutional theories (described earlier in this chapter to explain the findings of research question 01) to explain the relationship between CED volume and quality. This section includes an overview of stewardship theory followed by a justification for the application of this theory.

2.4.1 Stewardship Theory in Disclosure Context

Stewardship theory is a fairly new approach in understanding the voluntary disclosures published in annual reports. Information that is not mandatory to disclose, but which institutions choose to disclose willingly is known as voluntary disclosure. Voluntary disclosures can include strategic information such as company characteristics and strategy, nonfinancial information such as socially responsible practices, and financial information such as stock price information. Carbon emission disclosure, as a part of voluntary disclosure, has been explained and theorized with stewardship theory to facilitate the understanding of the relationship between volume and quality of CED. This theory, in this thesis, explains the relationship between volume and quality of carbon emission disclosures of HEIs.

Thus, stewardship theory will be used to facilitate an explanation of the results in chapter four to know whether HEI management discloses more when they have more to say on carbon emission.

2.4.2 Origin of Stewardship Theory

The 'model of man' in stewardship theory is someone whose behaviour is ordered such that pro-organizational behaviours have higher utility than individualistic behaviours (Davis et al., 1997). This model of man is rational as well, but perceives greater utility in cooperative behaviours than in self-serving behaviours. A steward's utility function is maximized when the shareholders' wealth is maximized. A steward is defined as someone who protects and takes care of the needs of others. Under stewardship theory, company executives protect the interests of the owners or shareholders and make decisions on their behalf. Their

sole objective is to create and maintain a successful organization so the shareholders can prosper. Firms that embrace stewardship place the CEO and chairman responsibilities under one executive, with a board comprised mostly of in-house members. This allows intimate knowledge of organizational operation and a deep commitment to success. Stewardship governance requires that a CEO be trustworthy and willing to put personal gains aside for the good of the organization. This has been remarked by Donaldson and Davis (1991, p. 60):

> *"... managers seek to maximise organisational performance and shareholder returns, as stewardship theory states, so long as the fundamental coalition between managers and owners remains intact, that is, the organisation is on-going."*

Stewardship theory puts forward the notion that that managers, left on their own, act as responsible stewards of the property controlled by them (Lee and O'Neill, 2003). This theory was rooted in sociology and psychology and was intended to facilitate researchers with bases to examine situations in which managers as stewards are motivated to act in the best interests of their principals (Donaldson and Davis, 1991). In the academic literature, stewardship has been variously discussed as a theory describing managers' behaviours (Davis et al., 1997). Unlike agency theory, which is based on economic assumptions and assumes a divergence of interest between principal and agent, stewardship theory looks into the relationship from a sociology and psychological point of view and assumes that the interest of both principals and agents (stewards) actually align for the collective development (Davis et al., 1997). Unlike self-serving behaviours, which only benefit a single person, the beneficiary of the steward's actions is a larger community as a whole.

2.4.3 Philosophy behind Stewardship Theory

Stewardship theory is mainly concerned with identifying the situations in which the interests of the principal and the steward are aligned (Donaldson and Davis, 1991, 1993). According to this theory, there are two types of factors that predispose individuals to become stewards rather than agents: situational and psychological. Situational factors refer to the surrounding cultural context, rather

than to an organization's work environment. Some of the situational factors that predispose an individual towards stewardship are working in an involvement-oriented management system, as opposed to a control-oriented management system; a collectivistic culture, as opposed to an individualistic one; a low-power distance culture; or when corporate governance structures give them authority and discretion (Donaldson and Davis, 1991). On the other hand, there are psychological factors that predispose the executive to become a steward. Some of these factors include having higher-order motivations, a better disposition to identify with the objectives of the firm, a value commitment orientation, and greater use of personal power as a basis to influence others (Davis et al., 1997). To sum up, the situational and psychological characteristics of the principal and the manager are antecedents for their rational choice between agency or stewardship relationships (Davis et al., 1997).

According to Davis et al. (1997), the process through which the parties decide to be agents or stewards can be synthesized as follows: First, this is a decision made by both parties of the relationship. Second, the psychological characteristics and the cultural background of each party predispose the individuals to make a particular choice. Finally, the expectation that each party has regarding the other will influence the choice between agency or stewardship relationships. However, Davis et al. (1997) keep silent about the specific interactions of antecedents in the prediction of stewardship versus agency theory. When the factors that surround the individual, both psychological and situational, are aligned to make him decide to be a steward or agent, the situation is clear, as there is no conflict inside the person. The problem arises when there are conflicting forces between the psychological and the situational factors. For instance, some of the psychological attributes of the individual may predispose him to become an agent, such as when the manager is solely motivated by extrinsic motives, whereas situational mechanisms such as empowerment management systems orient him to become a steward. This mismatch between the management philosophy of the company and the psychological characteristics of the manager remains rather unexplored under current stewardship theory.

Stewardship theory assumes that becoming a steward or an agent is the result of a rational process. In this rational process, the individual evaluates the pros and cons of one position versus the other. For instance, there are contributions in stewardship literature that argue that stewards are not altruistic, but that there are situations where executives perceive that serving shareholders' interests also serves their own interests (Lane et al., 1998). In this situation, agents would recognize that the company's performance directly affects perceptions of their individual performance. In other words, in being effective stewards of the organization, they also manage their own careers (Daily et al., 2003).

2.4.4 Assumptions behind Stewardship Theory

Stewardship theory is based on the belief that a steward is a pro-organizational entity and puts more importance on collective interest as compared to individualistic and self-serving behaviour (Lee and O'Neill, 2003). A steward always chooses the pro-organizational behaviour over self-serving behaviour and always ensures the interest of his or her organization (Eddleston et al., 2012). S/he puts more weight on cooperative behaviour and none on self-serving behaviour, when interests of principal and agent are not aligned. S/he does not trade between self-serving behaviour and cooperative behaviour; rather always puts greater utility in cooperative behaviour. This behaviour is completely rational as stewardship theory assumes that stewards get higher utility from collective behaviour. A steward seeks to attain the organizational goal first (for example, more profit, sales growth, customer satisfaction, social acceptance etc.) rather than any individual self-centred objective. This behaviour in turn benefits the principals (owners or shareholders) through a positive impact on organizational profit, surplus, sales, customer satisfaction etc. The theory assumes that a steward maximizes his utility by protecting and maximizing shareholders interest.

Stewardship theory has been framed as the organizational behaviour counterweight to rational action theories of management (Donaldson and Davis, 1991, 1993). This theory holds that there is no conflict of interest between managers and owners, and that the goal of governance is, precisely, to find the mechanisms and structure that facilitate the most effective coordination between the two parties (Donaldson, 1990). Stewardship theory holds that there is no

inherent problem of executive control, meaning that organizational managers tend to be benign in their actions (Donaldson, 2008). The essential assumption underlying the prescriptions of stewardship theory is that the behaviours of the managers are aligned with the interests of the principals. Stewardship theory places greater value on goal convergence among the parties involved in corporate governance than on the agent's self-interest (Slyke, 2007). The economic benefit for the principal in a principal-steward relationship results from lower transaction costs associated with the lower need for economic incentives and monitoring. Stewardship theory has its own merits. In some contexts, stewardship theory may become the obvious narrator of the motivational factors of managers. HEIs form one of such sectors where goal congruence can be commonly expected.

The basic assumptions behind stewardship theory are various. Executive-agents who are stewards are motivated to act in the best interests of their principals (Donaldson and Davis, 1991). The model advocates pro-organizational and collective behaviour. The acts of a steward do not depart from the interests of his organization. He or she does not substitute or trade self-serving behaviour for cooperative behaviour, even if the interests of agent and principal are not aligned. A steward finds greater utility in cooperative and organization-centred behaviour. According to this theory, the principal can afford to assume a relatively higher risk. In addition, people in involvement-oriented situations, where a collectivist culture exists and any culture of power distance is low, are more likely to become stewards. People who are motivated by higher order needs, by intrinsic factors and who like to use personal power for influencing others are more likely to become stewards. HEI managers tend to have a higher position in society, and are in the same situation as reported here – ideal for stewardship theory to be perfectly valid.

2.4.5 Stewardship Theory as Opposed to Countering Theory

To better understand stewardship theory, it is helpful to contrast it with the other popular governance style – the agency theory. Clearly, agency theory focuses on a checks-and-balances type of governance. Here, the two distinct entities involved are the CEO and chairperson of the board. The board of directors, which is comprised of mostly independent members, is tasked with monitoring management to avoid problems. If a stewardship relationship exists, potential

performance of a firm is maximized as opposed to a mutual agency relationship, where the potential agency cost of the firm is minimized. Agency theory is grounded in neo-classical economic principles of utility maximization (Watts and Zimmerman, 1978) and provides an established framework, forming what they termed 'a nexus of contracts' between managers and shareholders, and between managers and subordinates, to discuss principal–agent relations. Jensen & Meckling (1976) first expounded the agency costs argument associated with debt–equity trade-offs, which initiated a stream of research linked to the choice of accounting policy, and subsequently to management accounting. The idea of the agency relationship was borrowed from the sociologists and psychologists to factor into accounting research, and it explains what causes principal–agent divergent interests to align, whereas stewardship theory assumes the convergence of the principal–agent interest. This results in the lowering of agency costs. Management works for the principal assuming goal congruence, which replicates the mind-set of HEI management. This is the factor why HEI management are in the ideal place to choose to be stewards for society, thereby disclosing honestly on CED. This leads to a potentially positive relationship between the CED volume and CED quality.

Unlike agency theory, the theory of stewardship assumes an alignment between the behaviours of the stewards and the objective of the principals (Wiseman et al., 2012). The theory instigates a different form of motivation, in that managers perform highly in order to attain the organizational goals and thus get an intrinsic satisfaction through gaining acknowledgment and recognition from their peers and principals. The dominant motive to perform excellently is to gain satisfaction through successfully performing challenging tasks and exercising responsibility, thus gaining recognition from the principal as well as the peers. The theory, therefore, acknowledges the non-financial motivators for managers. In a stewardship setting, corporate governance structure enables highly discretionary authority rather than self-serving objectives (Eddleston et al., 2012). Because of this assumed higher authority, there exists a sense of belongingness, resulting in the principal's willingness to assume risk being relatively high. This indicates that the existence of a stewardship relationship is very likely to maximize the potential

performance of a firm because of the existence of belongingness and goal congruence.

The steward perceives that the utility gained from interest alignment and collaborative behaviour with the principal is higher than the utility that can be gained through individualistic, self-serving behaviours (Davis et al., 1997). Stewards are motivated by intrinsic rewards, such as reciprocity and mission alignment, rather than solely extrinsic rewards. The steward, as opposed to the agent, places greater value on collective rather than individual goals; the steward understands the success of the company as his own achievement. Therefore, the major difference between both theories is in the nature of motivation. Agency theory places more emphasis on extrinsic motivation, while stewardship theory is focused on intrinsic rewards that are not easily quantified, such as growth, achievement, and duty. As rightly remarked by Donaldson & Davis (1991, p. 62):

> *(Agency theory) emphasises control of managerial "opportunism" by having a board chair independent of the CEO and using incentives to bind CEO interests to those of shareholders. Stewardship theory stresses the beneficial consequences on shareholder returns of facilitative authority structures which unify command by having roles of CEO and chair held by the same person.*

Thus, assumptions behind the stewardship theory indicate the applicability of the theory in explaining the behaviour of the HEIs managers in this thesis. Managers in HEIs may be motivated intrinsically to disclose environmental matters as mentioned earlier. In addition, they are generally expected to be more knowledgeable and well educated than other general industry managers. This potentially results in an expectation for an alignment of interest with the broad society by disclosing carbon facts most ethically in the annual reports. Thus, the goal congruence results with the principal and agent by disclosing the fact and utilizing the disclosure volume to ensure its conceived disclosure quality. This results in the existence of a positive relationship between the CED volume and CED quality, i.e. if HEI managers report more CED in terms of volume this will also ensure more information quality in the CED.

2.4.6 Application of Stewardship Theory

Stewardship practice is associated with positive consequences throughout the organisation. Managers displaying stewardship feel more positive about themselves and are likely to be better able to meet higher order needs such as personal growth and a sense of contribution to the organisation and society. Stewardship models also include environmental concerns, where entities operate with minimum negative effects on the earth, and practise human or animal rights, refraining from using products that are made in sweatshops or tested on live subjects. The theory argues that the good steward understands that he or she is responsible and accountable for managing well the resources that he or she holds in trust. He also chooses to use the power he possesses to serve the long-term collective good of those he is accountable to, placing their interests above his own interests. The term steward indicates that the manager places the highest importance on the interest of the principal. Thus, it is expected that HEI management should disclose on carbon emissions and environmental impact to the public, so that these disclosures contain the information content expected by the society.

2.5 SIGNALLING THEORY

The researcher uses signalling theory to explain the findings of the last research question of this thesis, which deals with the impact of CED in HEIs on their environmental reputation. The research assumes that the impact of CED works through signalling to a wide audience and impacts through the message delivered through the signalling process. The researcher contends that the assumptions behind signalling theory better explain the findings in chapter five than any of the other theories mentioned earlier in this chapter. Thus, signalling theory has been used to explain the findings of the last research question in chapter five.

Prior literature used signalling theory to explain the impact of CED on the environmental reputation of the institutions. This research agrees with prior literature and finds signalling theory most appropriate in explaining the relationship between CED and “green reputation”. The logic behind this is that the

signalling may help to create a good green reputation through the help of the "green rankings", listings according to environmental performance by external bodies, which again sends signals to the stakeholders. This condition is better explained by signalling theory than any other theories used earlier in the thesis. The findings further suggest that signalling can become a very useful tool in explaining voluntary disclosure (Toms, 2002, p. 258) and its impact on organizational reputation-building activities. Signalling theory may posit an important tool when different parties have information asymmetry (Connelly et al., 2011, p. 63):

> *Signalling theory provides a unique, practical, and empirically testable perspective on problems of social selection under conditions of imperfect information.*

2.5.1 What is a Signal?

Signals indicate a perceivable action or structure that is intended to or has evolved to indicate an otherwise not perceivable quality about the signaller or the signaller's environment (Donath, 2007). The purpose of a signal is to indicate a certain quality, such as – improved EPS, better earnings, business acquisitions, voluntary environmental activities and many others. Signals can be in the form of dividend, leverage, voluntary disclosures, equity retained etc. In this research study, signalling theory is used to explain the impact of CED in HEIs on their environmental reputation.

Institutions intend to send a signal in various circumstances, for example, firms that voluntarily apply IFRS (International Financial Reporting Standards) create a certain reputation and image which in turn signal their ambitions, which can be used as advertising in order to become more competitive (Campbell et al., 2001). Firms those are working voluntarily on reducing carbon emission signals these activities to the society through different disclosures to create reputation to enjoy competitive advantage. Thus, in relation to green issues, signalling theory may help us to understand the CED impact on environmental reputation. In HEIs, signalling could be an explanation for the motivation for voluntary carbon disclosures, which is considered in this study.

2.5.2 Origin of Signalling Theory

The signalling theory was developed at the beginning of the 1970s and is based on two main research contributions: Arrow (1972) and Spence (1973). Arrow (1972) argued that to get a job – jobseekers use own credentials to signals to the employer his potential suitability for the job. Later, to overcome the classic theory limitations – above all, the hypothesis of perfect competition – Spence (1973) analysed the workforce market with the aim of drawing some general conclusions about information economics. The author's reasoning was simple: seeking for a job, an unemployed person has something to gain from sending signals to the market, thus keeping his talents in the public eye in order to prevail over other unemployed people. According to this reasoning, research on disclosure to financial markets argues that the most profitable companies have something to gain from signalling their competitive advantage through more and better communications (Miller, 2002).

Signalling theory was introduced by Spence (1973) based on Akerlof's seminal work in 1970. Akerlof (1970) mentioned about quality signals in presence of information asymmetry in the labour market. Later, Michael Spence in 1973 wrote about signalling in the context of the job market. For example, employers can rely on applicant's chosen level of education/certain education credentials as a credible signal of that person's underlying competence. Thus, the incentive-signalling literature was originally developed by Spence (1973) and has since been adopted in a number of accounting and finance applications. Ross (1977), following Spence (1973), initiated incentive-signalling theories in finance, spawning a research stream concerned with voluntary disclosures in financial reporting. Smith & Taffler (2000) use signalling theory to examine the nature of corporate disclosures, in the expectation that firms will behave in a manner that "signals" to the market that they are high achievers and are adopting industry best-practice. They use this as a basis to establish a formal hypothesis, for subsequent testing, that the positive content of corporate narratives will be directly associated with the financial performance of the company. This theory will be applied in order to shed light on the disclosure impact related to carbon initiatives on the HEI environmental reputation.

2.5.3 Signalling Theory in the Disclosure Context

According to signalling theory (Spence, 1973), the primary objective of corporate disclosure is to inform analysts and investors about the firm quality and value. This suggests that voluntary disclosure decisions lead to the reporting of relevant information about firm performance. Based on these theoretical suggestions, prior studies have attempted to examine empirically the relevance of corporate voluntary disclosure. Voluntary disclosure can be explained as an effort to reduce monitoring and political costs by signalling in order to maintain their legitimacy (Scott, 2003).

Disclosures are a way for institutions to sustain and legitimize their activities to social (i.e., community), economic (i.e., capital providers), and political (i.e., government, legislators, and regulators) stakeholders. Institutions must convince capital providers that they are capable of using their assets (such as external capital) at the highest levels of efficiency for capital accumulation. Institutions do this through news releases, including accounting reports such as company annual reports. The disclosure signals of external capital in annual reports are distinctive in two ways. First, external capital disclosure signals are presently unregulated, allowing institutions to choose what, when, and where to disclose. Second, external capital disclosure signals are proactive and voluntary, since there are no legislative or accounting requirements that need to be met (Abeysekera and Guthrie, 2004). Signalling theory suggests that a positive relationship exists between voluntary disclosure and profitability (Watson et al., 2002). Profitable firms provide additional information to the market in order to signal quality (Prencipe, 2004), and corporations disclose more voluntary information during prosperous times than during poor times (Holland, 2005). Signalling is one way of responding to perceived market failure when the market does not have the full information needed to create better market efficiency (Watts and Zimmerman, 1978). Depending on whether disclosure signals meet certain conditions, stakeholders will believe some signals to be true and reject others.

Signalling occurs in competitive environments. Signalling theory is useful for describing behaviour when two parties (individuals or organizations) have access to different information (information asymmetry). This theory argues that the

existence of information asymmetry can also be taken as a reason for good companies to use financial information to send signals to the market (Ross, 1977). Information disclosed by managers to the market reduces information asymmetry and is interpreted as a good signal by the market.

Conditions for signalling include that management has sufficient incentive to disclose, that the signal is difficult to imitate, that there is an observable relationship between the firm disclosing and stakeholder perception, and that the signals are cost effective. Institutions depend on three types of stakeholder: capital providers, policy makers, and the community (Abeysekera and Guthrie, 2004). It is often easier to manage public impressions of institutions through communication than through output, goals, and methods of operation (Neu et al., 1998). In this study, the use of carbon disclosure by HEIs has been investigated to find out how this signals to the external parties and results in a better reputation.

2.5.4 Assumptions behind Signalling Theory

Signalling theory comes from the situation when two parties have different access to information. The sender in this case benefits from the information asymmetry and has more information. He decides how, when and what quantity of information to send to the receiver. The concept of signalling theory is based on the idea that information is not otherwise available to the wider public and insiders can signal about undisclosed information based on the information asymmetry. This theory recognises the information asymmetry existing between insiders and wider stakeholders and argues that signalling can reduce such an information gap (Morris, 1987). Acknowledging the information asymmetry, this theory argues that management can signal information in response to stakeholders' pressure through voluntary disclosures to reduce this information asymmetry. So, voluntary disclosures can be used to signal in order to distinguish from other organisations.

Organisations use signal to communicate the news, which would have positive impact on its legitimacy. Disclosing social activities would leave a positive impact on the social legitimacy for any organisation. Organisations communicate to

maintain the public impression about their existence. Thus, organisations having good news to share are more likely to signal that good news (Ross, 1977).

Toms (2002, p. 259) argued that accounting disclosure is a potentially important channel to transmit signals. Management would be encouraged to use signalling techniques if it ensures higher pay-off to the signalling organisations (Watts and Zimmerman, 1978). If management has invested in reputation-building activities, that would be enough incentive to disclose these in annual reports (Toms, 2002). However, Grossman (1981) argued that as non-disclosure would be interpreted in the worst possible way, signalling factual bad news along with good news is a good idea. Also disclosing bad news helps to fight the reputation cost of non-disclosure (Skinner, 1994). Thus, organisations are motivated to produce both good and bad news. However, non-disclosure of bad news can be still considered on the grounds of stopping organisational loss (Okcabol and Tinker, 1993). Credibility of signals is vital for the effectiveness of the news (Eccles et al., 2001). Organisational attempt to falsely signal the quality results will not be perceived as credible in any subsequent disclosures. Criticism of signalling theory exists, arguing that managers might signal in their own interest. However, management decisions to disclose have been theorized widely with the use of signalling theory. As argued before in this thesis, HEI managers are well educated and generally more knowledgeable than in any other industries. This indicates that they may be ethically stronger and, thus, there exists a smaller possibility of any false signal. HEI managers are, therefore, likely to honestly disclose the authentic news on their carbon initiatives and lack of initiatives (if any).

2.5.5 Application of Signalling Theory

Information asymmetry can be reduced if the party with more information signals to others. These signals are sent out in order to provide investors with more information (Spence, 1973). Corporations use voluntary disclosure to satisfy investors by positive signalling about the firm value (Watson et al., 2002). High quality firms endeavour to differentiate themselves from low quality firms through voluntary disclosure.

Several studies evidence the relevance of corporate voluntary disclosure by its effect on the cost of capital. They point out that firms which have increased their level of voluntary disclosure show a lower cost of capital (Botosan, 1997). In this regard, Espinosa & Trombetta (2007); Francis, Nanda, & Olsson (2008); and Gietzmann & Ireland (2005) find a negative association between voluntary disclosure and the cost of capital. Some other studies examine the relevance of corporate voluntary disclosure through its effect on the firm value (Lajili and Zéghal, 2006). They evidence the existence of a positive relationship between voluntary disclosure and the firm value. Hence, they highlight the significant signalling role of corporate voluntary disclosure. For instance, Hassan et al., (2011) specify that corporate voluntary disclosure mitigates uncertainty surrounding firm growth perspectives and facilitates share trading. Consequently, voluntary disclosure is likely to affect the firm value. Based on the arguments of signalling theory and the empirical results of prior studies, the researcher concludes that corporate voluntary disclosure may be considered as a signalling tool reducing information asymmetry. To summarize, signalling is expected from institutions having more to say to the public to create better value. The application of this theory is rightly stated as below by Bini, Daielli, & Giunta (2011, p. 16):

… information … is the most significant for principals and agents, thus suggesting that the more credible firms would communicate the relative indicators.

2.6 JUSTIFICATION FOR THEORIES USED IN THIS THESIS

Following the descriptions made in the earlier sections on different related theories, this section justifies the use of appropriate theories for different models in this thesis. This section discusses in the specific subsections the specific theories to be used in three distinct models of this thesis.

2.6.1 Justification for Stakeholder and Institutional Theories for the First Model

Both stakeholder theory and institutional theory have their bases in the political economy paradigm. As these two theories originated from the same paradigm,

they are commensurable (Islam, 2009). These theories accept organisations as part of a broader social system, as components of the larger social environment within which they exist. They are considered to be system-oriented theories that assume an organisation is influenced by, and in turn influences, the society in which it operates (Deegan, 2009; Gray et al., 1995a). Social, environmental and climate change accounting research has utilised these theories in seeking to explain corporate social, environmental and carbon emission accountability behaviour. Several common characteristics identified by accounting researchers (for example Deegan 2002, 2009; Gray 1995a) as theories to explain corporate social, environmental and carbon emission reporting practices are discussed below.

Stakeholder theory emphasizes that an organisation needs to conform to the expectations of powerful stakeholders in order to maintain legitimacy. Institutional theory suggests that an organisation can incorporate institutionalized norms and rules to maintain conformity in the broader society (Islam, 2009). Interestingly, these theories have a shared objective to explain the behavioural motivation to disclose voluntary information. As Deegan (2002, pp. 293–294) states:

> *Under "isomorphism" of institutional theory, organisations will change their structure or operations to conform to external expectations about what forms or structures are acceptable. For example, because the majority of other organisations in an industry might have particular governance structures there might be "institutional" pressure on an organisation to also have such structures in place. That is, there is expected to be some form of movement towards conformance with other "established" organizations* (DiMaggio and Powell, 1983, p. 149).

Deegan (2009) asserts that institutional theory tends to take a broader view to explain why organisations adopt a particular form of disclosure strategy. However, Deegan (2002) argues that under institutional theory managers are expected to conform to "norms" that are largely imposed upon them. However, the stakeholder theory recognises that society is composed of different stakeholder groups, which have different and even conflicting expectations of organisations. It describes the expectations of powerful stakeholders to explain organisational

practices, and may ignore other stakeholder groups in society because they are perceived as relatively less powerful.

As institutional theory describes coercive isomorphism, it shares common views with the managerial branch of stakeholder theory, in that the institutional theory describes an organisation as coerced into a particular form or practice by its powerful stakeholder group, and stakeholder theory explores how stakeholder power can exert pressures on an organisation to follow that practice. Institutional theory differs from stakeholder theory, however, in that while institutional theory views the organisation as embedded in an external environment in which the existence of institutions external to the organisation, such as laws, regulations and norms, influence its structure and the creation of institutions within the organisation, stakeholder theory perceives that organisations act in response to resource-control power wielded by stakeholders.

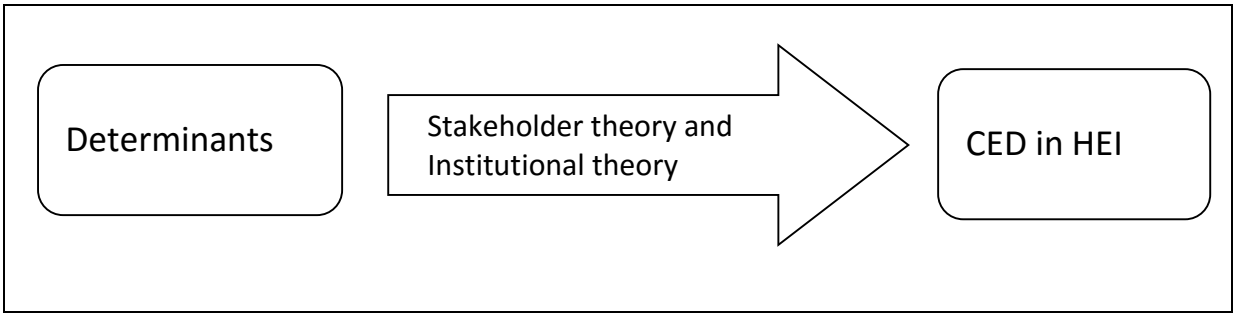
Social and environmental accounting researchers such as Gray et al. (1995a) and Deegan (2006) argue that joint consideration of different theories originating from the same paradigm will enrich understanding of social, environmental and carbon disclosures. As Gray et al. (1995a, p. 67) state, the different theoretical perspectives need not be seen as competitors for explanation but as sources of interpretation of different factors at different levels of resolution. In this sense, stakeholder theory and institutional theory enrich our understanding of carbon emission disclosure practices. When Deegan (2006) discusses the complementary perspectives of different theories, he provides an explanation of the relevance of institutional theory to stakeholder theory to understand the motivations for social disclosure behaviour. As Deegan (2006, p. 305) argues:

> *A key reason why institutional theory is relevant to researchers who investigate voluntary corporate reporting practices is that it provides a complementary perspective to both stakeholder theory and legitimacy theory, in understanding how organisations understand and respond to changing social and institutional pressures and expectations. Among other factors, it links organisational practices (such as accounting and corporate reporting) to the values of the society in which an organisation operates, and to a need to maintain organizational legitimacy. There is a view that organisational form and*

practices might tend towards some form of homogeneity—that is, the structure of the organisation (including the structure of its reporting systems) and the practices adopted by different organisations tend to become similar to conform to what society, or particular powerful groups, consider to be 'normal'.

Based on the discussions presented above, this thesis argues that no single theory alone is capable of describing the causes and effects of carbon emission disclosures (Bebbington et al., 2008a, 2008b; Gray et al., 2010). A combination of theories discussed above is required to provide us with a more rounded understanding of organizational responses associated with various social and environmental pressures. Figure 2.1 shows in the diagram the two primary theories used in this study to explain the determinants of CED by UK HEIs - the first research question.

Figure 2.1
Determinant framework



Stakeholder theory and institutional theory have been utilised by numerous researchers to explain how the social and environmental reporting practices of organisations respond to pressures exerted by particular communities, stakeholders or institutional groups. As mentioned before, HEIs have strong support in society in general, and they have very little challenge (if any) to their existence. HEIs have a strong commitment towards society and have to cope with an expectation that they follow up this commitment responsibly. This gives rise to the responsibility towards its stakeholders and thus, carbon emission disclosures by HEIs would be better theorized based on stakeholder perspectives. In addition, the institutional expectation on HEIs is a significant part of the explanation about such disclosures by the HEI sector in the UK. In relation to this, it is the contention of the researcher that a joint consideration of stakeholder and institutional theories

will provide richer insights into what drives social and environmental reporting practices than would be possible with only one theory considered in isolation.

As discussed previously, stakeholder theory and institutional theory provide rich insights into the factors that motivate managerial behaviours in relation to the social and environmental disclosure practices of organisations. Previous social and environmental accounting research which utilised these theories indicate that organisations respond to the expectations of stakeholder groups specifically, and more generally to those of the broader community in which they operate, through the provision of social and environmental information within annual reports, and in so doing reveal the legitimating motives underlying such organisations' disclosures. While prior research indicates that the disclosure strategy of organisations is brought on by a crisis of legitimacy, little can be foretold about the behaviour of HEIs.

2.6.2 Justification for Stewardship Theory for the Second Model

This thesis uses stewardship theory to answer the second research question, which investigates the relationship between volume and quality of CED by HEIs. The researcher believes that stewardship theory best describes the positive relationship between CED volume and CED quality found in this thesis as HEI managers report honestly without misguiding any parties involved and thus act as stewards. Thus, stewardship theory has been used in this thesis to explain the said relationship between CED volume and CED quality in preference to stakeholder and institutional theory (explained earlier in this chapter).

2.6.2.1 The Context for Stewardship Theory in this Thesis

The researcher understands the importance of an appropriate theory in explaining the results of the investigation into the relationship between CED volume and CED quality. A theory is a network of hypotheses or an all-embracing notion that underpins one or more hypotheses. A theory is "a set of tentative explanations" with which to justify diverse observations. A theory is needed to have some

justification for expecting a relationship to exist, in order to prevent any of the hypotheses becoming disputable. Faced with a set of diverse observations, researchers can establish a set of tentative explanations, which help to make sense of the diversity. Such explanations constitute theory. In any set of circumstances, there will usually be multiple theories available to explain the observations. The relationship between CED volume and quality can be explained with the help of a few competing theories. The systematic collection of further data allows for the testing of the alternative theories so that it can be established which of the existing theories best explains the facts. A layman's perspective of "theory" is cynically expressed in Michael Crichton's *The Lost World* as: "A theory is nothing more than a substitute for experience put forward by someone who does not know what they are talking about" (Crichton, 1995). The data collection itself allows only a descriptive approach (e.g. means, standard deviations, ranges, correlations); we cannot attempt to attribute causation in any meaningful way without recourse to an explanatory theory. Researchers are always looking for another theory which may fit better, so that, as Popper (1959, p104) suggests, a "genuine test of a theory is an attempt to falsify it or refute it". We look for disconfirmations rather than confirmations. The potential competing theories do, however, explain the CED disclosures well. However, stewardship theory goes a bit further and explains the positive relationship between CED volume and quality.

Stewardship theory states that the managers act honestly on behalf of the principal and voluntarily hold themselves responsible for their duties. According to stewardship theory, higher educational institutions (HEI) are expected to be self-motivated for the well-being of the society as a whole. Managers of HEIs are naturally highly educated and well informed. It would be very unlikely for them to get involved in disclosing issues in their own interest in a way that does not also correspond with the interest of the society. Thus, they are expected to be responsible to their consciences even in the absence of any external reliability checks for disclosures on carbon emissions.

However, challenges exist in pursuing green initiatives on campuses by the universities. Green initiatives and disclosures are both obviously costly and, at the same time, voluntary. This is to say that carbon reduction initiatives are essentially

voluntary in nature and thus universities are not legally bound to pursue these activities. Though there exists a target for carbon reduction which has been set for the UK HEIs by the end of the year 2020, these are substantial motivational factors and not legal bindings. HEIs, thus, may stay silent and opt to maintain their historic practices (Chen, 2012). Additionally, carbon initiatives are costly. HEIs require data collection to calculate carbon emissions. Moreover, new staff may have to be employed to take responsibility for issues such as carbon management and carbon accounting. Carbon friendly green technologies are also not very cheap. Together, these factors result in a high cost for implementing green initiatives. However, being in the role of steward, university management should work accordingly and disclose all their activities to society to maintain transparency.

2.6.2.2 How is Stewardship Theory More Applicable than Stakeholder Theory?

The researcher believes stewardship theory best explains the findings of the second research question, which deals with the relationship between volume and quality of HEI CED. Stakeholder theory, which is used in the third chapter for explaining the findings of the first research questions dealing with CED determinants of UK HEIs, is not going to be used in chapter four to explain the findings of the second research question.

Stakeholder theory is a widely used theory for explaining social disclosure findings. This theory, in more general terms, helps to explain the motivations behind voluntary disclosures, like CED, and asserts how CED might meet the information needs of different stakeholder groups of any institution. The normative or ethical branch of stakeholder theory as mentioned earlier in this chapter suggests that all stakeholders irrespective of their power to exert influence over the organization should receive the information. The ethical or normative perspective of stakeholder theory argues that all stakeholders have the right to be provided with information about the organization's impact on them, regardless of whether or not such information would be utilized (Deegan, 2000) and regardless of the power of the stakeholders involved. In contrast, the managerial perspective of stakeholder theory argues that organizations will tend to satisfy the information

demands of those stakeholders who are important to the organization's ongoing survival (Friedman and Miles, 2002) and who are perceived to be powerful (Deegan, 2000). The hypothesis of the potential positive relationship between CED volume and quality could possibly be illuminated by the application of stakeholder theory; however, stewardship theory fits more closely with HEI CED and the said hypothesis scenario.

Thus, this relationship would be better and more meaningfully explained with stewardship theory because of the distinct nature of HEI management. According to stewardship theory, HEI managers would be loyal to their society and act as the stewards for their duties in order to work responsibly towards a better society. This theory expects HEI managers would honestly disclose as much as they are required to and would not exaggerate CED in annual reports. Thus, anything disclosed on carbon will be precise and useful for any decision-making for the stakeholders. Therefore, if the HEI managers disclose a high volume of CED, that could be expected to mean that this is of a high quality (decision useful) as well. As a result, a positive relationship is expected to exist between CED volume and quality in the annual reports when HEI managers act according to the stewardship theory.

2.6.2.3 How is Stewardship Theory More Applicable than Institutional Theory?

The researcher also considers that the superiority of stewardship theory prevails over the earlier-used institutional theory in explaining the second research question in chapter four. Institutional theory has also been used in prior literature to discuss voluntary disclosure and CED. Institutional theory assumes that disclosures are made to conform to the standardised form to maintain legitimacy. However, when the positive relationship has been explained between HEI CED volume and quality in the fourth chapter, institutional theory was found to be less powerful than stewardship theory.

Institutional theory is concerned with examining and explaining how institutionalised norms and pressures affect social change among organisations. Coercive isomorphism, according to institutional theory, suggests that an

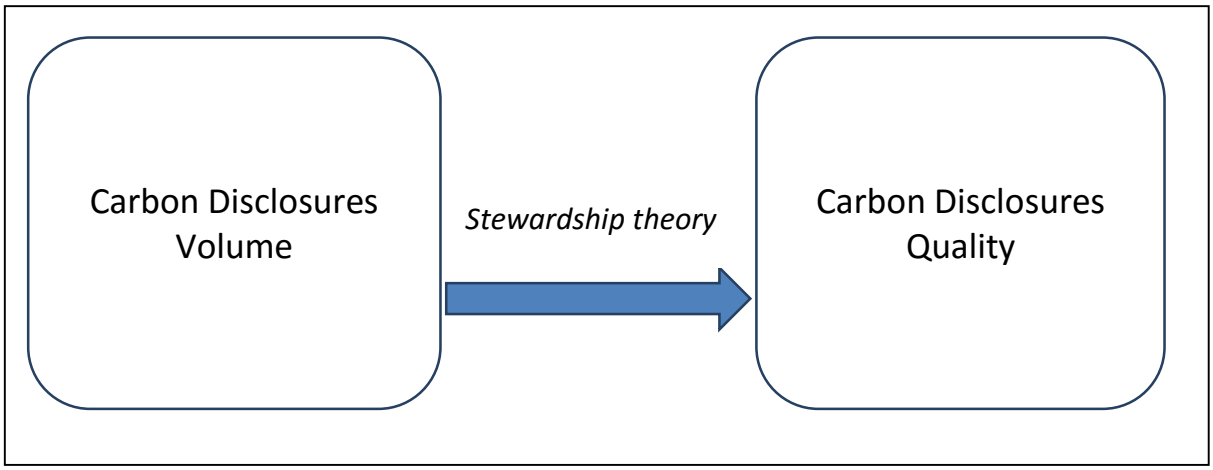
organisation changes because standards of behaviour or elements of structure are imposed on it externally. Mimetic isomorphism assumes that organisations look to other organisations that are considered "successful", as well as similarly sized organisations, as role models (DiMaggio and Powell, 1991, p. 67). Normative isomorphism indicates that in an increasingly professionalised industry, one could expect to observe greater homogeneity among organisational characteristics. One commonality among coercive, mimetic and normative pressures is that they make organisations conform to the expectations of their environment. Thus, expectation of the society and environment is to act in an environmentally sensitive way, and the institutions respond to this expectation by disclosing related issues on environmental activities to conform to the standard expectation and to maintain legitimacy. Therefore, institutional theory also puts forward a good candidature to be used as the theoretical framework in chapter four to explain the positive relationship between CED volume and quality.

However, stewardship theory should be more applicable to HEI sector as the HEI managers are well educated and more knowledgeable than, arguably, managers of any other sectors. As mentioned before, HEI managers may be motivated intrinsically to disclose environmental matters. Thus, a potential alignment of interest is expected with the broad society by disclosing HEI carbon facts most ethically in the annual reports. This study argues that the positive relationship found between volume and quality of CED is because of the honest and ethical attitude by the knowledgeable management of UK HEIs. There exists a goal congruence between the principal and the agent by disclosing the fact and utilizing the disclosure volume to ensure its conceived disclosure quality. As a result, the findings of the second research question, i.e. the positive relationship between the volume and quality of CED, can be better explained with the assumptions of stewardship theory.

Figure 2.2 shows the theoretical framework for the relationship between CED volume and quality.

Figure 2.2

Relationship between CED Volume and Quality



Hence, stewardship theory is most applicable in the context of UK HEIs to explain the relationship between volume and quality of disclosures. As a result, the relationship between their CED volume and quality will be discussed in chapter four of this thesis in light of stewardship theory.

2.6.3 Justification for Signalling Theory for the Third Model

This thesis uses signalling theory instead of stakeholder and institutional theory to answer research question 3, which deals with the impact of CED in HEIs. Prior literature used signalling theory to explain the impact of CED on reputation. This research agrees with prior literature and finds signalling theory to be the most appropriate in explaining the said relationship between CED and green reputation. This signalling tool can become very helpful in explaining voluntary disclosure (Toms, 2002, p. 258) and its impact on organizational reputation-building activities.

2.6.3.1 The Context for Signalling Theory in this Thesis

The research question investigates the impact of HEI CED on the environmental reputation of HEIs. The impact of CED works through signalling to a wide audience and impacts by the message delivered through this signalling process.

Toms (2002, p. 259) argued that accounting disclosure is a potentially important channel to transmit signals. It can be argued that signalling is able to reduce information asymmetry (Morris, 1987). The researcher suggests that the assumptions behind signalling theory better explains the findings than stakeholder and institutional theories, which were discussed in the beginning of this chapter and used to explain the findings of the first research question. While the assumptions behind both these theories best explains the determinants of HEI CED, the researcher wants to find out from a different viewpoint how this CED affects the institutions going forward and what this signals to the readers. For the purposes of the third research question, this is actually better explained with the signalling theory assumptions when compared with the other theories used in this thesis.

The researcher argues that HEI management would be encouraged to use signalling techniques if it ensures a higher pay off to the organization (Watts and Zimmerman, 1978). CED in annual reports would be able to add to the organisational endeavour for environmental reputation. As suggested by Toms (2002), management would have enough of an incentive to disclose carbon activities in annual reports if it wishes to enhance its organisational reputation. This thesis investigates whether CED volume and quality have any impact on such a green reputation as indicated by the green rankings. The researcher introduces signalling theory to explain this CED impact on green reputation, believing that the assumptions behind this theory better suit the relationship than the earlier discussed theories in the chapter.

2.6.3.2 Why is Signalling Theory More Suitable than Stakeholder Theory?

Freeman (1984) develops stakeholder theory to identify the interested parties within an organisation, and a modelling of the methods that managers might employ to address the interests of diverse groups. Within accounting research, Magness (2010) and Laan (2009) provide examples from different spheres of research: financial, management and corporate social reporting, respectively.

The researcher has chosen signalling theory for explaining the findings of the third research question of the impact of HEI CED over the stakeholder and institutional theory chosen at the beginning on the ground that this model uses the CED impact on HEI green ranking. Stakeholder theory assumes that the CED is directed to the stakeholders. The normative branch says that all stakeholders, irrespective of their power to exert influence over the organization, should get the information. The ethical or normative perspective of stakeholder theory argues that all stakeholders have the right to be provided with information about the organization's impact on them, regardless of whether or not such information would be utilized (Deegan, 2000) and regardless of the power of the stakeholders involved. In contrast, the managerial perspective of stakeholder theory argues that organizations will tend to satisfy the information demands of those stakeholders who are important to the organization's ongoing survival (Friedman and Miles, 2002) and how powerful that stakeholder is perceived to be (Deegan, 2000). Both these branches of stakeholder theory assume the information is directed towards the stakeholders. This is not the case in chapter five investigating the third research question. The related chapter investigates the impact of this disclosure on green reputation first, which may in turn have an impact on stakeholders.

2.6.3.3 Why is Signalling Theory More Suitable than Institutional Theory?

Institutional theory assumes that disclosures are made to conform to the standardized form to maintain organizational legitimacy and assures society and other stakeholders that standards are met. Institutional theory has been used in disclosure literature to explain the findings. However, signalling theory is widely used in explaining voluntary disclosures as well, especially when the study investigates the impact of the disclosure in the way of signalling. Thus, the researcher has chosen signalling theory for explaining the findings of the third research question investigating the impact of HEI CED over institutional theory. Nelson & Winter (1982, p. 482) conceptualize institutional theory by identifying the routine nature of business practice, including accounting methods, as being the tacit knowledge which underpins a firm's acknowledged "know-how'". Institutional theory is concerned with examining and explaining how

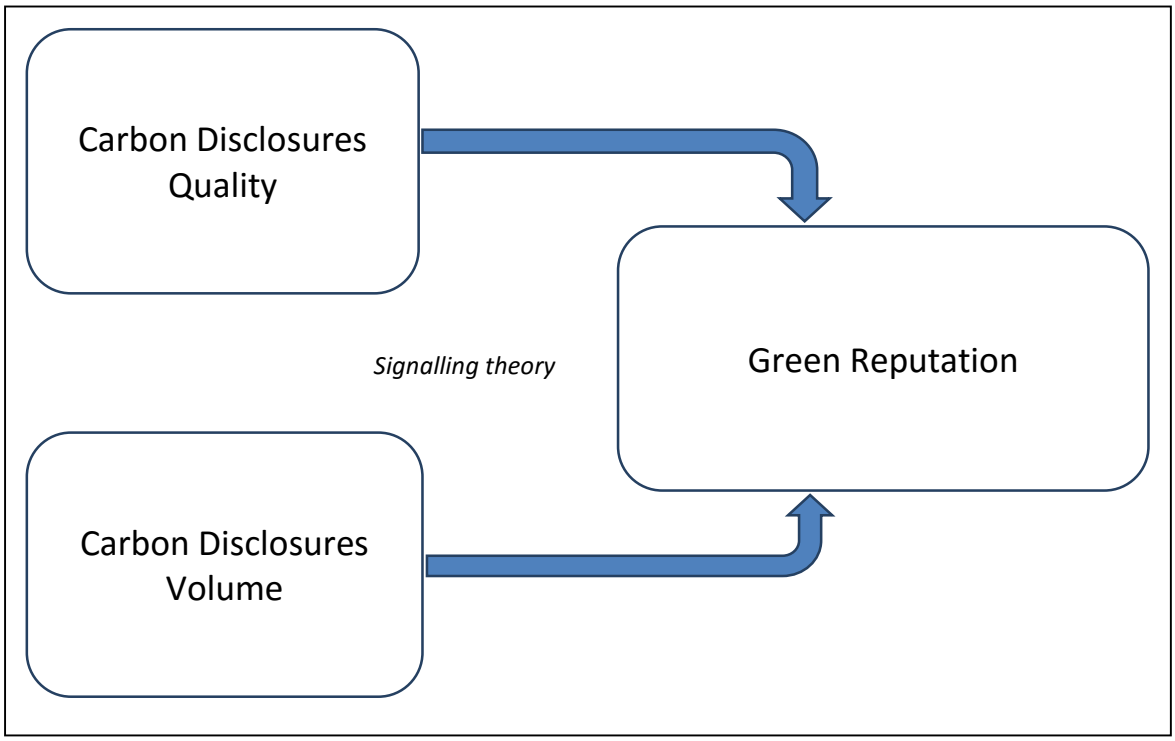
institutionalized norms and pressures affect social change among organizations. Coercive isomorphism suggests that an organization changes because standards of behaviour or elements of structure are imposed on it externally. Mimetic isomorphism assumes that organizations look to other organizations that are considered "successful", as well as similarly sized organisations, as role models (DiMaggio and Powell, 1991, p. 67). Normative isomorphism indicates that in an increasingly professionalised industry, one could expect to observe greater homogeneity among organizational characteristics. One commonality among coercive, mimetic and normative pressures is that they make organizations conform to the expectations of their environment. Thus, the expectation of society and those in the surrounding environment is for institutions to act in an environmentally sensitive way and the HEIs respond to this expectation by disclosing related issues on environmental activities. This was exactly the case in the first research question, which studied the determinants of HEI CED. However, chapter five, which investigates the third research question, assumes the impact of this disclosure on the reputation of the institution, which may contribute in meeting the social and environmental expectation thereof.

2.6.3.4 Why is Signalling Theory Appropriate?

Chapter five deals with the third research question and investigates the impact on institutions' green reputation as measured by green rankings given by the organization People and Planet. This green ranking indicates a prestigious achievement for the organization and management, which in turn may have its impact, in the next stage, on various stakeholders of HEIs, such as students, staff, regulatory bodies and others. This green reputation is actually created through signals in various forms, including annual reports and sustainability report disclosures. Thus, signals are utilised in the ranking, which again signals back to the stakeholders. This condition is better explained by signalling theory than both stakeholder and institutional theories.

Figure 2.3 shows the theoretical framework used for explaining the impact of CED volume and quality on green reputation.

Figure 2.3
Theoretical Framework of CED and Green Reputation



Hence, chapter five uses signalling theory to explain the impact of carbon emission disclosures on green reputation in the context of UK HEIs. Theoretically, this theory should be similarly applicable to other sectors, in addition to the HEI sector. The relationship between the UK HEIs' CED and their green reputation will therefore be discussed in this thesis in chapter five in the light of signalling theory.

2.7 CHAPTER SUMMARY

This chapter outlines the theories used to explain different models of this thesis. Reportedly, the first empirical model has been explained with joint application of stakeholder and institutional theories, stewardship theory has been used to explain the second empirical model of this thesis and last but not the least, the third model uses signalling theory in order to explain its findings. This chapter further justifies the allegedly use of multiple theories for different models and answers the potential question mark of why different theories are needed for different models. This chapter argues that no single theory is best in explaining different relationships and thus, arguably the most appropriate theories were sought after in the context to explain the three different models in this thesis.

CHAPTER THREE

DETERMINANTS OF CARBON EMISSION DISCLOSURES IN HIGHER EDUCATIONAL INSTITUTIONS IN UK

CHAPTER 3

Determinants of Carbon Emission Disclosures in Higher Educational Institutions in UK

3.1 CHAPTER OVERVIEW

The raising public awareness regarding climate change and stricter government intervention and regulation have resulted in an increased pressure on the organisation to report their activities to their stakeholders (Wilmshurst and Frost, 2000). This increase in public awareness has also resulted in increased motivation, additional regulation and intervention from the institutional stakeholders in the United Kingdom (UK)(de Villiers et al., 2011), for example, Higher Education Funding Council of England (HEFCE) target set during 2008-09, the Climate Change Act 2008, the Climate Change (Scotland) Act 2009, the ESOS (Energy Savings Opportunity Scheme) Regulations 2014 etc. The targets and requirements by the powerful institutional stakeholders results in the expectation of the higher education institutions (HEI) to become more transparent than ever regarding their carbon emission and activities. It is expected that the change in guidelines and action should result in disclosure, reporting and statement in the annual report, which is one of the most formal media by the organization (Yekini and Jallow, 2012), the most authentic media of communication recognised and acceptable to stakeholders (Guthrie and Parker, 1990) and the only document routinely sent out (Adams et al., 1998)for communicating facts and figures to various stakeholders.

While profit making organizations aims to maximize profit and forward this profit to the company's owners and shareholders, HEIs aim to provide society's needs. This has a considerable impact on the accounting methods of each type of organization. While profit making companies base their accounting around income, universities prepare statements that revolve around their activities. HEIs being different from profit seeking organizations possess distinguished characteristics different from profit oriented companies. This calls for specific academic and research attention for HEIs. Generalising the research study for

profit oriented companies for the majorly publicly funded UK HEIs should mislead any outcome. Thus, studying carbon emission disclosures (CED) of UK HEIs is very much important in the existence of the uniqueness of the research. This research thus considers unique explanatory variables, for example carbon emission target by the HEFCE to be achieved by the year 2020, which is actually different for each HEI, current emission status, spending on facilities improvement by respective HEIs have been taken to consideration among others. Prior literature has investigated the effects of a number of variables (such as- size, profitability, industry etc.) on CSR disclosure, which is concerned specifically with the corporate sector (Alnajjar, 2000; Cowen and Carolina, 1987; Gray et al., 2001; Hackston and Milne, 1996; Patten, 1991; Roberts, 1992). But there is absolutely no study known to the researchers that deals with identifying such factors, which determine the carbon disclosures of HEIs in their CAR. This instigates to the research question: ***What are the causal factors of HEI CED? Especially, what is the impact of HEFCE target on HEI CED?*** Answers to these questions may provide a foundation for the research on CED information reported by the UK HEIs.

Background of this study stems from the acknowledgement of the social pressure to act according to the social norms those motivate the organizations to disclose its response to the society. In this way organizations align their position with the society's norm by voluntarily disclosing their favourable activities (Gray et al., 1988). Carbon reduction and controlling activities are one such set of actions, and organizations tend to disclose those in the existing most formal and authentic media of communication – annual report, which is the focus of current research. This study specifically aims at investigating the determinants of HEI CED in the UK. HEFCE has secured the commitment of the sector to reduce its carbon emissions, in many cases building on work already under way. HEFCE consulted and asked HEIs to introduce carbon management plans and provide a collective sector target as part of the Capital Investment Framework-2 (CIF-2) in 2011. It is not legislated but as capital payments require conformity, which is a substantial encouragement. The sector targets for carbon emission reductions are 34 per cent by 2020 and 80 per cent by 2050 against a 1990 baseline. Against a 2005 baseline, this is equivalent to a reduction of 43 per cent by 2020 and 83 per cent by 2050.

The requirement for institutions to set their own targets for 2020 emissions against a 2005 baseline has been used in the scope of the current study because HEFCE demonstrated that robust data are available for that year at institutional level and hence most likely to be meaningfully put into operation. This is expected to provide consistency across the sector against which progress can be monitored and reported.

Universities' role in providing education is vast that includes creating better human beings to play their role for the society. Motivation of the study is from the fact that the higher education (HE) sector demonstrates its commitment to take the leadership role in carbon reduction (HEFCE, 2013), which is evident from many universities' vision and carbon management disclosures. Universities utilise different formal and informal communication strategies to inform their various stakeholders group about their carbon management strategies (Mazhar et al., 2014, p. 154). CED in annual reports, complemented by independent environmental reporting can act as a formal way of such communication covering most information. Thus this study limits its scope of investigation of determinants of CED to disclosures annual reports complemented by independent reports. The scope of this research is empirical.

First chapter set the background, motivation and expected contribution for the thesis. It argued that public awareness on climate change has resulted in much societal attention to carbon reduction activities including other issues (Gray et al., 1987) and HEIs are in a unique position to lead the way. Chapter one informs that HEFCE sets the sector target of 43 percent carbon reduction to be achieved by the year 2020 on the baseline year 2005 (HEFCE, 2013). The current chapter specifically aims at investigating the determinant factors of CED including the role of carbon reduction targets imposed by the HEFCE on the HEIs in the United Kingdom.

The remaining parts of this chapter are arranged as follows. The next section (2.2) discusses the review of prior literature to find the context in which the current research is taking place. Section 2.3 describes the theoretical underpinning used to explain the study and section 2.4 develops the hypotheses used for this chapter. Section 2.5 provides an overview of the research methodology employed for the

study and section 2.6 presents the empirical analysis and econometric results to test the hypotheses used in the study. Finally, section 2.7 concludes the chapter with importance, limitation and scope for further research.

3.2 LITERATURE REVIEW

Climate change is widely acknowledged by the leading researchers as one of the biggest challenges facing the world today. The education sector has a key role to play in addressing this challenge as an important influence of policy making and educator of future leaders. Education is critical to achieving the transition to a low carbon economy and society. Teaching and learning are crucial to inspire and educate the next generation of decision makers, business leaders and citizens, and equip them with the skills and knowledge to deal with the challenges of climate change. Research and innovation help us to understand the many facets of climate change and central to developing ideas and technologies to mitigate and adapt to climate change.

Kolk, Levy, & Pinkse (2008), in their early contribution, examine carbon disclosures and reporting as an emergent corporate response to climate change. They set out the context of changing corporate responses to climate change, from oppositional towards more proactive strategies, observing the development of carbon management, accounting and reporting capacities as being driven partly by (expectations of) government requirements, and also by pressure from investors and environmental NGOs. They draw on the concept of institutional entrepreneurship to help explain the emergence of carbon disclosure as a new form of governance, noting the use by environmental NGOs of investors as way of leveraging 'strategic power' (Levy and Scully, 2007) to achieve their objectives.

Rankin, Windsor, & Wahyuni (2011) call on institutional governance systems theory to help explaining voluntary greenhouse gas reporting in Australia in 2007 in the absence of mandatory reporting requirements. Using data from 80 S&P ASX300 companies, the authors find that carbon sensitive firms e.g. energy, mining and industrial firms are more likely to report greenhouse gas emissions voluntarily than consumer or services industry firms. Other factors associated with disclosing firms include having an Environmental Management System in place,

having this certified, having higher corporate governance quality, and publicly reporting to the CDP.

Cooper & Pearce (2011) examine climate-related performance measurement and reporting from English local authorities, through a combination of documentary analysis and interviews. A number of limitations with the measurement framework are pointed out, such as incomplete coverage of emissions, unclear 'additionality' of reported emission reductions, and unclear accountability when responsibilities are shared between central and local governments. Nevertheless, the authors also discern some positive outcomes, such as evidence that the process has focussed minds, built capacity and encouraged local authorities to pay more attention to their use of energy.

Solomon, Solomon, Norton, & Joseph (2011) point towards acknowledged weaknesses in public disclosure of corporate climate change risks, opportunities and responses, or what they term 'public climate change reporting', which leads them to question whether information disclosed privately to institutional investors is any more effective. Applying discourse analysis to data from interviews with 20 UK institutional investors, the authors find that institutional investors are demanding detailed climate change risk and opportunity information from companies. However, the authors note the 'complete absence of any ethical discourse' in private climate change reporting, echoing concerns raised in different contexts by Cooper & Pearce (2011), McNicholas & Windsor (2011), and others.

Haigh & Shapiro (2012) focus on the decision-usefulness of carbon reporting information for financial institutions. They identify a 'discourse of the imaginary' implicit in finance professionals' visions for the future, which is used by such professionals to justify non-traditional investment criteria. The authors then compare mandatory carbon reporting under the Kyoto Protocol, EU ETS and EU Integrated Pollution Prevention and Control Directive with four voluntary approaches (input–output analysis, structural decomposition analysis, British Standard PAS 2050 and the Greenhouse Gas Protocol). Broadly, the authors' findings support the evidence cited by Solomon et al. (2011) regarding the

shortcomings of public climate change reporting in terms of investor decision-usefulness.

Lodhia & Martin (2012) apply a combination of coding and content analysis to 105 written submissions to a consultation on the Australian National Greenhouse and Energy Reporting Act of 2008. While most of the paper concerns identification of the different stakeholder groups and their key concerns, general support for a consistent framework for carbon accounting, moving from voluntary to mandatory reporting was noted, along with a need for independent assurance. The authors support the views of CPA Australia (the accountancy professional body) 'the accounting profession would be in the best position to facilitate auditing processes, even though this task would be beyond the realm of the most accountants' expertise'.

Green & Li (2012) examine whether an expectation gap exists between different Australian stakeholders in relation to assurance of greenhouse gas reporting, by surveying emission report preparers, assurers and users (non-institutional shareholders). They find evidence of an expectation gap with various dimensions. For example, shareholders had higher expectations of assurers than assurers themselves in relation to responsibilities for accurate record-keeping and internal controls. Assurers also placed higher importance on auditing rather than engineering and environmental science expertise, which are emphasised more by shareholders. In keeping with other studies, the authors found that all groups considered assured emission reports not to be decision-useful (however, this may also relate to the lack of a mandatory carbon price in Australia at the time of the survey). They conclude that standard-setters such as the International Auditing and Assurance Standards Board (IAASB) must not only consider expectation gaps in their standard-setting, but also proactively seek to educate users as to the purpose and limitations of greenhouse gas assurance.

Hrasky's (2012) study examines the disclosure strategies of Australia's ASX Top 50 companies, based on content analysis of their sustainability and annual reports for 2005 and 2008. The author finds that, consistent with an increased need for legitimating in the face of heightened public awareness of climate change, companies are disclosing more greenhouse gas emissions information. More

disturbingly, the author also observes an increase in emphasis on symbolic information, associated with a pragmatic approach to seeking legitimacy, particularly for non- intensive sectors. On the other hand, there was a significant increase in the disclosure of behavioural actions by the carbon-intensive industries, indicating a shift towards a moral legitimating strategy. However, the author cautions that organisational accounts of behavioural action may not reflect real changes in operations and impact, and short-term actions may be insufficient to achieve long-term climate objectives.

Gallego-Álvarez, Rodríguez-Domínguez, & García-Sánchez (2011) analyse the factors associated with the level of corporate disclosure of opportunities arising from climate change. Taking their cue from legitimacy theory, the authors test for correlations between environmental performance (defined as 2007 emissions per unit revenue), economic performance (defined as Return on Assets) and location (whether headquartered in a country that has ratified the Kyoto Protocol) with respect to the volume of disclosure on opportunities arising from climate change in a sample of sustainability reports from 162 international companies. They suggest that environmental performance and location in a Kyoto Protocol country are determinants of such disclosure, whereas economic performance is not.

Dragomir (2012) analyses the disclosure of greenhouse gas emissions information in the last decade's sustainability reports from Europe's five largest oil and gas companies. The author finds significant gaps and shortcomings in the data presented by the five companies, as compared with the requirements of the Greenhouse Gas Protocol, especially with respect to clarity over methodological issues, uncertainty, and re-statements of current and base year emissions. Nevertheless, this longitudinal study does show that data quality and standardisation have improved over time.

Sullivan & Gouldson (2012) investigate the debate between investors and companies reporting through initiatives such as the CDP over the utility of this information. From an analysis of carbon disclosure by UK supermarkets, they conclude that while investors have encouraged companies to report, they have paid far too little attention to the quality of the data, while at the same time, reported data fall short of comparability requirements for investors. The authors consider

the potential role of mandatory reporting and point out that while it offers an opportunity to improve the quality and comparability of reported information, companies will inevitably retain some discretion, and more prescriptive reporting could potentially mask company-specific insights. They, therefore, conclude that the best way forward would be through a combination of voluntary and mandatory reporting, together with active investor interest in the reported data.

Pellegrino & Lodhia (2012) use legitimacy theory as their framework for exploring how two companies and two industry bodies in the Australian mining industry have used carbon disclosures through different media to ensure their on-going legitimacy. They find that 'disclosures may not only contribute to maintaining organisational legitimacy, but also system-wide legitimacy for an entire industry'. The authors also note that the use of a wide range of communication media indicates the existence of multiple stakeholders or 'publics' with whom legitimacy is being sought.

J. Andrew & Cortese (2011) explore the role of discourse in shaping carbon disclosure regulation, focusing on the CDP as a voluntary 'self-regulatory' framework. Like many others in this group, the authors find that variances in carbon accounting methodologies used by firms reporting to the CDP inhibit comparability and decision-usefulness of the information. The authors express concern that 'self-regulatory devices such as the CDP may further entrench the current economic status quo as the only path to a more environmentally responsible future'.

Chatterjee (2012) uses content analysis of carbon disclosure in corporate sustainability reports of 14 multinational mining and oil companies to evaluate the influences on corporate decisions to have their disclosures independently verified. The author finds that companies operating within a stronger policy environment and with a stakeholder-oriented (as opposed to shareholder-oriented) business culture are more likely to opt for independent assurance. The author calls for adoption of a single commonly accepted standard for corporate carbon disclosure and independent assurance.

Qian (2012) examines carbon efficiency, which they define as economic value generated per unit of reported greenhouse gas emissions, for Australian companies over 2008–2010, finding that environmentally sensitive industries display relatively high efficiency for Scope 2 emissions but relatively low efficiency for Scope 1 emissions; while the reverse is the case for less environmentally sensitive industries. The author also finds little significant change in carbon efficiency since the introduction of mandatory reporting in Australia in 2008.

The carbon disclosures literature can be related to the entire social disclosure literature. Table 3.1 shows the empirical studies in the field of CSR, relevant to this study.

Table 3.1

Empirical Studies on Determinants of Corporate Social Disclosures

Author(s) & Date	Dependent Variable	Independent Variable	Period of Observation, Sample Size and Sample Type	Analysis and General Result
Trotman & Bradley (1981)	Level of social responsibility disclosures	– Size, – Systematic risk, – Social pressures, and – Management's decision horizon	Period of Observation 1978 Sample Size 207 Australian companies Sample Type The largest companies listed on the Australian Associated Stock Exchange	Analysis 1. Mann-Whitney *U* test 2. Chi-Square test 3. Spearman Rank Correlations General Result Companies which provide social responsibility information are on average, larger in size; have a higher systematic risk and place a stronger emphasis on the long term than companies those do not disclose this information.
Cowen & Carolina (1987)	Types of social responsibility disclosures	– Size, – Industry, – Profitability, and – Social responsibility committee	Period of Observation 1978 Sample Size 134 US companies Sample Type Companies drawn from ten different industries as reported in Ernst	Analysis OLS Regression General Result Corporate size and industry category influenced a number of social responsibility disclosures while the presence of social responsibility committee was found to correlate with only human resources disclosure. No

			&Whinney's 1978 survey.	relationship was found between social responsibility disclosures and profitability.
Freedman & Jaggi (1988)	Extent of pollution disclosures	Economic Performance Control: – Size and – Industry	Period of Observation 1973 and 1974 Sample Size 108 US firms Sample Type Firms affected by environmental regulations and belonging to four highly polluting industries	Analysis 1. Pearson product-moment Correlation 2. Spearman Rank Correlations General Result No significant association was found between extensiveness of pollution disclosures and economic performance except for the oil refining industry where a significant positive correlation was detected. Results also showed that for large firms, a significant negative correlation exists.
Belkaoui & Karpik (1989)	Social disclosure	– Social performance, – Economic performance, – political visibility (size, capital intensive ratio, systematic risk), and – Monitoring & contracting cost variables (leverage and dividends to unrestricted retained earnings)	Period of Observation 1973 Sample Size 23 US companies Sample Type Companies included in both the Ernst & Ernst social disclosure survey and the survey conducted by *Business and Society Review.*	Analysis OLS Regression General Result Results suggested the existence of significant and positive association of social disclosure with each of social performance and political visibility as measured by size and systematic risk, while the existence of significant and negative association of social disclosure with financial leverage.
Patten (1991)	Social disclosures	Public pressure (as measured by size and industry classification and profitability)	Period of Observation 1985 Sample Size 128 US companies Sample Type Companies drawn from eight industry classifications in the 1985 Fortune 500 listing	Analysis OLS Regression General Result Results indicated that size and industry classification are significant explanatory variables whereas profitability variables are not.

Roberts (1992)	Level of corporate social disclosure	– Stakeholder power, – Strategic posture, and – Economic performance Control: – Company age, – Industry classification, and – Firm size	Period of Observation 1984, 1985, 1986 Sample Size 130 US corporations Sample Type Major companies investigated by CEP drawn from large Fortune 500 companies	Analysis Logistic Regression General Result Results indicated that measures of stakeholder power, strategic posture and economic performance are significantly related to levels of corporate social disclosure.
Hackston & Milne (1996)	Level of social and environmental disclosure	– Size, – Industry type and – Profitability	Period of Observation 1992 Sample Size 47 New Zealand companies Sample Type Top 50 companies listed in New Zealand Stock Exchange based on a size ranking of market capitalization	Analysis 1. Pearson correlations 2. Spearman's rank correlations 3. OLS Regression General Result Results showed that both size and industry are significantly associated with the amount of disclosure, while profitability is not.
Deegan & Gordon (1996)	Level of corporate environmental disclosure	– Environmental group membership, – Environmental sensitivity, and – Firm size	Period of Observation 1991 Sample Size 197 Australian companies Sample Type Firms filed with the Australian Graduate School of Management (AGSM)	Analysis 1. Pearson product-moment Correlations 2. Spearman rank correlations General Result The amount of voluntary environmental disclosure was found to be low in Australia but increases over time. A significant positive association was found between environmental disclosures and each of environmental group membership, environmental sensitivity of the industry and firm size.
Adams, Hill, & Roberts (1998)	Types of social disclosures	– Company size, – Industry grouping, and – Country of domicile	Period of Observation 1992 Sample Size	Analysis ANOVA tests General Result

			150 European companies Sample Type The largest 25 companies in each of six Western European countries	Results indicated that company size is significantly associated with all types of social disclosures, while industry membership was found to be related to environmental and some employee disclosures only. In addition, the amount and nature of social information disclosed varied significantly across countries.
Gray, Javad, Power, & Sinclair (2001)	Total social disclosure, Major areas of social disclosure and types of social disclosure	– Turnover, – Capital employed, – Number of employees, and – Profit Control: – Industry classification	Period of Observation 1988 – 1995 inclusive Sample Size 100 UK companies Sample Type Top 100 UK companies selected from the *Times1000*	Analysis OLS Regression General Result The results provided strong support that in the UK, corporate social and environmental disclosure is related to corporate characteristics of size, profit and industry affiliation.
Salama (2003)	Total environmental disclosure, Types of environmental disclosure and Areas of environmental disclosure	– Industry, – Profitability, and – Size	Period of Observation 1999 Sample Size 169 UK firms Sample Type The largest 200 UK companies by Market capitalization	Analysis 1. OLS Regression 2. TOBIT Regression 3. LOGIT Regression 4. Ordered PROBIT Regression General Result Corporate size and industry membership significantly and positively influence environmental reporting practices, while prior profitability negatively influences corporate environmental disclosure in the UK.
D. Campbell (2004)	The volume of environmental disclosure	– Membership of environmental lobbying organizations, and – Environmental sensitivity of the industry	Period of Observation 1974 – 2000 Sample Size 10 UK companies Sample Type Two companies from five sectors chosen from the	Analysis 1. *t* - tests 2. OLS Regression General Result An increase in the volume of voluntary environmental disclosure over 27 years, and a strong correlation of that disclosure to membership of environmental lobby groups.

			FTSE 100 (by market value)	Also, a significant positive association was found between environmental disclosure and the environmental sensitivity of the industry.
Gao, Heravi, & Zezheng (2005)	Amount, content themes and location of Corporate Social and Environmental Disclosure (CSED)	– Size and – Industry effects	Period of Observation 1993 – 1997 Sample Size 33 Hong Kong companies Sample Type The Top 100 companies listed on Hong Kong Stock Exchange	Analysis 1. Pearson Correlations 2. ANOVA tests General Result Industry difference has an impact on the amount, content themes and location of CSED and there is a positive correlation between company size and the level of CSED.
Ho & Taylor (2007)	Extent of triple bottom-line reporting (TBL)	– Size, – Profitability, – Industry – membership, – Leverage, and – Liquidity	Period of Observation 2003 Sample Size 50 US and Japanese companies Sample Type The largest 50 US and Japanese companies by market capitalization	Analysis OLS Regression General Result For total TBL disclosure (combining economic, social, and environmental categories), the extent of reporting is higher for firms with larger size, lower profitability, lower liquidity, and for firms with membership in the manufacturing industry.
Branco & Rodrigues (2008)	Level of social responsibility disclosure (SRD) and Types of social responsibility disclosure	– Degree of international activity, – Company size, – Industry, – Consumer proximity, – Environmental sensitivity, and – Media pressure Control: – Profitability, and – Leverage	Period of Observation 2003 Sample Size 49 Portuguese companies Sample Type Companies listed in Portuguese Stock Exchange (Euronext – Lisbon)	Analysis 1. *t* - tests 2. Wilcoxon test 3. OLS Regression General Result Only company size and media pressure are significantly associated with social responsibility disclosure, while other variables do not provide an explanation as to the level of such disclosure.
Parsa & Kouhy (2008)	Level of social reporting	– Corporate age, – Industrial background,	Period of Observation 2001-2003	Analysis 1. Spearman's rank correlations

		– corporate size, and – Gearing	Sample Size 90 UK companies Sample Type Random sample of companies listed on the Alternative Investment Market (AIM)	2. Kruskal–Wallis test General Result Corporate age is not associated with social reporting, while industrial background, corporate size, and gearing, are associated with the level of such disclosure.
Stanny & Ely (2008)	Level of environmental disclosure	– Corporate size, previous disclosure, – Industry, – Foreign sales, – Asset age, – Capital expenditure, – Tobin's Q, – Leverage, – Profitability, and – Institutional ownership	Period of Observation 2007 Sample Size 500 US companies Sample Type US S&P companies	Analysis 1. Tetrachoric correlation 2. Pearson correlation 3. LOGIT Regression General Result The empirical results of binary logit regressions revealed that corporate size, previous disclosure, and foreign sales are significantly associated with disclosure, while no significant association was found between disclosure and institutional ownership, Tobin's Q, profitability, leverage, industry, and asset age.
Liu & Anbumozhi (2009)	Level of environmental disclosure	– Government power (environmental sensitivity of industry), – shareholder power (percent of floating stock possessed by the top 10 shareholders) and – creditor pressure (debt/asset) Control: – Size, – Age, – Location, – Learning capacity, and	Period of Observation 2006 Sample Size 175 Chinese companies Sample Type Chinese listed companies	Analysis 1. Pearson correlation 2. OLS Regression General Result Firm's environmental sensitivity (government power) and size are the major significant factors influencing their environmental disclosure efforts. The economic performance is not significantly related to the environmental disclosure activities. Shareholder power and creditor pressure show no significant association.

		– Return on equity		
Reverte (2009)	Corporate social responsibility (CSR) disclosure	– Corporate size, – Industry sensitivity, – Profitability, – Ownership concentration, – International listing, – Media pressure, and – Leverage	Period of Observation 2005-2006 Sample Size 46 Spanish companies Sample Type Spanish firms listed on the Madrid Stock Exchange and included in the IBEX35 index	Analysis 1. Correlation 2. OLS Regression General Result Corporate size, industry sensitivity, and media pressure are significantly associated with corporate social responsibility disclosure, while both profitability and leverage are not associated with such disclosure.
Monteiro & Aibar-Guzman (2010)	Level of environmental disclosure	– Firm size, – Industry membership, – Profitability, – Quotation on the stock market, – Foreign ownership, and – Environmental certification	Period of Observation 2003 Sample Size 109 Portuguese companies Sample Type Companies drawn from the list of the 500 largest Portuguese companies by turnover in 2003	Analysis 1. Pearson correlation 2. OLS Regression General Result Firm size and enlistment of a company on the stock market are positively associated with environmental disclosure.

A further stem from the social disclosure literature is the environmental disclosure literature, which relates to carbon disclosures. The available literature shown in Table 3.2 is presented to relate and place the current study chapter in the field of environmental disclosures study.

Table 3.2

Empirical Studies on Determinants of Corporate Environmental Disclosures

Author(s) & Date	Dependent Variable	Independent Variable	Period of Observation, Sample Size and Sample Type	Analysis and General Result
Magness (2006)	Quality of environmental disclosure	Strategic posture (as measured by press releases) Control: – External funding, – Size, and – Financial performance	Period of Observation 1995 Sample Size 44 Canadian companies Sample Type Gold mining Canadian companies publicly traded and identified with a primary Compustat SIC of 1040 (gold & silver ores)	Analysis 1. Spearman's Rank Correlation 2. OLS Regression General Result Increase in corporate environmental disclosure is associated with: (1) companies pursuing an active strategy of stakeholder management through press releases, (2) companies having plans to access external financial markets and (3) large sized companies. However, there was no evidence to suggest that disclosure content is moderated by financial performance.
García-sánchez (2008)	Corporate social reporting content and characteristics	– Size, – Industry and – Profitability	Period of Observation 2004 Sample Size 32 Spanish companies Sample Type	Analysis 1. Cluster analysis estimation algorithms 2. Discriminant analysis General Result

			The 35 largest Spanish companies quoted in the stock market (index IBEX35 of the Spanish stock exchange)	Both corporate size and industry membership are associated with corporate social disclosure, while there is no association between profitability and such disclosure.
Mio (2010)	Quality of sustainability, environmental and social reporting	– Level of clarification of the sustainability strategy, – Level of complexity, – Territoriality, – Degree of maturity, and – Experience in sustainability communication, – Rate of growth, – Degree of privatization and organizational structure, and – Organizational arrangements to support social and environmental responsibility	Period of Observation 2006 Sample Size 12 Italian companies Sample Type Multi-utility companies listed on the Italian Stock Exchange	Analysis Correlation Analysis General Result Variables influencing the quality of reports are the complexity, the territoriality and number of employees and to limited extent the level of privatization. There were no correlation between the quality of reports and each of turnover and organizational structure.
Roy & Ghosh (2011)	Quality of discretionary environmental disclosure	– Economic performance Control: – Industry and – Country	Period of Observation 2004-2009 Sample Size 69 companies Sample Type Companies from seven Asian countries including India, Japan, China, South Korea, Malaysia,	Analysis 1. Hausman specification test 2. OLS regression General Result Economic performance and discretionary environmental disclosure quality are not simultaneously related and thus are not endogenous.

	Indonesia and Israel	Sustainable environmental practices and the discretionary disclosures had negative or very low positive as well as insignificant association with the economic performance of the firm. Companies that belong to environmentally sensitive industries tended to disclose less objective information leading to lower quality disclosures. Similarly, companies that belong to countries having high relative emissions also showed a less informative and low quality of disclosure.

Empirical research those deal with determinant attributes of carbon emission disclosures are more focused and relevant to this study. Table 3.3 explicitly depicts studies available on determinants of carbon disclosures.

Table 3.3
Empirical Studies on Determinants of Carbon Emission Disclosures

Author(s) and date	Dependent variables	Independent variables which proved significant	General results	Sample size
Johnston, Sefcik, & Soderstrom (2008)	Market value of equity	– Book value – Earnings before extraordinary items – Sales growth – Number of SO_2 emission allowance held	– Positively significant – Positively significant – Positively significant – Positively significant	195 firm years, comprised of 58 firms from the USEPA's Acid Rain Program Allowance database in 1995-2000 period
Gallego-Álvarez, Rodríguez-Domínguez, & García-Sánchez (2011)	Disclosures of opportunities arising from climate change	– Environmental performance – Ratification of Kyoto protocol by country of origin – Developed/ undeveloped country – Asset newness	– Positively significant – Positively significant – Positively significant – Positively significant	162 Fortune 500 largest companies of different countries in 2007
Rankin, Windsor, & Wahyuni (2011)	Greenhouse gas emission disclosures	– Existence of Environment Management System – Governance – Size – Industry	– Positively significant – Positively significant – Positively significant – Positively significant	187 S&P ASX300 Australian companies in 2007

Hrasky (2012)	Carbon footprint related disclosure	– Industry orientation – Symbolic or behavioural	– Positively significant – Behavioural for higher intensive and symbolic for lower intensive	ASX top 50 companies- large listed Australian companies

The existing literature does not explain the factors determining of CED of HEIs. Nejati et al. (2011) studied top 10 world universities and found that almost all the universities covered in their sample do provide the CSR disclosure in their web pages. This study was based on a very small sample limited to ten, which is not enough to come up to any conclusion. Moreover, this study did not focus on analysing the causal effects for such CSR engagement disclosure by the universities. Godemann et al. (2011) in their research paper series on 100 business schools who signed in UN PRME (United Nations Principles for Responsible Management Education) found that the signatory universities worldwide proactively follow sustainable behaviour and disclose it. This study also lacks in analysing the motivation behind such proactive behaviour of HEIs regarding sustainable behaviour. Additionally, both these studies focused on CSR as a whole, rather than carbon or green disclosures.

Mazhar et al. (2014) did a qualitative exploratory study on the strategic carbon management of HE sector. They came up with 17 semi-structured interviews with middle and senior managers in HEIs to investigate the issues related to HEI carbon management. Their proposed thematic framework includes – understanding carbon management, leadership, funding & resources, carbon management planning, carbon reduction targets, communication, stakeholders' engagement – staff and students, ownership & governance, strategic decision-making, benchmarking and space management. They pointed out that there exists a 5% gap between aggregate individual target (38%) and sectors' overall target (43%), which is acknowledged by HEFCE in their publication (HEFCE, 2013). In justifying the argument in favour of further strengthening sector role, Mazhar et al. (2014) displayed interview results with a responsible person from each of their sample 17 HEIs in a logical manner. However, this study only explores key factors regarding strategic carbon management, without any back up of empirical

analysis. Thus, an investigation to find the determinants of HEI CED can add to the existing knowledge.

Contributions of this study to social disclosure knowledge are mainly in following areas. First, this is the first known research on determinants of HEI carbon disclosures. There has been decades of research on social reporting (Gray, Kouhy, & Lavers, 1995b; Ullman, 1985), however research on CED is comparatively new (Bebbington and Larrinaga-González, 2008; Rankin et al., 2011). However, existing research are primarily on the corporate side, leaving a vacuum of literature on CED by HEIs. No study exists that investigated the cause of such HEI social disclosures, considering HEI is distinct from other organisations. Second is that only a limited existing literature studies the compliance, nature and extent of social disclosures by HEIs. None attempted to measure the causation of such disclosures. This leads to the third importance that the research investigates the impact of HEFCE target to be achieved by the year 2020, set out for the HEIs during the year 2009. This research has the potential to impact policy intervention and formulation in this regard. Basis for this research here is that the more critical particular stakeholder resources are to the existence and success of an organization, the more authoritative the stakeholder is and more likely the expectations of such stakeholder are to be fulfilled. This demand inspires the provision for organisational carbon reporting (Ullman, 1985).This is the first known research on CED of HEIs, which studies the determinants of CED of HEIs.

3.3 HYPOTHESES DEVELOPMENT

The Climate Change Act 2008[21] aims to improve carbon management and help the transition towards a low-carbon economy in the UK. It sets the world's first legally binding targets for greenhouse gas emissions of at least 80 per cent by 2050 and at least 34 per cent by 2020[22], against a 1990 baseline. In summer 2009 the

[21] Further information is available at www.decc.gov.uk under Legislation/Climate Change Act 2008.

[22] The 2009 Budget set the first carbon budgets, as required by the Climate Change Act. This increased the level of the 2020 target from 26 per cent to 34 per cent.

Government published the UK Low Carbon Transition Plan[23], which sets out how the UK will meet the 34 per cent cut in emissions on 1990 levels by 2020. Nationally, emissions have already been reduced by 21 per cent. HEI sector needs to play its part in meeting national targets for carbon reduction. It is uniquely placed to lead the way with its role in teaching and research, it aspires to go further and achieve carbon reductions in excess of the sector-level targets. However, there is no literature on how the CED is integrated in the structures and programs of the universities.

Prior literature has investigated the effects of a number of variables (such as- size, profitability, industry etc.) on carbon emission disclosures, which is concerned specifically with the corporate sector (Alnajjar, 2000; Cowen and Carolina, 1987; Gray et al., 2001; Hackston and Milne, 1996; Patten, 1991; Roberts, 1992). But no study in existence known to the researcher that deals with identifying such variables which determines the CED of HEIs.

The existing literature still now is searching for whether the social responsibility is practiced and disclosed by HEIs, or not. There is no study, in my best knowledge, which studies CED in HEIs. It is still to find out the drivers of the carbon disclosures of universities (see, for example, Godemann et al., 2011; Nejati et al., 2011; Mazhar et al., 2014). Some interesting areas to look for are- What are the drivers/causes behind universities' interest in CED - are these internally driven (and if so to what extent are these driven internally?) or driven by external influences? Also, Godemann et al. (2011), Nejati et al. (2011), and Mazhar et al (2014) studied only whether or not universities disclose CSR. But they never explored the effectiveness of the disclosures and the stakeholder's perception regarding such disclosures, which can be an interesting thing to investigate. This is motivated by the following hypotheses. Factors in existence expected to be affecting CED along with the carbon reduction are thought out to be the following.

- Carbon Reduction Target and Current Emission
- Carbon Audit and Investment for Carbon Reduction
- Institutional Characteristics

[23] The plan is available at www.decc.gov.uk under Publications.

3.3.1 Carbon Reduction Target and Current Emission

Carbon Reduction Target of individual HEIs by the year 2020 from 2005 baseline by HEFCE should affect the HEI CED in the sense that these targets create a pressure on the individual HEIs and their carbon reduction performance to be able to qualify for the CIF-2 fund. So, logically HEIs would like to disclose their activities on carbon emission reduction through their annual reports and carbon management plan and other relevant documents and communications.

On the other hand, low carbon performing HEIs emitting more carbon are likely to produce more carbon emission disclosures through appropriate media to manage the stakeholders' expectation by justifying the excess emission above the sector usual practice. Both stakeholder and institutional theories support the flow of information through different media to stakeholders, more directed towards the influential stakeholders to explain and justify activities.

H_{1a}: Carbon reduction targets (%) on HEIs from 2005 baseline to 2020 by HEFCE have a positive effect on its CED.

H_{1b}: Present carbon emission volume by a HEI is positively related with its CED.

3.3.2 Environmental Audit and Investment for Carbon Reduction

Extensive environmental audit and management systems should result in the higher carbon related disclosures by HEIs. Proper audit should result in better performance and subsequent positive disclosure. Thus, HEIs operating an externally audited Environmental Management System, are expected to disclose more in annual reports. Extensive environmental management systems are evident in their documentation, web page, certifications, and audit documents among others.

On the other hand, investment for carbon reduction is hard to quantify. However, facilities spending (investment in infrastructure) by universities are logically expected to relate to effort for carbon reduction. A positive causal relationship is expected between facilities spending and CED as more investment activities give

more scope to disclose positive news. This is respective university's expenditure on student facilities that comes from the HESA finance plus publication for 2011–12.

H_{1c}: Effectiveness of the environmental audit system in place for any university is expected to have positive relationship with CED.

H_{1d}: Spending on facilities has a positive influence on HEIs' CED in their annual reports.

3.3.3 Institutional Characteristics

Belongingness to a specific league may designate a sense of relative prestige and which might possibly give rise to a relative sense of responsibility resulting into relative variation in CED by the respective HEIs (Tilt, 1994). Member universities of a specific league are expected to have different characteristics those are what define the feature of that league grouping. League belonging should have causal effect on carbon emission disclosure on the ground that some leagues are expected to be more responsible than others in carbon emission and disclose the fact more sensibly (Clarkson et al., 2011). Some leagues are expected to be logically more motivated to pressurize its members and set criteria for member HEIs to disclose relevant carbon activities than others so that they can prove their superiority and legitimacy.

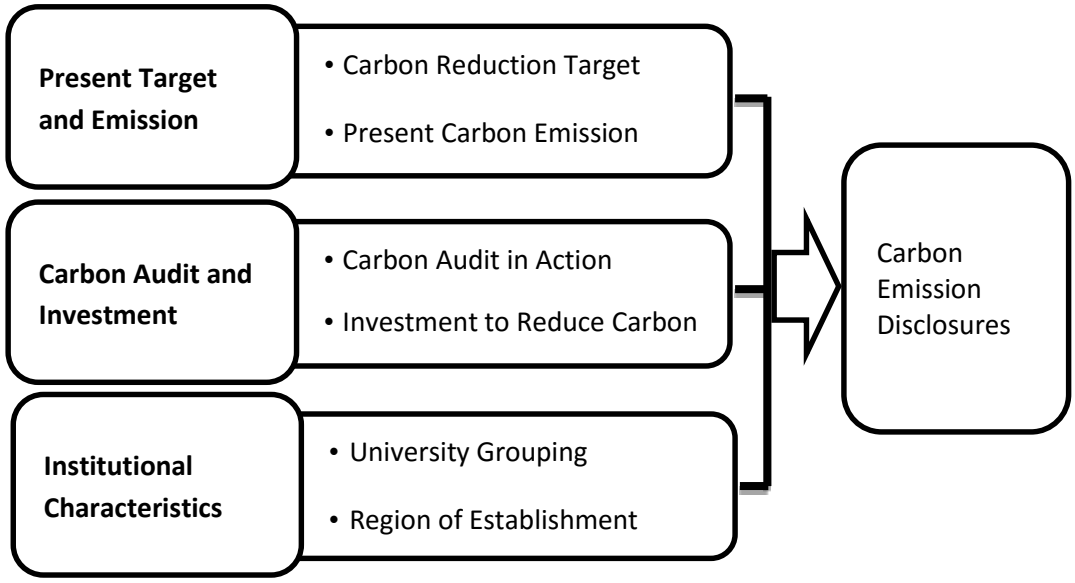
On the other hand, the CED practice can be logically different among universities in different regions (Deegan et al., 2000; Mio, 2010; O'Donovan, 2002; Wittneben and Kiyar, 2009)and patterns are expected throughout the UK. Adams (2002) argues in her study of German companies that the geographical belongingness influences the extent of social disclosure and non-disclosures. Specifically, the region specific rules and regulations might have their impact on the CED by HEIs. For example, Scotland has its own sets of targets in several occasions, which might have some differing causal effect relationship on the Scottish universities. Scottish Government's Climate Challenge Fund used give special funds to Transition University award winners.

H_{1e}: The university league groupings in which the HEIs belong to have a role in determining the extent of its CED.

H_{1f}: The region of its establishment has a role in determining the extent of its CED.

Figure 3.1 summarises the hypothesised effects on CED by its determinants.

Figure 3.1
Determinants of CED by HEIs



3.4 RESEARCH METHODS

The word 'method' comes from the Greek words 'meta' and 'hodos' meaning a way (Smith, 1988). Broadly, a method or methodology is the underlying principles and rules of organization of a philosophical system or inquiry procedure (Urdong, 1968). A Dictionary of Social Science observes Methodology is the systematic and logical study of the principles guiding scientific investigation (Gould and Kolb, 1964). Research Methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically (Kothari, 2004). According to Aminuzzaman (1991) research method is the functional action strategy to carry out a research project in the light of the theoretical framework and guiding research questions. A method is a

planned and systematic approach of investigation. It denotes the detail framework of the unit of analysis, data gathering techniques, sampling focus and interpretation strategy and analysis plan.

This section presents the methodology used in the study. It considers sample selection, measuring HEI reputation, data analysis, and model specification.

3.4.1 Sample Selection

The initial sample chosen for this study includes all of the publically funded (and one private) universities in the UK[24] that return data to Higher Education Statistics Agency (HESA)[25].It contains 168 HEIs in total. This study attempts to measure the determinants of CED by HEIs with the help of empirical analysis. The study covers CED in annual reports of 2012 by HEIs. Annual reports of all HEIs were collected for the study year 2012, if available. Annual reports of universities were downloaded from their websites. Also, emails were sent to the designated persons of those universities for the annual report of 2012 on 20 March, 2014. All the annual reports found were included in the database, if they emailed by 20 June, 2014. It left the researcher with 144 HEI samples. To make the sampling robust, the study includes all feasibly available HEIs in the sample. However, for the other variables like, carbon target, carbon emission, carbon audit, carbon investment, size and age - the thesis depends on the databases collected from HEFCE publication, HEI websites, the People and Planet organisation website and HESA. This returns information of 135 HEIs from our sample and thus the final sample was reduced to 135.

The study uses most recent up-to-date data available at the time of the conducted study. This will help to capture the most recent awareness of the carbon emission and disclosure practices by HEIs. The annual reports of 2012 have been selected as the primary source for CED and financial data since they are publicly available, produced regularly, management implement editorial control over them, formats are comparable with peer HEI annual reports (Al-Shaer, 2013; Saha and Akter,

[24] By the UK, I mean England, Scotland, Wales and North Ireland.
[25]HESA is a charitable company which is funded by the subscriptions of the HE providers from whom it collects data.

2012, 2013; Schleicher, 2012; Schleicher and Walker, 2010; Wilmshurst and Frost, 2000). However, databases published by HESA and HEFCE were extremely helpful in collecting data for independent variables.

The researcher does not expect any significant fluctuation in HEI CED around the study period and also does not find any influential fact happening around the study period to induce such significant fluctuation in HEI CED. Considering the nature of the research which requires content analysis of AR and the researcher actually has to get to great details of the AR, which requires time dedication; the researcher decides to limit the study to focus on 2012 annual reports only. Especially, as no significant year-to-year CED fluctuation is expected around the selected study period, this is in line with previous major research in social accounting of similar nature (Alotaibi and Hussainey, 2016; Guthrie and Parker, 1990; Hackston and Milne, 1996; Hasseldine et al., 2005; Rankin et al., 2011; Sun et al., 2010). Thus, this study period seems to be a good choice for the research. Thus, this research constitutes cross-sectional analysis.

3.4.2 Dependent Variable Definition and Measurement

Dependent variable is the variable in which the research is interested to study. In this research the variable researcher is interested to study about carbon emission disclosures in the annual report defined by number of sentences. Justification for using annual report, measurement and process of gathering the sentence counts are given in this subsection.

3.4.2.1 Why Annual Report?

Annual reports (AR) are regarded as an important and useful source document regarding social and environmental (including carbon disclosures) mainly because of its credibility of relevant information published in it and the high importance it carries in disseminating relevant information (Rizk et al., 2008; Unerman, 2000). The annual report is a formal document published by companies and is used as a communication media or sampling unit. Krippendorf (1980, p. 57) defines sampling units as “those parts of observed reality or of the stream of source

language expressions that are regarded independent of each other". The vast majority of social and environmental disclosure literature used the annual report as the main source of corporate disclosure. The annual report is a secondary data source that is employed in the current study to examine the carbon emission disclosure practices of UK HEIs for the year 2012.

Organizations use the AR as a tool for disbursing information to various stakeholders, along with other tools such as – interim and quarterly reports, media releases (including advertising and news releases in papers, journals, radio and television), personnel handbooks, employee newspapers, speeches of top executives, announcement to the stock exchange, and internet home page (Zeghal and Ahmed, 1990). The AR is viewed as a mean by which organizations seek to establish an image in the public sphere through voluntarily reporting, emphasizing the role of the annual report in constructing and presenting a 'reality' of corporate life (Hines, 1989). Corporations used to use AR as a mean to disclose social and environmental information (Patten, 1995). The ARs of organizations listed on stock exchanges have often become a source of raw data for disclosure studies, and therefore have served as an instrument for observing voluntary reporting (Guthrie and Abeysekera, 2006). Most of prior disclosure studies have used disclosures in the annual reports (Milne and Adler, 1999). ARs contain important signals of social performances for organizations (Robertson and Nicholson, 1996).

Although there are a number of ways (for example, the internet, press reports and interim reporting) through which CED may be made, like many other studies (Adams et al., 1998; Gray et al., 1995a, 1995b; Guthrie and Parker, 1990; Jizi et al., 2013; Rizk et al., 2008) this study considers disclosures made in the corporate annual reports only. The reason is the annual report is the most common and popular document produced by organizations regularly. However, Unerman (2000) argues that exclusive focus on annual reports may lead to an incomplete picture of social disclosures. Justification for choosing AR were several (Abbott and Monsen, 1979; Gray et al., 1995b; Wilmshurst and Frost, 2000; Wiseman, 1982). First, AR is a permanent means communication from the top management with editorial control to the shareholders and general public to disseminate news of economic and social activities of and regarding organizations. Second, AR is

easily obtainable and thus usable for this sort of studies. Last, AR contains both statutory and voluntary disclosures and comes in a comparable format and interval, which makes it suitable for this research. The available literature on carbon emission disclosures prominently uses disclosures in annual reports along with stand-alone report and websites for their research. These are shown in Table 3.4.

Table 3.4

Constructs Used for Research in Carbon Emission Disclosures

Author(s) and date	Construct	Year
Rankin et al. (2011)	Annual Reports Stand-alone sustainability reports	2007
Gallego-Álvarez et al. (2011)	Websites	2007
Hrasky (2012)	Annual Reports Stand-alone sustainability reports	2008 and 2005

Various justifications have been put forward throughout the disclosure literature for the extensive focus on annual reports. Annual reports are the most important media through which an organisation reveals corporate information to the public (Adams et al., 1998; Botosan, 1997; Hines, 1989) and a main channel of corporate communication of social and environmental information (Gibson and Donovan, 2007; Gray et al., 1995b; Smith et al., 2005; Wiseman, 1982). In addition, annual reports are characterized by their high degree of credibility (Neu et al., 1998; Tilt, 1994), availability, accessibility and wide distribution (Campbell, 2000; Tilt, 1994; Unerman, 2000; Wilmshurst and Frost, 2000), formality and statutory nature (Buhr, 1998; Hackston and Milne, 1996; Hines, 1989; Wilmshurst and Frost, 2000), consistency (Tilt, 1994) as well as usefulness to various stakeholders (Buhr, 1998; Deegan and Rankin, 1997; Neu et al., 1998; Tilt, 1994).

In addition, the presentation of financial information and social and environmental information within the same report is an important element in demonstrating how

the company reconciles possible conflict between the financial and social objectives and interests of different stakeholders (Gray et al., 1995b). Halme & Huse (1997) argue that annual reports are likely to reflect corporate environmental concerns by addressing environmental issues and interests of various stakeholders. In this regard, using annual reports as a channel of communication with stakeholders is consistent with the principles of stakeholder theory (Smith et al., 2005).

CED are found in different places of ARs (Deegan and Rankin, 1996; Toms, 2002). Financial and non-financial sections of ARs such as the audited financial statements, the management discussions and analyses, footnotes and supplements to accounts, the chairman's and/or president's letter to shareholders, a separate environmental section and the corporate overview are used for the research (Deegan and Gordon, 1996). Independent sustainability reports (ISR) are also treated as a part of ARs when ARs included the cross reference to ISRs (Toms, 2002). CED are identified as part of HEIs' responsibilities towards the society (Toms, 2002). CED is defined as the voluntary disclosure of information to inform or influence audiences by organizations (Mathews, 1984).

Accordingly, and in line with the above arguments and disclosure literature, the annual report would be used by the current study as the most reliable source for corporate environmental information. Moreover, it is virtually impossible to monitor all available communication media of corporate social and environmental disclosure over a number of years (Gray et al., 1995b). Complete and consistent identification of all these corporate communication forms of disclosure over a long period of time is likely to be problematic (Hammond and Miles, 2004; Unerman, 2000). Accordingly, Unerman (2000) argues that even though several disclosure media are available, a limit must be put on the range of documents to be examined in any particular research in order to ensure completeness and consistency of data investigation and analysis of all possible corporate environmental disclosure media prove to be pragmatically, financially and technically infeasible (Hanafi, 2006).

However, focusing solely on annual report, neglecting other media is not a prudent thing to do. This research will cover the independent sustainability reporting and

web reporting to a limited extent. Moreover, annual reports were mostly downloaded from the websites of the respective HEI. As such they are free from the demerits of paper annual reports (Craven and Marston, 1999; Crowther, 2000; Marston and Polei, 2004). Annual reports published in the websites are in the context of other relevant information, which can be verified from the same place (website) by the readers.

3.4.2.2 Content Analysis

Content analysis (CA) has been used to extract CED from the corporate annual reports (CAR) in line with previous literature. Many studies followed CA in the corporate social responsibility categorisation developed by Owen, Gray, and Maunders (1987). This technique has been widely used in social and environmental (SE) studies, specifically which are predominantly of quantitative nature and explore the motivations behind and determinants of such disclosures (Abbott and Monsen, 1979; Andrew et al., 1989; Belkaoui and Karpik, 1989; Deegan and Gordon, 1996; Deegan and Rankin, 1996; Gray et al., 1995a, 1995b; Guthrie and Parker, 1990; Hackston and Milne, 1996; Ingram and Frazier, 1980; Neu et al., 1998; Patten, 1991; Singh and Ahuja, 1983; Toms, 2002; Williams and Pei, 1999; Wiseman, 1982; Zeghal and Ahmed, 1990).

CA is a method for coding the content or text of a piece of writing into categories based on chosen criteria (Weber, 1988). CA has been defined as, "a technique for gathering data that consists of codifying qualitative information in anecdotal and literary form, into categories in order to derive quantitative scales of varying levels of complexity" (Abbott & Monsen, 1979, p. 504). CA has been used extensively in social and environmental responsibility (SER) disclosure research to proxy the quantity of information disclosures (Blacconiere and Patten, 1994; Freedman and Wasley, 1990; Wiseman, 1982). It requires reviewing the document for the presence or absence of disclosure across selected areas of information (Brown et al., 2010). CA allows narrative information to be coded in quantitative terms, which allows statistical operations for further research. It also allows coding large amount of narratives with help of more than one coder, or group of coders. However, the categorisation scheme needs to be well defined (Beattie et al., 2004). Another advantage of CA is that it facilitates external validation as the coding and

measurement do not interfere with the phenomenon (Krippendorf, 1980). Additionally, CA allows for both quantitative (descriptive analysis of content) and qualitative (test of hypothesis) research afterwards (Weber, 1988).

A number of studies used CA method to gather data on disclosure in AR (e.g., Guthrie & Mathews, 1985; Guthrie & Parker, 1990). Researchers in the field of social research have, according to Parker (2005), used CA as the dominant research method for collecting empirical evidence. Parker (2005) found that over the 1988-2003 study period, 52 per cent of papers published belonged to the 'literature, theory, commentary, methodological' category; and 48 per cent to empirical studies. Among the empirical studies, content analysis represented 19 per cent; case, field and interview studies 12 per cent; surveys 15 per cent; experimental studies 1 per cent; and combined 1 per cent. Table 3.5 presents available prior social and environmental studies (including carbon disclosures) those used content analysis approach.

Table 3.5

Prior Studies Using Content Analysis Approach

Authors (Date)	Research contribution	Content analysis approach or tools
Wiseman (1982)	Relationship between environmental disclosure content and environmental performance	Quantity with quality/ 18 index items classified into 4 categories
Harte & Owen (1991)	A look at the development of green reporting by British companies	Quantity/ dichotomous disclosure index
Ness & Mirza (1991)	The relationship between environmental disclosure and the oil industry based on agency theory	The relationship between environmental disclosure and the oil industry based on agency theory
Patten (1991)	Examining whether public pressure or firm profitability is behind firm's decision of	Quantitative/ pages counts and categories classified

	disclosing social information voluntarily	based on Ernst & Ernst (1978)
R. W. Roberts (1992)	The explanation of social responsibility disclosure based on stakeholder theory	Quantity with quality/ CEP ratings (measure of both level and reliability of CSR disclosure
Gray et al. (1995b)	Constructing a research database of social and environmental reporting by UK companies	Quantitative/ Guthrie's approach based on Ernest & Ernest database
Hackston & Milne (1996)	Examining some potential determinants of social and environmental disclosure in New Zealand companies	Quantitative measure/ sentence- based coding instrument
Kolk (1999)	An evaluation of environmental rating system	Quantitative/UNEP, sustainability rating survey
Milne & Chan (1999)	Investigating the impact of narrative social disclosures in the annual reports on investment decision making	Narrative textual disclosure/ investment decision experiment using survey questions
Milne & Adler (1999)	A study of inter-coder reliability of environmental disclosure content analysis	Quantitative/ based on Hackston & Milne (1996) instrument
Unerman (2000)	Complement to Milne & Adler's (1999) paper on method application	Quantitative measure/ number of pages
Wilmshurst & Frost (2000)	A link between the importance of specific environmental disclosure issues and actual environmental reporting	Quantitative/ sentence count
Cormier & Gordon (2001)	Relationship between company disclosure, size and ownership	Disclosure index based on Wiseman (1982)
Gray et al. (2001)	Exploring the relationship between social and environmental disclosure by	Quantitative/ content analysis employed in the CSEAR database (data are

	large companies and corporate characteristics	collected by volume categorized by subject)
Milne & Patten (2002)	The legitimized impact of environmental disclosure provided in chemical firms' annual reports on investors	Narrative/ investment decision experiment based on Milne & Chan (1999)
Toms (2002)	Relationship between environmental disclosure and environmental reputation	Quantitative measure/ quality signalling based on the volume of information
D. Campbell (2003)	The UK environmental disclosure as a mechanism of legitimating	Quantitative/ word count
Al-Tuwaijri, Christensen, & Hughes II (2004)	An analysis of the interrelation among environmental disclosure, environmental performance and economic performance with a joint determination of the three functions	Quantitative/ dichotomous scoring index
Freedman & Jaggi (2005)	Evaluates disclosures on pollution and greenhouse gases by firms domiciled in countries that have ratified the Kyoto Protocol compared to others.	Weighted and un-weighted disclosure indices
Gao et al. (2005)	Examining the determinants of social and environmental disclosure in Hong Kong	Quantitative/ word count
Hasseldine et al. (2005)	The impact of environmental disclosure on environmental reputation	Qualitative measure with weights/ based on Toms (2002)
P. M. Clarkson, Li, Richardson, & Vasvari (2008)	Relationship between environmental disclosure content and environmental performance with GRI	Index based on the Global Reporting Initiative sustainability reporting guidelines

	guidelines to better capture firm disclosures	
Beck et al. (2010)	Dual contribution. A robust matrix approach to environmental narratives and comparison of environmental reporting by German and UK companies	Consolidated narrative interrogation (CONI) to measure the information diversity, information content and volume
Sun, Salama, Hussainey, & Habbash (2010)	The association between corporate environmental disclosure, earning management and the impact of CG on that association	Quantitative/ Environmental Key Performance Indicator (KPI) required by UK government
Dhaliwal, Li, Tsang, & Yang (2011)	Voluntary nonfinancial disclosure and the cost of equity capital: The initiation of CSR reporting	Disclosure index based on different categories of CSR issues employed by KLD
Gallego-Álvarez et al. (2011)	Analyses different factors behind the disclosure of corporate information on issues related to opportunities arising from climate change worldwide	Disclosure index based on the opportunities arising from climate change and disclosed by companies
Rankin et al. (2011)	Explains voluntary corporate greenhouse gas (GHG) reporting in the context of a market governance system in the absence of climate change public policy	Index constructed from the "ISO 14064-1" items
Hrasky (2012)	Adopting a legitimacy perspective, assess how Australian companies adjusted their responses through carbon disclosures	Un-weighted index based on sentence count as per Milne & Adler (1999)

In line with prior literature, this research also use content analysis approach, as it facilitates with scoring of units of analysis to derive quantitative scale for statistical analysis (Weber, 1988). This thesis followed following steps (Weber, 1988) in coding the disclosures in annual reports.

a. *Define the unit of measure*. Sentence count is used in this thesis for the purpose, sub-section 3.4.2.3, which is following, provides the argument in for using sentence count.
b. *Define the categories*. Categories used in this thesis are discussed in sub section 3.4.2.4 following (Gray et al., 1995b; Hackston and Milne, 1996; Salama, 2003). Table 3.7 provides details of CEDI categories used in this thesis.
c. *Test coding of a sample of text*. Pilot 1 sample discussed in sub section 3.4.2.5 was used in this research in first phase for test coding purpose.
d. *Assess reliability*. Subsection 3.4.2.5 discusses about the reliability checks done for the purpose of this thesis.
e. *Revise coding rules*. Subsection 3.4.2.5 discusses about revising the coding rules after pilot sample study.
f. *Repeat steps 3–5 until reliability is satisfactory*. See subsection 3.4.2.5.
g. *Code all text*.
h. *Assess achieved reliability* – subsection 3.4.2.5 talks about reliability check for this thesis. (Weber, 1988, pp. 23–24)

3.4.2.3 Unit of Measure

There has been a long and critical debate on the best unit of measure of the disclosure in content analysis (Gray et al., 1995b). The argument is about finding out the best unit of measure for quantifying the disclosure (Milne and Adler, 1999), where research supports words (Adams et al., 1998; Campbell, 2004; Deegan and Rankin, 1996), sentences (Deegan et al., 2000; Hackston and Milne, 1996; Milne and Adler, 1999), pages or page proportions (Campbell, 2000; Gray et al., 1995b; Guthrie and Parker, 1990), phrases (Beck et al., 2010) as the unit for quantifying disclosures.

While prior literature does not consist of overwhelming justification about using any of such unit (Williams, 1999), sentences are regarded as more reliable coding basis by many researchers as compared to its alternatives (Milne and Adler, 1999). Proponents of word count for quantifying disclosures in content analysis argue that it is the smallest unit, which gives robustness (Deegan and Gordon, 1996; Krippendorf, 1980) and allows much extensive analysis as compared to other units of measure. However, Hackston & Milne (1996) argue that having word as the unit of analysis might confuse coders pondering which word is a social disclosure and which is not, considering it is hard to define each word for such indices. Milne & Adler (1999) supported this arguing that individual words lack any value to provide a sound basis for coding without a sentence context. Also, words may sometimes be part of different disclosure categories at the same time, which might result in double coding (Campbell and Abdul Rahman, 2010). Phrases, on the other hand, have the characteristics of vagueness even more than the word measure, which may potentially result in high disagreements among different coders and thus lack reliability. In addition, whilst pages or page proportions give a very straight forward measure for volume measurement in content analysis of disclosures, this measure is very much unlikely to give comparable results of content analysis of annual reports as the print size, column size, page sizes may differ among those (Hackston and Milne, 1996). Pages may also contain unnecessary graphs and pictures, which may have nothing to do with CED.

This thesis uses sentences as the unit for the measure of analysis in coding for CED in annual reports (Hackston and Milne, 1996; Ingram and Frazier, 1980; Milne and Adler, 1999). Sentences have some advantages over words, phrases and pages (Milne and Adler, 1999) - they are easily identifiable, involve less subjectivity in identification, and have been supported by previous research (Ingram and Frazier, 1980). This ensures the reliability of the coding process (Hackston and Milne, 1996, p. 86). Sentence count stands better by overcoming the problem of page proportion by removing the need to standardize the number of words (Hackston and Milne, 1996). Sentences are conventional way of communication in speech and writing, while pages are not, hence more supported by researchers (Walden and Schwartz, 1997). Quantity of CED is expressed in this thesis as a ratio and calculated as the number of sentences, for each of the

categories and types reported in the HEIs' 2012 annual report, divided by the total number of sentences in that annual report.

3.4.2.4 Carbon Emission Disclosure Index

Table 3.6 presents the CED Index that has been prepared following the structure given by Hackston & Milne (1996) to collect raw data about disclosure quantity. Using this structure allows to understand and account for both various categories and types of CED (Beattie et al., 2004). Following the notion this thesis distinguishes among different areas and types of activities of CED.

CED areas include carbon policies, vision and strategies claim (Beck et al., 2010; Gray et al., 1995b; GRI, 2013; Hackston and Milne, 1996; ISO 14064-1, 2012; Prado-Lorenzo et al., 2009; Rankin et al., 2011; Salama, 2003); carbon governance and management systems (Beck et al., 2010; GRI, 2013; ISO 14064-1, 2012; Rankin et al., 2011); regulatory compliance (e.g. mention of HEFCE) (Hackston and Milne, 1996; ISO 14064-1, 2012; Rankin et al., 2011; Salama, 2003); credibility, auditing and external assurance (Beck et al., 2010; Gray et al., 1995b; GRI, 2013; ISO 14064-1, 2012; Prado-Lorenzo et al., 2009; Rankin et al., 2011; Salama, 2003); carbon profile ; carbon initiatives, processing, reduction and abatement (Gray et al., 1995b; GRI, 2013; ISO 14064-1, 2012; Prado-Lorenzo et al., 2009; Rankin et al., 2011; Salama, 2003; Wiseman, 1982); carbon spending and financial data (GRI, 2013; Wiseman, 1982); carbon focus on curriculum and education for carbon sustainability; community engagement in carbon initiatives (staff-student engagement); and other carbon disclosures (Beck et al., 2010; Hackston and Milne, 1996; Salama, 2003; Wiseman, 1982). CED types include whether they are monetary, non-monetary, declarative, diagram, good, bad and neutral (Gray et al., 1995b; Hackston and Milne, 1996; Salama, 2003).

Table 3.6

Carbon Emission Disclosures Index/Instruments Name _____

Categories/ Themes Characteristics	Carbon policies, vision and strategies claim	Carbon governance and management systems	Regulatory compliance (e.g. mention of HEFCE)	Credibility, auditing and external assurance	Carbon profile	Carbon initiatives, processing, reduction and abatement	Carbon spending and financial data	Carbon focus on curriculum and education for carbon sustainability	Community engagement in carbon initiatives (staff-student engagement)	Other carbon disclosures	Total	
											Count	%
Monetary/good news												
Monetary/bad news												
Monetary/neutral												
Non-monetary/good news												
Non-monetary/bad news												
Non-monetary/ neutral												
Declarative/good news												
Declarative/bad news												
Declarative/neutral												
Diagrams												
Total												
Category-wise percentage												

- Total amount of each type of carbon emission disclosures for each company = (Total carbon related themes in a specific category/ Total theme in the corporate annual report) x 100
- Total amount of measured sentence disclosure (to nearest 100th) ☐

Table 3.7

Checklist of Areas of CED

Categories	Details
Carbon policies, vision and strategies claim	A statement of carbon policy, strategy, values and principles, programs, carbon codes of conduct
	Statement of formal intentions and aims
	Vice Chancellor statement on carbon performance annual report
	A statement about formal management systems regarding carbon risk and performance
	A statement that the firm undertakes periodic reviews and evaluations of its carbon performance
	A statement of measurable goals in terms of future carbon performance
	A statement about specific carbon innovations and/or new technologies
	Statements indicating that there are past, current or future estimates of capital and operating expenditures to abate carbon and equivalent GHG emission resulting from the processing or natural resources, e.g. reforestation and land reclamation
	Undertaking carbon impact studies to monitor the institutional carbon impact
Carbon governance and management systems	Person responsible
	Committee/ Audit - any committee or group for carbon
	Anybody working with the organization e.g. reference to each employee
	Reporting period
	Document organizational boundaries
	Description of carbon and GHG info management and monitoring procedures
	Reference to or description of quantification methodologies
	Historical base year selected and base-year GHG inventory
	Existence of a Department for pollution control and/or management positions for carbon management
	Executive compensation is linked to carbon performance
	Reference to separate carbon report
	Specific carbon related risks for the institution
	Attempts to manage / reduce these risks
	A substantive description of employee training in carbon/GHG management and operations

	Internal carbon awards, audit or certification of carbon programs
Regulatory compliance (e.g. mention of HEFCE)	Description of impact of uncertainties on accuracy of GHG emissions & removals data
	A statement about the firm's compliance (or lack thereof) with specific carbon/GHG/environmental standards
	Implementation of ISO14001
	Statement that prepared in accordance with ISO 14064
	Discussion of carbon and GHG regulations and requirements
	Statement describing GHG inventory, report or assertion has been verified
	Statements indicating that the company's operations are in compliance with pollution laws and regulations
Credibility, auditing and external assurance	Assessment of performance against internal and/or external benchmarks
	Description of and presentation of additional indicators (e.g. efficiency or GHG emission intensity)
	Certification of carbon programs by independent agencies (e.g. ISO 14001 certification, adherence to GRI sustainability reporting guidelines or provision of a CERES report)
	Periodic independent verifications/audits on environmental performance and/or systems
	External carbon performance awards and/or inclusion in a sustainability index
	Stakeholder involvement in the carbon disclosure process
	Participation in voluntary carbon initiatives endorsed external organizations
	Participation in other carbon activist organizations/association to improve carbon practices
	Reference to carbon review, carbon scoping, carbon audit, assessment including independent attestation
Carbon profile	Direct and indirect carbon (and equivalents) emissions
	Explanation for exclusion of any GHG sources or sinks from quantification
	Energy indirect GHG emissions associated with generation of imported electricity, heat or steam (tonnes CO2e)
	Carbon profile
	An overview of carbon impact of the HE industry

	An overview of the operations and/or products and services impact the carbon emission
	An overview of carbon performance relative to industry peers
Carbon initiatives, processing, reduction and abatement	Description of how CO2 emissions from the combustion of biomass are treated in GHG inventory
	Actions/targets undertaken/Initiatives to reduce carbon and other GHG emissions and reductions achieved
	Results
	Project involvement
	Sponsoring
	Emissions of ozone depleting substances by weight
	Opportunities from climate change, for example related to products, services or technologies
	Involvement in emissions trading, such as buying or selling emissions allowances
	Existence of response plans in case of emergency carbon emission
	Carbon emissions or removals disaggregated by facility
	Uncertainty assessment description and results (include measures to manage or reduce uncertainties)
	Control, installations, facilities or process described
	Compliance status of facilities
Carbon spending and financial data	Summary of dollar savings arising from carbon initiatives to the institutions
	Amount spent on technologies, R& D and/or innovations to enhance carbon and GHG performance and/or efficiency
	Amount spent on fines related to carbon issues
	Carbon related financial /economic data:
	Reference to financial/economic impact
	Investment and investment appraisal
	Discussion of areas with financial /economic impact
	Discussion of carbon-economic interaction
	Other financial disclosures
	Balance sheet within voluntary section
	Justification for no disclosure
	Past and current expenditure for emission control equipment and facilities

	Past and current operating costs of pollution control equipment and facilities
	Future estimates of expenditure for emission control equipment and facilities
	Future estimates of operating costs of pollution control equipment and facilities
	Financing for pollution control equipment or facilities
Carbon focus on curriculum and education for carbon sustainability	Education for Sustainable Development is included within the portfolio of responsibilities of a member of the university senior management team
	University Strategic Plan commits to developing and promoting Education for Sustainable Development
	The university Teaching and Learning Strategy includes a commitment to Education for Sustainable Development
	The university environmental/sustainability policy commits to the development and promotion of Education for Sustainable Development through the curriculum
	The university has developed a framework or strategy for ESD
	The university has a mechanism for reviewing and reporting on progress of the integration of Education for Sustainable Development into the curriculum
	The university makes available support AND training to help all academic staff integrate Education for Sustainable Development into the curriculum
	Coursework linked to sustainability projects within the university/estates department
	The university supports and highlights School, Faculty or Research team projects for Education for Sustainable Development
	Past evidence of undertaking action on Education for Sustainable Development that has not been identified by this section of the criteria
Community engagement in carbon initiatives (staff-student engagement)	Existence of terms and conditions applicable to suppliers and/or other stakeholders regarding carbon practices
	Stakeholder involvement in setting corporate carbon policies
	Community involvement and/or donations related to carbon
	Strategy for progress in student and staff engagement for sustainability
	Staff inductions cover university sustainability policy, issues and areas for staff engagement
	Recognized trade union environment reps (e.g. GreenReps) or engagement with trade unions on sustainability issues

	Student representation on all university committees concerned with estates, planning, finance and resource allocation
	Students' Union or Students' Association associated to the institution working toward continual improvement for environmental sustainability by mapping, auditing and tracking annual progress of its impact areas
	The Students' Union or Students' Association associated to the institution has achieved a Bronze, Silver, Gold or Green Impact Excellence Award in this year's Green Impact Union Awards or similar scheme
	Oversight and involvement opportunities of students and staff in the development and ongoing monitoring of Carbon Management Plan
	Oversight and involvement opportunities of students and staff in the development and ongoing monitoring of the university environmental sustainability policy and strategy
	The university sustainability policy/plan, sustainability issues and student engagement opportunities for sustainability are a component of student induction processes
	University actively supports an annual Go Green Week or Environment Week
	The university runs environmental and ethical/sustainability campaigns that reach all students and staff
	Availability of university funds for student or staff-led practical sustainability projects (e.g. campus allotments, recycling schemes etc.)
Other carbon disclosures	Any mention of (carbon) sustainability
	Involvement/commitment to UNCED, RIO, KYOTO
	Conservation of natural habitat/species
	Litigation – present and/or potential

3.4.2.5 Reliability of the Coding Process

Reliability of the content analysis was ensured through the construction of categorization scheme and well defined set of rules to guide the coding (Milne and Adler, 1999). According to Krippendorf (1980), reliability is maintained when data stays constant throughout variations of measuring process. For ensuring the reliability and have well defined categorization, the researcher performed a pilot study with 30 annual reports with preliminary definition of checklist of categories and types of disclosures set for the 'Carbon Emission Disclosure Index (CEDI)' instrument guided by theoretical underpinnings – Stakeholder theory and Institutional theory as discussed before in chapter two. This contributes towards the suitability of modified adoption of the CEDI (Gray et al., 1995b; Hackston and Milne, 1996; Ullman, 1985) from the corporate sector to HE sector. The pilot study of 30 annual reports showed the need for additional three categories- Carbon profile; Carbon focus on curriculum and education for carbon sustainability; and Community engagement in carbon initiatives (staff-student engagement). After incorporation of these additional three categories (area) of carbon disclosures for HEIs the researcher successfully adopted the CEDI for HEI with properly defined checklist as suggested by Beattie et al (2004). However, care was taken to make the categories mutually exclusive and classification of categories are not discretionary (Ingram and Frazier, 1980).

However, the categorization scheme and the process of content analysis in extracting disclosure information needs to be reliable, which has been questioned in prior literature (Milne and Adler, 1999). Literature suggests to ensure three different types of reliability, which are stability, reproducibility and accuracy (Krippendorf, 1980). First, to ensure stability (where the researcher agrees with him/herself over time) the researcher selected 30 annual reports and performed a first time coding of the data in September, 2014 according to the predefined categories and types set in content analysis instrument set for this study for quantifying narrative data in annual reports. Then the researcher coded the same 30 annual reports after three weeks of interval in October, 2014. Both rounds of coding were about in conformity with each other. In rare cases, second round of coding was more generous than comparable first round. Few instances showed

where both rounds of coding differ in intra-categorisation of disclosure items, i.e. first round coded as declarative whereas second round coded as non-monetary. However, two rounds were always in conformity when it comes to inter category (disclosure area) coding. Said that, there is hardly any statistical test to measure objectively satisfactory level of stability (Beattie et al., 2004).

Second, is the reproducibility, which is also termed as inter coder reliability, ensures the consistency of the coding decision (Beck et al., 2010) irrespective of phenomenon and coder (Krippendorf, 1980). The advantage here is that in coding large amount of data the more than one coder or a group of coders can work together (Rourke et al., 2000). However to achieve this the checklist for the content analysis and classifications need to be clearly defined (Beattie et al., 2004) and be able to be coded in the same form by different coders. To test for reproducibility, 10 annual reports were coded by additional two additional coders (Milne and Adler, 1999). They recognised a few statistical coefficients to test for the inter coder reliability including *Kappa* (Cohen, 1960), α (Krippendorf, 1980),λ (Perreault and Leigh, 1989), and π (Scott, 1955). For the purpose of this research, Krippendorf's α (alpha) coefficient was used, which showed an alpha value of 75%. Though there is no universally acceptable result in the literature, some argue that the cut off pass score should be at least 80% match among the coded indices (Guthrie and Mathews, 1985, p. 261). The discrepancy in inter coder reliability was mainly due to items not counted in disclosures. However, the discrepancies were then talked through to reach a consensus. Additionally, the definitions for categorisation checklist were made clearer by including more disclosure types. This is expected to make the checklist categorisation clearer to state what needs to be included in the category, and what needs not; also care taken to make it mutually exclusive among different categories. After reconciliation, an independent coding took place again by all 3 researchers. The alpha score increased to 98.7% in the second attempt, which evident objectivity and reliability of the coding process.

The last one is the test of coding accuracy against any standard set in the literature (Milne and Adler, 1999) or predetermined standards set by researchers to measure the performance of coders in terms of the predetermined standard (Krippendorf,

1980). The present study takes into account previous standards set by prior literature in construction of such index (Beck et al., 2010; Gray et al., 1995b; GRI, 2013; Hackston and Milne, 1996; ISO 14064-1, 2012; Prado-Lorenzo et al., 2009; Rankin et al., 2011; Salama, 2003; Wiseman, 1982). The prior decision rule set by CSEAR (Centre for Social & Environmental Accounting Research) in their website[26] was also set as one of the standards. The researcher found that the current decision set is quite comparable to the standard set by CSEAR. However, minor amendments were made to make the present decision set more compliable to set standard to maintain reliability and at the same time applicable for HEI.

3.4.3 Independent Variables

Proxies selected as independent variables need to be carefully thought out as there is no prior study about the determinant factors of such disclosure in case of HEI. Following are the independent variables and their description.

3.4.3.1 Carbon Related Factors

Carbon Reduction Target

Carbon reduction target is measured as the percentage target mentioned by HEFCE for individual HEIs from 2005 baseline to 2020. This data can be found from HEFCE publication[27]. Carbon reduction targets create a pressure on the individual HEIs to gradually reduce carbon emission, which is also a requirement to qualify for HEFCE's Capital Investment Framework CIF-2 fund. HEFCE requirement for institutions to introduce carbon management plans provides a collective sector target as part of the CIF-2 requirement in 2011. This capital requirement is encouragement for the HEIs to reduce their carbon emission. HEFCE targets for measurable carbon emission reductions are 34 per cent by 2020 and 80 per cent by 2050 against a 1990 baseline. Against a 2005 baseline, this is equivalent to a reduction of 43 per cent by 2020 and 83 per cent by 2050. The requirement for institutions to set their own targets for 2020 for scope 1 and 2 emissions against a 2005 baseline is being used because it is used for reporting

[26]https://www.st-andrews.ac.uk/csear/research/uk-disclosure/decision-rules/
[27]http://www.hefce.ac.uk/workprovide/carbon/

against the UK national carbon target. This provides consistency across the sector against which progress is monitored and reported.

Present Carbon Emission

Volume of carbon emissions (kgCO2) mentioned in the HEFCE publication for individual HEIs in the year 2012, which is the latest year for which data were available at the time of data collection. This data ensures how the HEIs are doing to date in response of the target set by HEFCE in consultation with individual HEIs.

3.4.3.2 Carbon Audit and Investment

Carbon Audit

HEIs are expected to have carbon audit in place to have control over the carbon emission reduction. Universities were scored on two criteria-

- Whether audited its environmental performances in last five years on several factors were scored. These factors are Biodiversity, Construction and refurbishment, Emissions and discharges, Energy, Sustainable procurement, Transport, Waste and Water.
- Whether operating any externally audited environmental management system (e.g. ISO14001, EMAS, Ecocampus, Green Dragon, IEMA Acorn Scheme [BS8885]).

This score can be obtained from the People & Planet organization, which produces the sole comprehensive and independent league table of UK HEIs for their environmental performances. HEIs are scored on different bases, accumulating possible maximum score to 8. This data are published on People and planet disclosure on their website.

Carbon Investment

Facility spend is the data denoted by spending on facilities by individual HEIs in the year 2012, which is the concerned year for this study. This comprises of the indication about how much the university spent on supporting as all expenditure incurred (whether centrally or departmentally) on the management of premises (including academic buildings, central academic services, art centres, HE

provider's health service premises, pavilions, sports buildings, etc.) and on roads and grounds, except residences and catering. This also includes repairs and maintenance expenditure, the maintenance of premises including the pay of staff involved and maintenance provision charges. This data can be found from Higher Education Statistics Agency (HESA) Website.

3.4.3.3 Institutional Characteristics

University League

Membership to university league groups was identified and taken from the websites of the league groups. Major groups to which the HEIs belong are identified as GuildHE; Million+Group; Russell Group and University Alliances. HEIs, which are not member of any of the mentioned group were classified as not affiliated university. Recognition of these university groups classifications were in conformity with various major university league rankings in recent years.

Region of Establishment

Regions in which the HEIs are primarily based in have been identified here. These were found in individual websites of HEIs. Regions identified for the purpose of this research were England, Scotland, Wales and North Ireland.

3.4.4 Control Variables

Independent Carbon Reporting

Independent environmental reports available on the university website are the main form of reports produced by them. This can take different names but should have focus on carbon sustainability to be included in this research. Moreover, considering the purpose of the research dealing with carbon disclosure and thus impact of the HEFCE carbon reduction target, the researcher also includes carbon management plan produced by the universities in response to the HEFCE requirement. This is available from individual HEI Websites.

Size

Size was found to affect organisations voluntary disclosures (Hussainey and Al-Najjar, 2011).HEI size has been measured by the total number of Staff and Students, which can be found from HEFCE publication.

Age

Age of the HEI in terms of completed years since its establishment to date can be found from each HEI websites.

3.4.5 Model Specification

With the aim to find out the determinants of CED in annual reports, especially to investigate the role of carbon reduction target of 43 percent carbon reduction to be achieved by the year 2020 on the baseline year 2005 (HEFCE, 2013) set by the HEFCE on the CED in annual reports by the UK HEIs, the following econometric model was used.

$$CED_i = \beta_0 + \beta_1 Carbon\ Target_i + \beta_2 Carbon\ Emission_i + \beta_3 Carbon\ Audit_i + \beta_4 Carbon\ Investment_i + \beta_5\ Institutional\ characteristics_i\ (League\ and\ Region) + \beta_6\ Controls_i(Sustain, Size\ and\ Age) + \varepsilon_i \ldots (3.1)$$

Where,

β_0	Intercept
$\beta_1\ to\ \beta_6$	Coefficient of slope parameters
ε	Error term

Variables	*Definition*	*Source*
Dependent variable:		
CED	Carbon emission disclosure; CE disclosure score in annual reports. CED is measured by content analysis of 2011-12 annual reports of sample HEIs.	Content analysis of annual reports
Explanatory variables:		
Carbon Related Factors		
Target	Carbon reduction target (%) of individual HEIs from 2005	HEFCE publication

	baseline to 2020 by Higher Education Funding Council of England (HEFCE).	
Emission	Carbon emissions (kgCO2) in the year 2012 which is the latest year for which data were available at the time of data collection.	HEFCE publication
Carbon Check / Investment		
Audit	Points received by the University for carbon audit system in place scored out of 8	People and planet disclosure
Investment	Facility spending of HEIs in 2011/12.	HESA website
Institutional Characteristics		
League	1, if GuildHE; 2, if Million+Group; 3, if Russell Group; 4, if University Alliances; 5, if Not affiliated with any of the above	Websites of specific league
Region	1, if England; 2, if Scotland or 3, if Wales and 4, if North Ireland.	HEI website
Control variables:		
Sustain	Independent environmental reporting available on the website ranges from 0, if no disclosure to 5, if high disclosure.	HEI websites

Size	HEI size measured by the natural logarithm of total number of Staff and Students.	HEFCE publication
Age	Age of the HEI in terms of completed years since its establishment.	HEI websites

3.5 EMPIRICAL RESULTS AND ANALYSES

This section deals with the descriptive and inferential statistics regarding this chapter. In the beginning the descriptive statistics and univariate analyses are presented followed next by the statistical regression analysis to support or reject the hypotheses. The last part presents sensitivity analysis.

3.5.1 Descriptive Statistics

Table 3.8 presents the descriptive statistics regarding the types and categories of CED. Panel A reports on types and Panel B reports on areas of CED indicating the amount of disclosures as measured by sentences. It shows numbers and percentages of HEIs disclosing specific types and areas of disclosures; and amount of sentences disclosing carbon related issues in absolute numbers and also as percentage of total voluntary disclosures in the annual reports.

Analysis of information presented here shows interesting insights. It shows total of 144 HEIs disclose something about carbon reduction activities in their annual reports. However, Panel A of Table 3.8 and Figure 3.2 show that majority of such disclosures are good news and narrative, having the highest disclosures in the type of non-monetary/good news (more than 71 percent of total disclosure volume), followed by declarative/good news (close to 18 percent of total disclosure volume). In contrast, very small proportion of total disclosed sentences are of monetary or bad news in nature. Moreover, suffice to state that most HEIs disclose narrative news, which are majorly good news as well. Only a very little proportion of HEIs discloses monetary (26 percent of total disclosing HEIs) and bad news (15 percent of total disclosing HEIs). This is in line with prior literature of profit

seeking companies, which shows that majority of social and environmental disclosures are in the form of narrative (Hackston and Milne, 1996) and good news (Deegan and Gordon, 1996; Guthrie and Parker, 1990).

Panel B of Table 3.8 and Figure 3.3 show the areas or categories of disclosures in the annual reports by the UK HEIs for the year 2012. Carbon initiatives, processing, reduction and abatement was found to be the highest (33.70%) disclosed area in the annual reports regarding the carbon activities and also disclosed by the most universities (63%). Carbon policies, vision and strategies claim is the other dominating area where many HEIs (61%) disclosed. In contrast, carbon spending and financial data is the least (2.43%) found annual report disclosure on carbon matter and disclosed by the least number of universities (13%). Carbon focus on curriculum and education for carbon sustainability is the other carbon disclosures category where very low number of HEIs (17%) told anything about their carbon issues.

Table 3.8

Proportional Analysis for Disclosure by HEIs

Disclosure	Disclosing HEIs (at least one disclosure)	Disclosing HEIs (% of total disclosing HEIs)	Number of Disclosed Sentences	Disclosed Sentences (as a % of total disclosed sentences)
Panel A: Types of Disclosure				
Monetary/Good News	32	22%	57	3%
Monetary/Bad News	2	1%	2	0.12%
Monetary/Neutral News	5	3%	9	1%
Non-monetary/Good News	108	75%	1174	71%
Non-monetary/Bad News	15	10%	25	2%
Non-monetary/Neutral News	19	13%	30	2%
Declarative/Good News	88	61%	289	18%
Declarative/Bad News	4	3%	8	0%
Declarative/Neutral News	10	7%	17	1%
Diagrams	15	10%	33	2%
Total			1644	100%
Panel B: Areas of Disclosure				
Carbon policies, vision and strategies claim	88	61%	251	15%
Carbon governance and management systems	63	44%	144	9%
Regulatory compliance (e.g. mention of HEFCE)	52	36%	106	6%
Credibility, auditing and external assurance	65	45%	231	14%
Carbon profile	36	25%	89	5%
Carbon initiatives, processing, reduction and abatement	90	63%	554	34%

Carbon spending and financial data	19	13%	40	2%
Carbon focus on curriculum and education for carbon sustainability	25	17%	48	3%
Community engagement in carbon initiatives	45	31%	93	6%
Other carbon disclosures	42	29%	88	5%
Total			1644	100.00%
Note: Total sample HEIs = 168; disclosing HEIs = 144				

Figure 3.2 below is the pie chart to show the types of carbon disclosures made in the annual reports by the HEIs during the year 2012.

Figure 3.2

Types of Disclosure

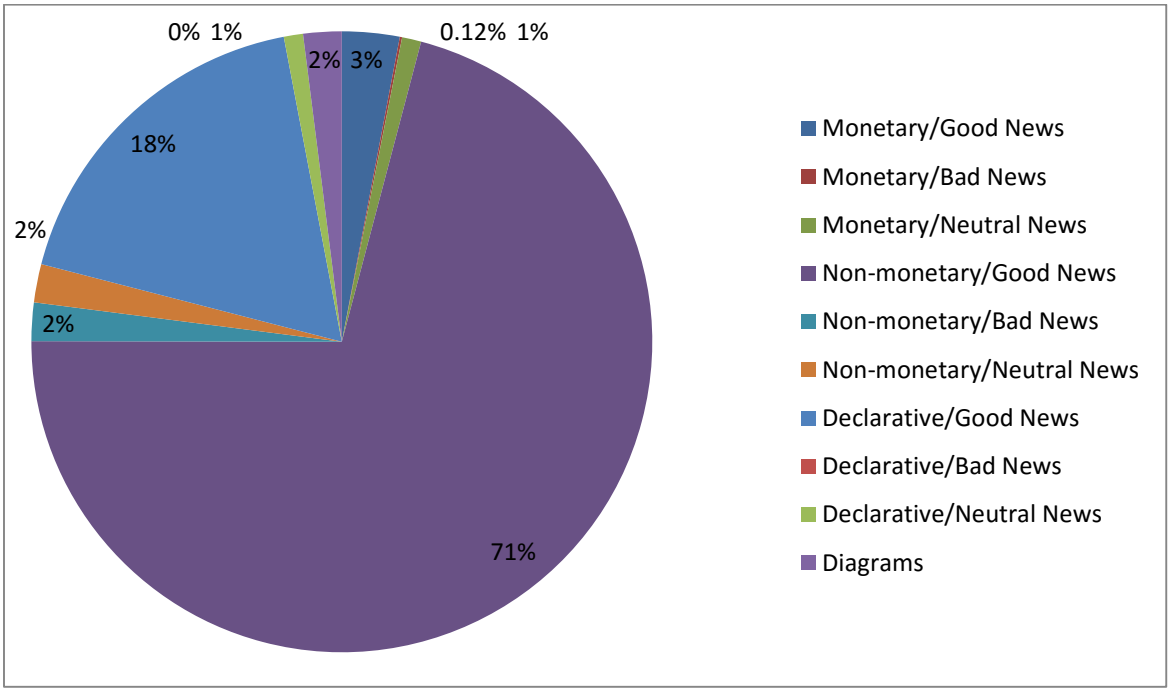


Figure 3.3 following is the bar diagram to show the areas or categories of carbon disclosures made in the annual reports by the HEIs during the year 2012.

Figure 3.3

Areas of Disclosure

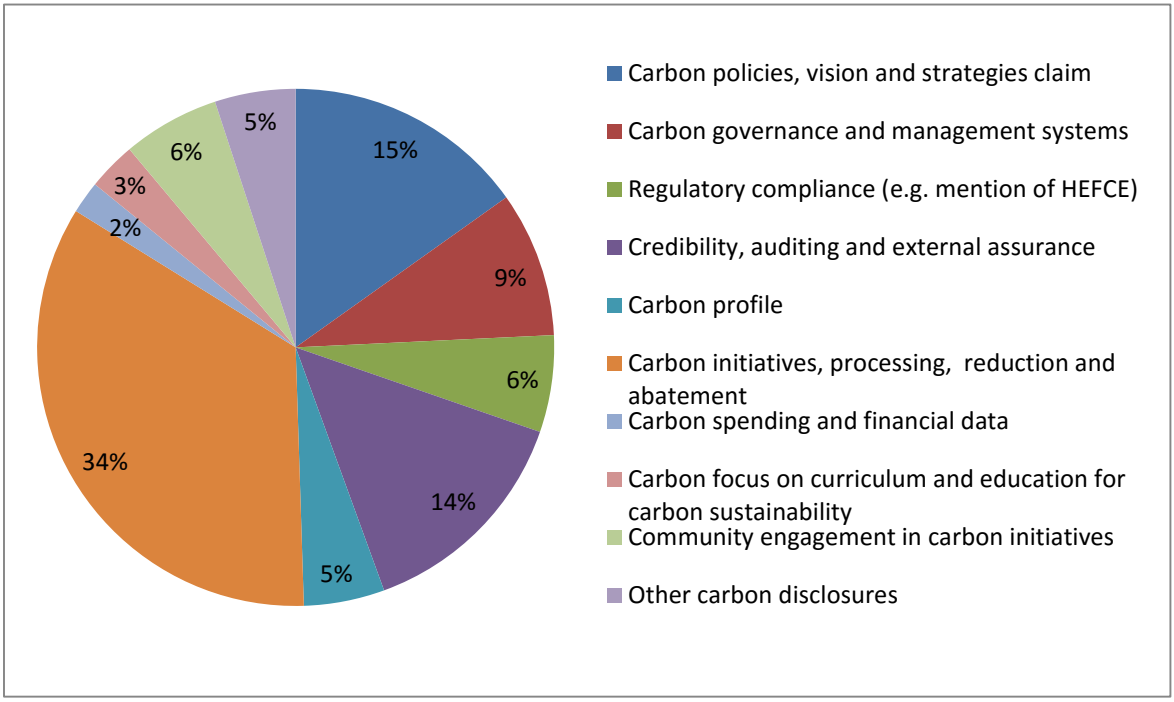


Table 3.9 shows the mean, median, standard deviation, maximum and minimum, skewness and kurtosis and Shapiro-Wilk normality test results for total carbon disclosure and types of carbon disclosures. Panel B shows the same statistics for areas of carbon disclosures. The symmetry of the distribution is measured by skewness and the flatness or peakedness of the distribution is measured by the kurtosis. The rule of thumb is that skewness and kurtosis should be ideally within the range of $\pm$ 1.96 and $\pm$ 3 respectively (Gujarati, 2004; Haniffa and Hudaib, 2006). Since total carbon emission disclosure score, its types and areas fall outside this range of skewness and kurtosis additional test of normality was done with Shapiro-Wilk test statistic for checking normality of the distributions.

Table 3.9, panel A shows the mean (median) for total CED, which is2.78 (1.88). Panel A also presents the mean (median) of Monetary/Good News, Monetary/Bad News and Monetary/Neutral News were found to be.101 (0), .003 (0) and .012 (0). Also, the mean (median) of Non-monetary/Good News, Non-monetary/Bad News, and Non-monetary/Neutral News were shown as 1.96 (1.31), .040 (0) and .051 (0). Further, Declarative/Good News, Declarative/Bad News, and Declarative/Neutral News have means (medians) of .528 (.276), .014 (0) and .038

(0). Finally, same statistics – mean (median) for Diagrams are .067 (0). Panel B in the same table shows the descriptive statistics for areas (or categories of disclosures). Carbon policies, vision and strategies claim, Carbon governance and management systems, Regulatory compliance (e.g. mention of HEFCE), Credibility, auditing and external assurance, Carbon profile, Carbon initiatives, processing, reduction and abatement, Carbon spending and financial data, Carbon focus on curriculum and education for carbon sustainability, Community engagement in carbon initiatives, Other carbon disclosures have mean (median) of .451(.235), .255(0), .187(0), .386 (0), .153 (0), .929(.62), .069 (0), .086 (0), .152 (0), .154 (0) as per panel B of Table 3.9.

Shapiro Wilk is arguably the most widely accepted powerful test for normality (Razali and Wah, 2011), which shows that the total carbon disclosure, its types and areas are not normally distributed except the total carbon disclosure qualitative scoring as p-values are less than chosen alpha level of 5% and thus evident that the data tested are not from a normally distributed population. CED qualitative marginally passes the Shapiro Wilk normality test as the null hypothesis of cannot be rejected here on the basis of 5% alpha level. Based on these results CED quantitative, its types and areas are transformed taking square root to get a more normal dataset. Arcsine transformation was tested on the same data according to the theory; however, transformation with square root came out to be the better solution and produced a better fit.

Table 3.9

Descriptive Statistics for Dependent Variable

Panel A: Types of Disclosure	**Mean (Median)**	**Standard Deviation**	**Maximum (Minimum)**	**Skewness**	**Kurtosis**	**Shapiro-Wilk test**
Total Carbon Disclosures (CED)	2.78 (1.88)	2.97	15.09 (0)	1.83	6.95	0.000
Monetary/Good News	.101 (0)	.237	1.43 (0)	3.11	14.52	0.000
Monetary/Bad News	.003 (0)	.029	.288 (0)	8.72	79.30	0.000
Monetary/Neutral News	.012 (0)	.068	.505 (0)	.004	6.05	0.000
Non-monetary/Good News	1.96 (1.31)	2.41	13.49 (0)	2.07	8.01	0.000
Non-monetary/Bad News	.040 (0)	.147	1.15 (0)	4.82	29.75	0.000
Non-monetary/Neutral News	.051 (0)	.186	1.75 (0)	6.20	51.58	0.000
Declarative/Good News	.528 (.276)	.740	3.68 (0)	1.98	7.00	0.000
Declarative/Bad News	.014 (0)	.116	1.31 (0)	10.10	110.89	0.000
Declarative/Neutral News	.038 (0)	.170	1.24 (0)	5.20	31.28	0.000
Diagrams	.067 (0)	.232	1.57 (0)	4.02	20.28	0.000

*** Shapiro-Wilk W test for normal data with significance <.05, hence data not normally distributed.*

Panel B: ***Areas of Disclosure***	**Mean (Median)**	**Standard Deviation**	**Maximum (Minimum)**	**Skewness**	**Kurtosis**	**Shapiro-Wilk test**
Carbon policies, vision and strategies claim	.451 (.235)	.616	3.15 (0)	2.01	7.56	0.000
Carbon governance and management systems	.255 (0)	.492	3.17 (0)	3.65	19.47	0.000
Regulatory compliance (e.g. mention of HEFCE)	.187 (0)	.367	2.20 (0)	3.053	14.32	0.000
Credibility, auditing and external assurance	.386 (0)	.621	3.50 (0)	2.15	8.39	0.000
Carbon profile	.153 (0)	.413	3.33 (0)	4.66	30.41	0.000
Carbon initiatives, processing, reduction and abatement	.929 (.620)	1.27	8.25 (0)	2.58	12.21	0.000
Carbon spending and financial data	.069 (0)	.231	1.57 (0)	4.21	22.29	0.000
Carbon focus on curriculum and education for carbon sustainability	.086 (0)	.261	1.73 (0)	4.18	22.43	0.000
Community engagement in carbon initiatives	.152 (0)	.322	2.38 (0)	3.58	20.25	0.000
Other carbon disclosures	.154 (0)	.360	2.58 (0)	3.78	20.54	0.000

***Shapiro-Wilk W test for normal data with significance <.05, hence data not normally distributed.*

Table 3.10 presents descriptive information about the determinants of CED used as explanatory variables in this study. It shows mean, median, standard deviation, maximum, minimum, skewness and kurtosis and Shapiro-Wilk normality test results for explanatory variables. Carbon target, emission, audit, and investment have mean (median) of 35.86 (38.5), 15.4 million (9.6 million), 4.32 (4), and

360.74 (343.5) respectively. Independent sustainability report has a mean (median) of 4.22 (5). Unfortunately, no study to the best knowledge of the researcher used HEI independent sustainability report, carbon target, emission, audit, investment for the purpose of analysis. However, the mean (median) size of HEIs is 14601.07 (15120) and that of age is 90.20 (46.5). The categorical variables league and region have mean (median) values of 3.33 (3) and 1.48 (1).Because of the same reason discussed above for the dependent variables, all the continuous explanatory variables (Target, Emission, Audit, Facility spend, Size, Age) came out as not normal. To avoid the influence of outliers and the high skewness and kurtosis in the raw data, natural logarithm of continuous explanatory variables has been used to get a more normal dataset for the purpose of the study.

Table 3.10

Descriptive Statistics for Independent Variable

Independent Variables	Mean (Median)	Standard deviation	Maximum (Minimum)	Skewness	Kurtosis	Shapiro-Wilk Test
Target	35.86 (38.5)	14.10	100 (0)	-0.18	5.64	0.000
Emission	15,400,000 (9,672,079)	17,500,000	82,800,000 (613,760.4)	2.16	7.62	0.000
Audit	4.32 (4)	2.11	8 (.5)	0.07	1.87	0.007
Investment	360.74 (343.50)	140.44	840 (126)	.86	3.96	0.000
League	3.33 (3)	1.42	5 (1)	-0.30	1.80	0.700
Region	1.48 (1)	0.97	4 (1)	1.72	4.33	0.000
Sustain	4.22 (5)	1.38	5 (1)	-1.51	3.66	0.000
Size	14,601.07 (15,120)	10,065.07	42,340 (320)	0.32	2.25	0.000
Age	90.20 (46.50)	124.66	845 (0)	3.63	18.97	0.000

** Shapiro-Wilk W test for normal data with significance <.05, hence data not normally distributed.

3.5.1.1 Frequency Distribution

This subsection presents the sample distribution in Table 3.11, which shows universities from different geographical regions, membership of different league groups of HEIs, and extent of reporting in independent sustainability report. These are shown in three different panels in the table.

Panel A of Table 3.11 presents the distribution of HEIs across the region in the UK. It shows that majority of the universities in the sample are from England (131) as can be expected. This is because England consists of the most of the universities in the UK. Thus, about 78% of the sample of this study comes from England. The second highest number of universities (18) in the sample comes from Scotland, which is close to 11% of the total sample. Wales comes next with 13 universities, which is about 8% of total sample. 5 universities are from Northern Ireland, which is about 3% of the whole sample.

Panel B of the same table shows the participation of universities who are members of different leagues in the UK. For this thesis top four leagues in terms of number of memberships were taken. These are GuildHE, Million+ group, Russell Group and University Alliances. Russell group has most of its members in the sample (24) for this research, which is more than 14% of the whole sample. Quite close in numbers, 23 universities (13.69%) are from University Alliances. Exactly 17 universities are from GuildHE and Million+ Group each. However, more than half of the universities in the sample do not belong to any of the league groups stated above.

Panel C of Table3.11 presents the extent of carbon disclosures made in independent sustainability reports by the UK HEIs. Again, the CED index presented in Table 3.1 – scoring for CED quality – has been used to measure the extent of CED in independent sustainability report. Interestingly enough, most HEIs report very high quality CED in their sustainability reports which is more than 70% of total HEIs. As such 119 universities in the sample discloses the implementation, monitoring or results of their carbon activities with year to year comparisons of carbon disclosures made in sustainability reports accompanying quantitative and comparable data and evidence. In contrast, the second highest

number of HEIs does not disclose at all on carbon in their sustainability reports. Panel C in Table 3.11 shows that 18 HEIs in the sample belongs to non-disclosing group i.e. about 11% HEIs do not say anything about carbon emission in their sustainability reports. 13 universities disclose more than average but less than the highest quality on carbon emission i.e. approximately 8% universities disclose how they implement and monitor carbon reduction activities; what results they achieve in controlling carbon emission. These universities also talk about kite marks or external accreditation of their carbon initiatives achieved. This is how they produce quantitative information on their carbon initiative with evidence. Further, 10 HEIs disclose minimum about carbon emission i.e. 6% of HEIs disclose only narrative words without any factual indication of what they are doing on carbon reduction including specific endeavour, statement of targets, narrative without evidence. These HEIs limits their disclosures to imitable narratives e.g. carbon policies, aims, goals. Least number of HEIs (only 8) in the sample disclose moderately. Approximately 5% HEIs use target, implementation, monitoring or results to support their disclosures on carbon emission or reduction in sustainability reports. These universities use evidences of what they are doing to reduce carbon to support any narrative disclosures.

Table 3.11

Frequency Distribution of Categorical Independent Variables

Panel A. Region

Region	Frequency	Percent
England	132	78.58
Northern Ireland	5	2.98
Scotland	18	10.71
Wales	13	7.74
Total	168	100.00

Panel B. League

League	Frequency	Percent
GuildHE	17	10.12
Million+Group	17	10.12
Russell Group	24	14.29
University Alliances	23	13.69
Not affiliated with any above	87	51.78
Total	168	100.00

Panel C. Independent Sustainability Reporting

Sustainability	Frequency	Percent
No disclosure	18	10.71
Less than moderate disclosure	10	5.95
Moderate disclosure	8	4.76
More than moderate disclosure	13	7.74
High disclosure	119	70.83
Total	168	100.00

The bar diagrams in Figure 3.4 show the average CED volume by universities in different regions in the UK. The bar diagrams show that universities from England do visibly a lot more disclosures in their annual report as compared to universities from any other region in the UK. The reason might be the sector carbon targets are more transparent and stricter in this region as compared to the other regions. Universities in Wales, in contrary, make visibly the least amount of CED on average as found from this sample.

Figure 3.4
Average Carbon Disclosures Based on Region

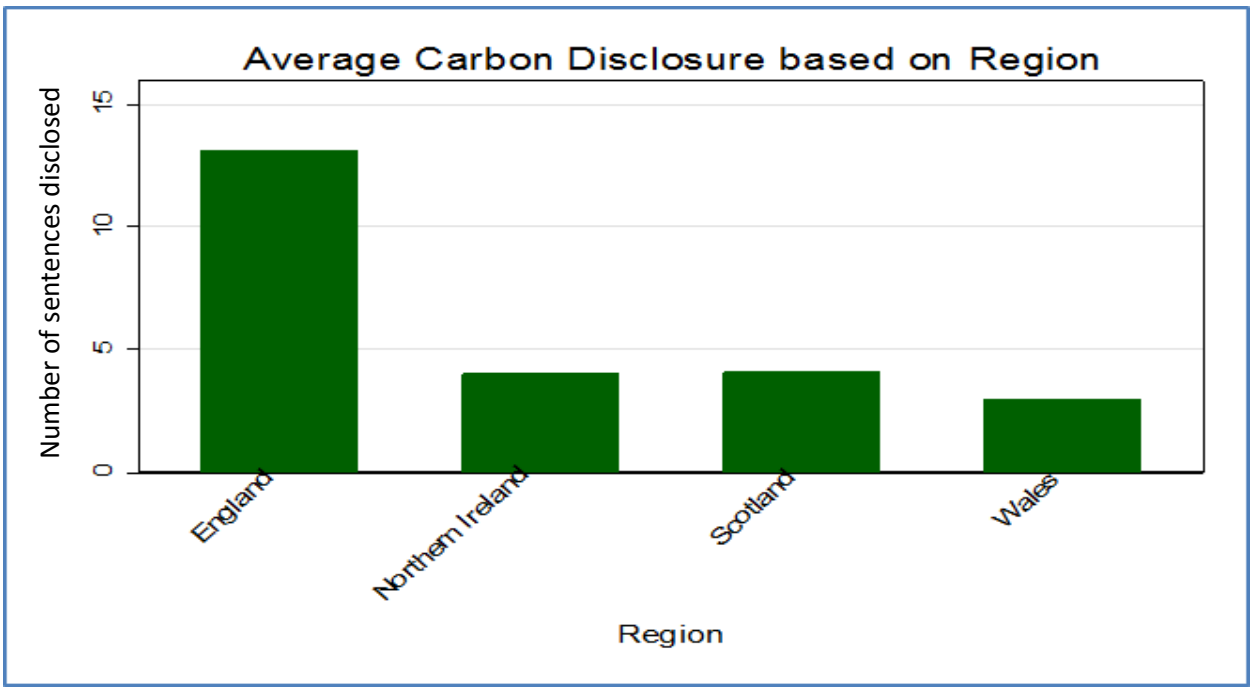
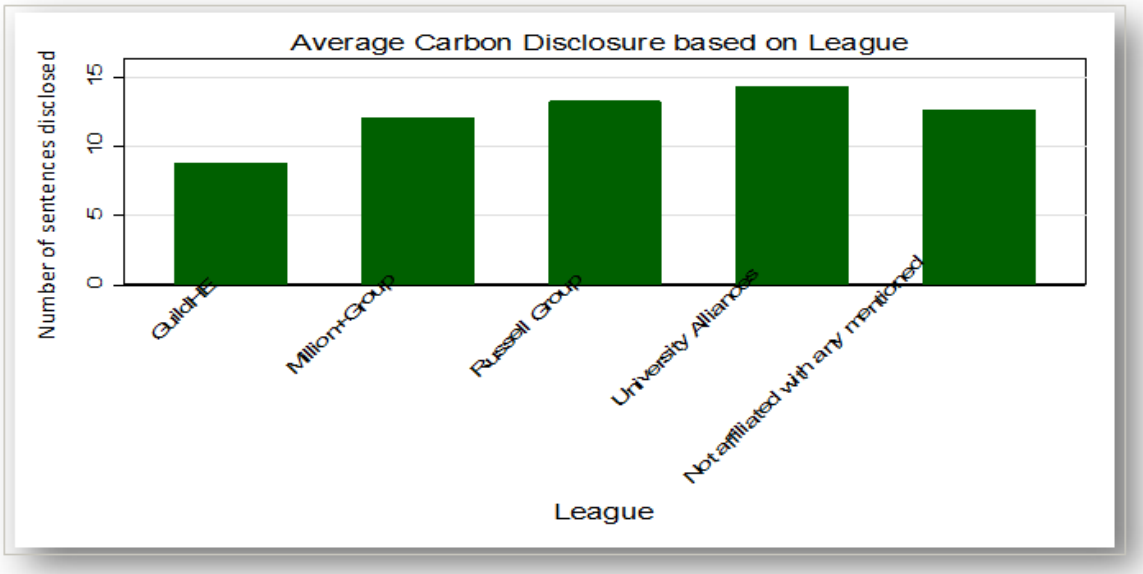


Figure 3.5 shows the average CED volume by universities from different league groups with the help of bar diagrams. FromFigure3.5 University Alliance was found to be making the most disclosure amongst the sample universities of this research. However, the figure does not show any huge variance amongst different league groupings in the sample in terms of their average carbon disclosures. Universities with membership of GuildHE are found to have the least average carbon disclosures in comparison to universities of other league group.

Figure 3.5
Average Carbon Disclosures Based on League



3.5.1.2 Univariate Analyses

This sub-section presents the univariate statistics in line with previous literature. Here mean differences in the explanatory variables were investigated between institutions with a high CED and low CED (Reverte, 2009). Top and bottom one-third cases of the sample were taken on the basis of high and low CED. For that purpose, the sample has been split up in three groups based on their CED score assigned with the help of CED the index developed in Table3.6 – 'Carbon Emission Disclosure Index / Instrument'. The first group has 45 HEIs in it with the highest CED scores, the second group has 45 HEIs with the least CED scores and the third group includes 45 HEIs with average CED scores. Table 3.12reports the mean values of the explanatory variables under analysis across the several CED scores for both HEIs belonging to top and bottom CED score groups. To test the statistical significance of the mean differences in the explanatory variables between both groups, which correspondents top and bottom CED scoring HEIs, t-tests are performed and presented for the mean difference. However, considering many variables are not normally distributed Wilcoxon signed-rank test results are also accompanied besides the t-test results in the same table.

The univariate analysis Table3.12, panel A indicates that HEIs making higher CED (39.93 %) are more likely to have committed for higher carbon reduction targets than are HEIs making low CED (31.24 %). The same is true for efficiency environmental audit in place, where HEIs making higher CED have more efficient environmental audit in place than HEIs making lower CED. Also geographical region of the HEIs has significant mean difference across high and low CED disclosing HEI groups. These are supported at 1% significance level by t-test. Also, non-parametric Wilcoxon rank test supports the results found with t-test.

Although the findings also show that the HEIs making higher CED emit more carbon, invest more in the facilities, disclose more on carbon in independent sustainability reports, are bigger in sizes, and are more recently founded, these differences are not found to be adequately significant at the levels considered (1%, 5% or 10%) for the study purpose, between both groups of HEIs. Insignificant findings from this univariate analysis show that HEIs with lower CED emit more carbon. Thus, higher carbon emitters are found to be quiet about their carbon activities, which quite understandable thing to do. Other findings include, though insignificant, HEIs with higher CED invest more on carbon reduction. The reason behind this is possibly that the HEIs spending more on carbon reduction have more to disclose on the topic, which leads to higher level of CED. As the analysis shows that these HEIs with higher CED are also majorly newer universities as compared to their counterparts making lower CED. The newer universities are found to be making higher CED (however, not found to be significant). This is because they have greener technology in place to manage carbon emission in comparison to their older counterparts. This creates opportunity to disclose positive news to be shared through their annual reports.

The univariate test of mean difference was repeated with two groups of HEIs – each group consisting half of the sample on the basis of the extent of CED, separated by median CED value. The two groups were –HEIs making high CED and HEIs making low CED. The first group with high CED HEIs in the analysis holds HEIs with CED value above the median value. Whilst the second group with low CED include universities having lower than median CED index (as per Table3.6) score. Panel B in Table 3.12 reports the mean values of the explanatory

variables under analysis for both HEIs with a CED index score higher than the median and those with a CED index score lower than the median. To test the statistical significance of the mean differences in the explanatory variables between both groups of HEIs, this chapter performs a t-test. Also considering the non-normal distribution of majority of explanatory variables, a Wilcoxon signed-rank test was done and presented in the same table. It should be noted that the results are generally consistent with earlier measures of univariate analysis in Panel A having one-third top and bottom environmentally reputed HEIs of the total sample. Also, results of t-test and Wilcoxon rank sum test are quite comparable to each other.

Table 3.12

Differences in Explanatory Variables between High and Low CED Groups

Variables	Top CED Group	Bottom CED Group	Mean Difference	T-value	Wilcoxon Rank Test
Panel A. One third groups					
Target	39.93	31.24	8.69	2.68***	2.05**
Emission	17400000	15300000	2072046	0.55	2.12**
Audit	5.48	3.86	1.62	3.86***	3.636***
League	3.44	3.35	0.09	0.24	0.20
Region	1.04	1.85	-0.81	-4.68***	-4.33***
Investment	369.50	362.17	7.33	0.20	0.24
Sustain	4.54	4.27	0.27	1.04	1.02
Size	16863.23	13222.33	3640.90	1.86*	2.07**
Age	69.46	108.31	-38.85	-1.34	-0.28
Panel B. Two groups separated by median					
Target	39.51	32.85	6.65	2.8***	2.34**
Emission	18700000	14600000	4100000	1.34	1.60
Audit	4.87	3.87	1.00	2.75***	2.64***
League	3.36	3.37	-0.02	-0.06	-0.19
Region	1.14	1.67	-0.53	-3.69***	-3.79***
Investment	364.07	353.22	10.85	0.40	0.27
Sustain	4.49	4.35	0.14	0.66	0.62
Size	17059.58	14637.39	2422.19	1.47	1.48
Age	77.88	95.25	-17.38	-.80	0.52

Notes: This table presents means, differences in means, t-values and Wilcoxon rank sum test values for the explanatory variables. *** p<0.01, ** p<0.05, * p<0.1.

3.5.2 Regression Diagnostics

Different regression models are used to test for causal effects amongst different variables i.e. variables Y and X, here variable X explains variable Y (Wooldridge, 2003). Ordinary least square (OLS) is the most common form of regression models used in literature. However, variants of this model i.e. Tobit, Probit, Logit, Poisson, Binomial are also used for cross sectional analysis given certain condition. However, the basic assumptions for regression analysis for OLS, which holds for different regression models, also known as the Gauss-Markov theorem are as following (Gujarati, 2004, pp. 65–80; Wooldridge, 2003).

i. The error term (ε_i) has an expected value of zero as: $E(\varepsilon_i|x_i) = 0$. Given the expected value of x, the mean of error term is zero.
ii. Zero correlation between explanatory variables and error term ε_i.
iii. Absence of perfect multi-collinearity i.e. the explanatory variables are not linearly related to one another.
iv. Homoscedasticity or equal variance of the disturbance (ε_i). Given the value of x, the variance of error is constant for all observations.
v. Absence of serial correlation or autocorrelation. The disturbances (error term) associated with each observation are uncorrelated with each other. This ensures that the data are a random sample of the population.
vi. Linearity: The regression model is linear in the parameters as: $y_i = \beta_0 + \beta_i x_i + \varepsilon i$. This is essential for the OLS model to be an unbiased estimator.
vii. Normality of disturbances.(Wooldridge, 2003)
viii. Absence of specification bias in model used for empirical analysis i.e. the regression model should be correctly specified (Gujarati, 2004, pp. 65–80).

Most of these assumptions also ensure the best fit of the regression model, which allows the disturbance to be as small as possible i.e. $\hat{\beta}_i$ is said to be a best linear unbiased estimator (BLUE) of β_i if the above assumptions hold (e.g. assumption *iv* above is not required for a model to be BLUE) (Gujarati, 2004, pp. 78–80). This section checks whether these assumptions hold for the sample used for this study and thus would give a possible best fit for generalisation.

3.5.2.1 Check for Unusual and Influential Data

It is essential to check for single observations which are substantially different from other observations. Presence of this kind of observations can cause significant difference in the results of regression analysis. This type of observations should be treated with caution so that any distortion in the regression results can be controlled. Observations of this kind are named as outliers and leverage. Outliers are observations with large residuals in linear regression. This is an observation whose dependent variable value is unusual given its values of the predictor variables (Wooldridge, 2003). Two-way scatter graphs (Appendix A) indicate presence of very few outliers in the data. Caution is needed for studentized residuals outside -2 to +2 (Chen, X., Ender, Mitchell and Wells, 2003). On the other hand, leverage is present if an observation has extreme values in predictor variables. Data suggests presence of observations with high leverage (Chen, X. et al, 2003).

A variable is said to be influential if removal of it makes significant change in the estimation of coefficient. Presence of observations with both high outliers and high leverage indicates the presence of potentially influential observations. A further check finds out presence of observations those are high in both of these measures. Options are to remove extreme observations or changing the extreme values to less extreme values (Tukey, 1962). In presence of outliers, leverage and influential observations, primarily winsorising (Cox, 2006) was done following previous literature (Al-Shaer, 2013) to curb the influential observations. In the second stage continuous independent variables are log transformed and count variables were transformed with square root. These are expected to get rid of the impact of outliers, leverage and influential observations (Gujarati, 2004).

3.5.2.2 Normality Test of Residuals

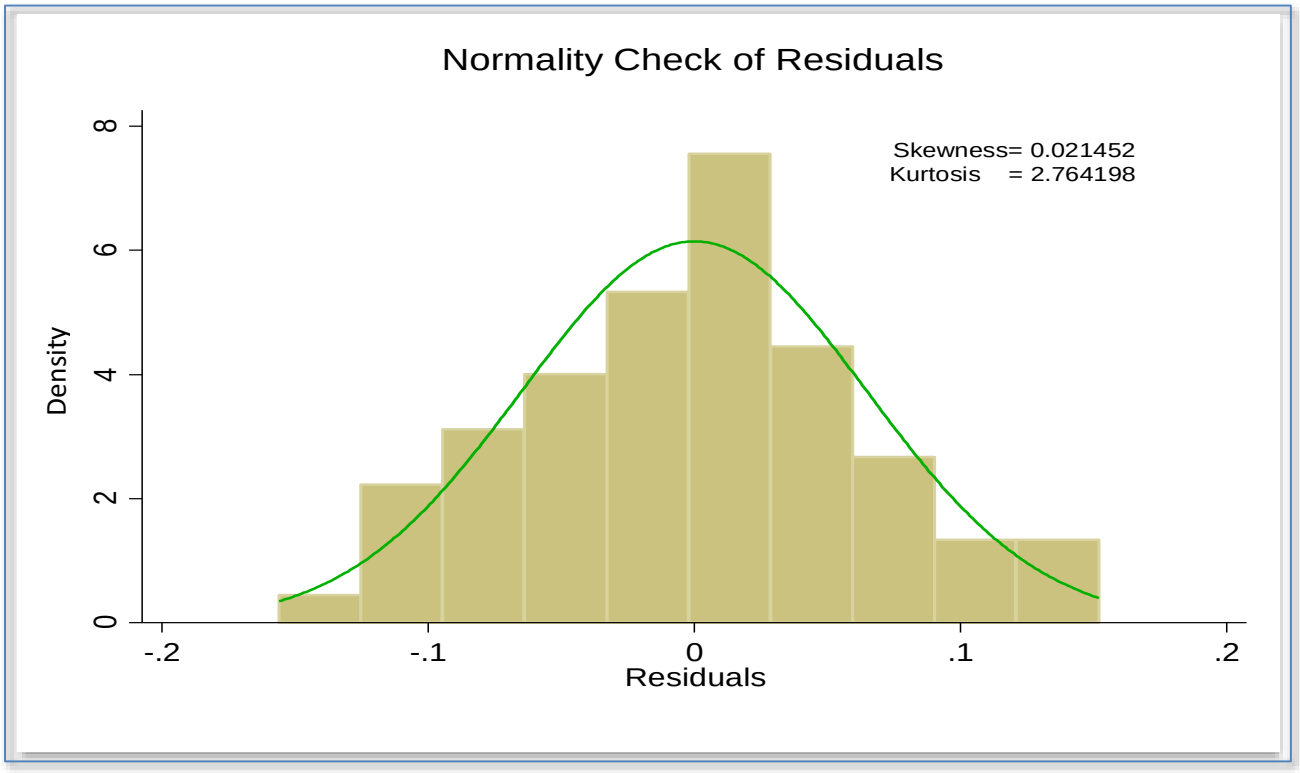
Normality assumption of a regression model states that the errors should be normally distributed (Wooldridge, 2003). It is not a condition for regression analysis that all the variables or predictors need to be normal. If that were the case, we could hardly use any dichotomous, dummy or even categorical variables (Chen, X., Ender, P., Mitchell, M. and Wells, 2003). Normality assumption is

important for hypothesis testing; it ensures the validity of p-values of t-tests and F-test. A test of normality has been done with visual histogram plot of residuals. Additionally, an inter-quartile range test (Hamilton, 1991), Jarque-Bera (Skewness/Kurtosis) test (Jarque and Bera, 1980, 1987) and Shapiro-Wilk test (Shapiro and Wilk, 1965) statistic were used to check normality of the distribution.

The skewness and kurtosis measure confirm the normality of the residuals (Skewness = 0.0214 and Kurtosis = 2.7641), as indicated earlier in Section 3.5.1. Also, Figure 3.6 shows that the histogram of residuals quite fits the line that indicates normality of data.

Figure 3.6

Histogram of Residuals



The interquartile range assumes symmetry of distribution. Presence of severe outliers[28] is sufficient to reject the normality assumption of any distribution. The test result presented in Table 3.13 confirms the absence of any severe (and mild as well) outlier and thus normality assumption holds for hypothesis testing.

[28] Severe outliers are the value 3inter-quartile-ranges above the 3rd quartile and 3inter-quartile-ranges below the 1st quartile.

Table 3.13

Inter Quartile Range for Residuals

Outlier Type	Low	High
Mild Outliers		
Inner Fences	-.1877	.1889
Number of Mild Outliers	0	0
Percentage of Mild Outliers	0.00	0.00
Extreme Outliers		
Outer Fences	-.329	.3301
Number of Extreme Outliers	0	0
Percentage of Extreme Outliers	0.00	0.00

Next, the Jarque-Bera (Skewness/Kurtosis) test for testing the normality of residuals, which is a simple test for normality check of the distribution (Jarque and Bera, 1980, 1987). It confirms (Appendix D) the normality of residuals as the p value is very high (.9873) and thus suitability for hypothesis testing. Additionally, Shapiro Wilk is arguably the most widely accepted powerful test for normality (Razali and Wah, 2011). The test is based on the hypothesis that the distribution is normally distributed (Shapiro and Wilk, 1965). Residuals are found (Appendix D again) to be normally distributed and thus the normality hypothesis could not be rejected based on the p value (ideally the p value should be very large to reject, in this case .8766). Also, the *W statistic* of *Shapiro Wilk test* is close to 1 for the distribution (.9907), which also confirms the normality of the residuals.

3.5.2.3 Heteroskedasticity Test

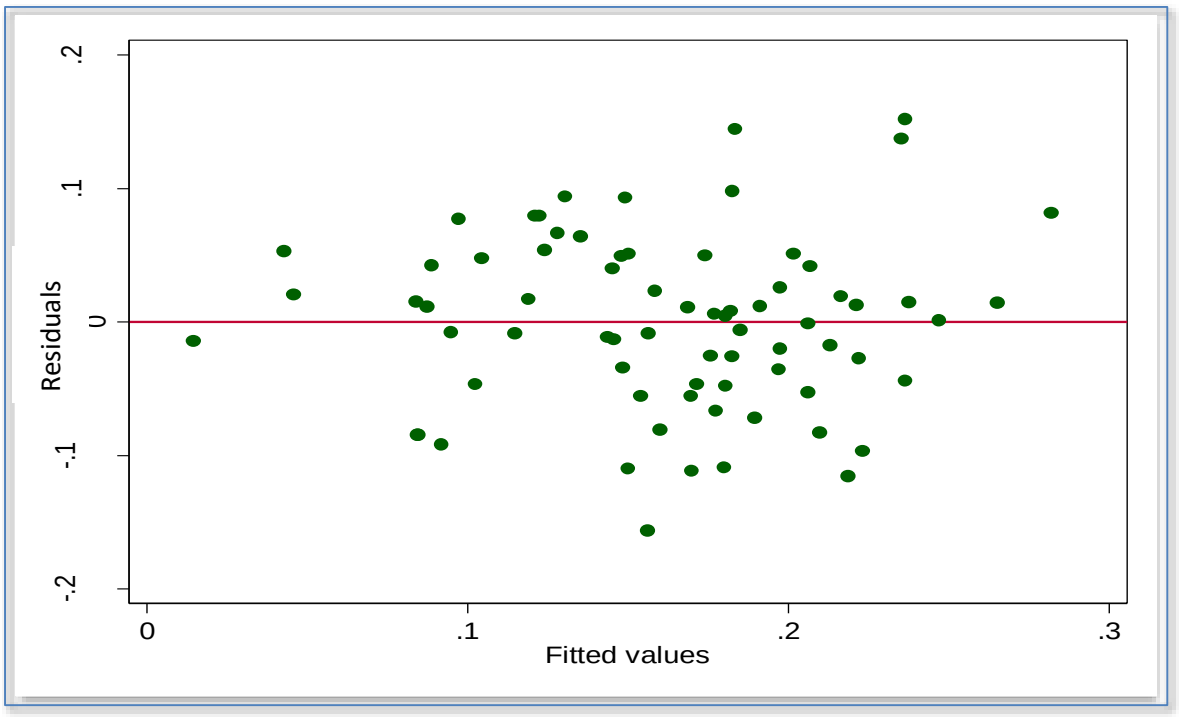
The assumption of regression that the error term would have constant variance i.e. the variance of residuals would be homoscedastic. Symbolically, $E(e_i^2) = \sigma^2$, $i=1,2,3,\ldots,n$. The violation of this assumption would make the distribution heteroskedastic, which means the variance of error term is not constant. Heteroskedasticity is more likely to occur in cross sectional distribution, rather than time series data. Several reasons of heteroskedasticity include presence of outliers, misspecification of the model, skewed distribution, incorrect data transformation, error learning model, improvement of data collection method

among others (Gujarati, 2004). In presence of heteroskedasticity i.e., when error term does not have constant variance, the model is no longer BLUE. The model is still linear and unbiased, but is no longer best and minimum variance. Whatever conclusions we draw or inferences we make will be misleading in presence of heteroskedasticity. Presence of heteroskedasticity might be checked with informal visual test or formal statistical tests.

The visual check of heteroskedasticity in Figure 3.7 shows that the left tail is narrower as than the right tail, which indicates the presence of heteroskedasticity.

Figure 3.7

Visual Check for Heteroskedasticity



Considering the indicated presence of heteroskedasticity, this study uses the more useful formal statistical tests, which are Breusch-Pagan (Breusch and Pagan, 1979) and White's tests (White, 1980), where null hypothesis is – residuals are homogenous. The Breusch-Pagan test is designed to detect linear heteroskedasticity. Breusch-Pagan test (Appendix E, Panel E1) rejects the assumption of homogeneity (p value 0.00).However, Wallace & Silver (1988) argued in favour of having routine check of heteroskedasticity with White test. Surprisingly, White test do not reject the homogeneity assumption (Appendix E,

Panel E2) at selected alpha level of 5% and thus suggests that the data is alright for regression analysis.

In presence of heteroskedasticity, we can avoid the issue with use of transformed variables that satisfies standard least square assumptions. Additionally, in the study *White's heteroskedastic consistent standard errors* (robust standard errors that are corrected for the heteroskedasticity inherent in the data and remains unbiased in presence of heteroskedasticity)has been used, which is widely used in literature as a cure against heteroskedasticity (Greene, 2012), as the distribution might suffer from heteroskedasticity and the regression might no longer be BLUE (Best Linear Unbiased Estimators) (Maddala, 1992; Wooldridge, 2003). This makes the estimates obtained with robust standard error not only unbiased but are consistent estimates of the determinants of HEI CED in cross sectional setting.

3.5.2.4 Test for Endogeneity

Endogeneity issue is one of the major challenges identified in prior literature (Armstrong et al., 2010; Brown et al., 2011; Lim et al., 2007; Roberts and Whited, 2013). Endogeneity exists due to omitted variable bias, measurement error and simultaneity / reverse causation, where explanatory variables are endogenous and correlated with the error term which will lead to biased results (Gujarati, 2004). Presence of endogeneity might cause researchers using cross-sectional analysis to treat explanatory variables as exogenous in the model suffering from endogenous effects (Baum, 2006).

Endogeneity effect was primarily suspected on the predictor variable TARGET. Since carbon reduction target to be achieved by the year 2020 are set on the base year 2005 carbon emission, it is expected that carbon emission amount of base year 2005 (BASE) might explain the carbon reduction target (TARGET). Additionally, the present carbon emission amount (EMISSION) might have impacted the carbon reduction target (TARGET) as well. As there is a suspicion that TARGET suffers from omitted variable biased in the form of unobserved factor, the researcher choose base year 2005 (BASE) and current year 2012 carbon emission (EMISSION) as instrumental variables. Base year 2005 (BASE) is not likely to affect the volume of carbon emission disclosure (CED) but base year and

current year carbon emissions are good predictors of the carbon reduction target set by the HEFCE. This is the justification why these may potentially be good instrumental variables. The study reports Durbin-Wu-Hausman test (augmented regression test) to investigate the presence of endogeneity (Durbin, 1954; Hausman, 1978; Wu, 1973). The null hypothesis here is that variables are exogenous, failing to reject this confirms the absence of endogeneity effects (Nakamura and Nakamura, 1981). Durbin-Wu-Hausman test results (Appendix F) show that the hypothesis could not be rejected (p value 0.998) and thus confirm the absence of endogeneity effect.

3.5.2.5 Correlation Analysis

Table 3.14 reports both *Pearson product-moment correlation coefficients* and *Spearman's rank correlation coefficients* with carbon emission disclosures, which is the dependent variable in this study. The correlation coefficient is for the dependent variable with the explanatory variables used in this research with the independent variables. The correlation coefficients show the justification of this study as there seems to be some relation amongst the carbon disclosure in annual reports and the explanatory variables. Although existence of correlation does not demonstrate any causal relationship, it is certainly worth further investigation for existence of any such causal relationship. It also shows positive significant relationships with TARGET, EMISSION, AUDIT and negative significant relationships with INVESTMENT, REGION, and SIZE. Although no significant correlation is found with SUSTAIN, LEAGUE and AGE, these are still potential for probable causal effects on the dependent variable – CED and thus kept for further investigation in regression analysis.

Table 3.14

Correlation Coefficients between Dependent and Explanatory Variables

Variables	*Pearson product-moment correlation coefficients*	*Spearman's rank correlation coefficients*
Target	0.3437***	0.2100*
Emission	0.1949**	-0.1106
Sustain	0.0880	0.1386
Audit	0.2943***	0.3104***
Investment	-0.1226	-0.1894*
League	0.1194	0.1052
Region	-0.2222***	-0.1882*
Size	-0.1815	-0.2344**
Age	-0.1633	-0.1834

*** indicates p<0.01, ** p<0.05 and * P<0.1

Table 3.15 shows both Pearson and Spearman correlation coefficients among the explanatory variables used in this study. Pearson correlation coefficients are presented in the bottom left diagonal segment. However, the Spearman Rank correlation coefficients are presented in upper right diagonal segment. The correlation coefficient values (between -1 and +1) show the degree and direction of correlation. The stars associated with the correlation coefficients show the statistical strength of the observed correlation, where highly significant findings (p-value<.01) are labelled ***, moderate significant findings (.01<p-value<.05) are labelled ** and marginally significant findings (.05<p-value<0.1) are labelled with single asterisks *.

Table 3.15

Pearson and Spearman Correlation Matrix for Explanatory Variables

Variables	Target	Emission	Audit	League	Region	Invest	Sustain	Size	Age
Target	1		0.178	0.078	-0.227	0.171	0.257	-0.037	-0.016
Emission	0.206	1	-0.071	0.124	-0.058	0.565 ***	0.289 ***	0.756 ***	0.527 ***
Audit	0.135	0.248	1	-0.088	-0.066	-0.011	0.250	0.023	-0.199
League	-0.029	0.360	-0.077	1	0.088	-0.002	0.306 **	0.080	-0.174
Region	-0.188 ***	0.071	-0.056	0.092 **	1	0.168	0.063	0.150	0.109
Invest	0.207	0.459 ***	0.031	0.055	0.169	1	0.248 **	0.377 ***	0.311 ***
Sustain	0.122 ***	0.462 ***	0.231 **	0.268 ***	0.056	0.303 *	1	0.292 **	0.189
Size	-0.072 **	0.687 ***	0.042 ***	0.251 ***	0.125	0.329 **	0.293 ***	1	0.114
Age	0.119	0.150 ***	-0.155	-0.172	0.090	0.313 ***	0.195	0.066 **	1

**** Significant at the 0.01 level; ** 0.05 level; * 0.1 level*

3.5.2.6 Multicollinearity Test

Multicollinearity test is important because in presence of perfect collinear relation, regression model cannot be uniquely computed. The primary concern here is that as the multi-collinearity increases the coefficient estimates in the regression model gets unstable and standard errors get widely inflated. Correlation coefficients less than 0.8 among the explanatory variables do not pose any significant threat of multicollinearity problem and are not likely to cause any undue effect on the results (Gujarati, 2004; Haniffa and Cooke, 2005; Mendenhall and Sincich, 1989). Though there lacks any straightforward cut-off universal benchmark for correlation coefficient (Alsaeed, 2006), the acceptable rule of thumb from existing literature shows that for checking problems of multicollinearity the correlation > 0.8 (Gujarati, 1995) is unacceptable while some suggest using 0.7 cutting point for the same purpose (Tabachnick and Fidell, 1996). Correlation coefficients in Table 3.17do not show any evidence of presence of any unacceptable level of multicollinearity issue amongst the explanatory variables. However as the table shows, there are some high correlation amongst some key explanatory variables as EMISSION with SIZE, INVESTMENT and SUSTAIN, which calls for acknowledgment of the issue and further consideration in constructing models to capture individual and joint causal effect.

Table 3.16 presents collinearity statistics for the explanatory variables, which confirms both variance inflation factors (VIF) and tolerance are in acceptable limit (VIF < 10 and Tolerance > 0.10) and thus multicollinearity is not an issue in this model (Haniffa and Cooke, 2005). Based on the VIF, multicollinearity is a problem if VIF exceeds 10 and/or tolerance gets lower than 0.10 (Neter et al., 1983), where the variable could be considered as linear combination of other independent variables.

Table 3.16
Collinearity Statistics

Variable	VIF	Tolerance (1/VIF)
Emission	2.00	0.4995
Size	1.88	0.5314
Age	1.60	0.6254
Investment	1.44	0.6950
Sustain	1.41	0.7072
Audit	1.38	0.7258
League	1.35	0.7411
Region	1.27	0.7896
Target	1.19	0.8415
Mean VIF	1.53	

3.5.2.7 Linearity Test

The linearity assumption is that there should be a linear relationship between the dependent variable and its predictors. If this assumption is violated the linear regression will try to fit a straight line to data that hardly follows a straight line. In order to see whether the dependent variable and the predictor variables in the model share any non-linear relation, augmented component-plus-residual plots have been constructed in Appendix B between CED and its predictor variables. The augmented component-plus-residual plots do not show extreme departure from the linearity assumption and confirms the justification of linear model.

3.5.2.8 Model Specification Test

Model specification in regression analysis is the way of developing a model to test. This includes the validity of the functional form of the model and the variables included in the model. Model misspecification might occur primarily by omitted variables, including irrelevant variables and incorrect functional form. Omitted relevant variables might result in wrongly distributing the common variance they share with the included variables and the error term will be inflated. Whilst, including irrelevant variables in the model will result in wrong attribution of common variance they share with included other variables. Model misspecification might significantly affect the estimation of regression coefficients (Chen, X.et al, 2003). Link test for model misspecification (Table

3.17) shows that the model does not have any misspecification error as the variable _hatsq is not significant (p value .287) and thus fails to reject the hypothesis of good model specification. Table 3.17 also presents Ramsey test for omitted variables, which comply by failing to reject (p value 0.2369) the hypothesis of no omitted variables.

Table 3.17

Model Specification Tests

Model	Item inspected	P value
Link Test	_hatsq	0.287
Ramsey Test	F test	0.237

3.5.3 Regression Results

The regression results are presented in Table 3.18 showing the determinants effect on the carbon emission disclosures volume. The models are specifically developed for cross sectional analysis and is available in STATA along with other statistical software such SAS, SPSS and others (Wooldridge, 2003). Considering the inherent structure of the data to be censored at zero, TOBIT model has been used with robust standard error to account for the censoring (Hussainey and Al-Najjar, 2011). TOBIT model is prescribed in case of censored data (Mcdonald et al., 1980; Tobin, 1958). The researcher found with a fit test of the model that it can predict about 34% of the actual value of carbon disclosure volume which is in line with prior literature.

Table 3.18

Regression Results – TOBIT Model

Models	**(3.1)**	**(3.2)**	**(3.3)**
Variables	**Dependent Variable= Carbon Emission Disclosures (CED)**		
Target	**0.067*** **		**0.054*** **
	(0.024)		**(0.022)**
Emission	0.012		0.011
	(0.019)		(0.029)
Audit	**0.010*** **		**0.009** **
	(0.004)		**(0.004)**
Investment	0.001		-0.001
	(0.025)		(0.023)
_League2		**0.082***	**0.093** **
		(0.051)	**(0.047)**
_League3		0.030	0.035
		(0.054)	(0.053)
_League4		0.075	**0.080***
		(0.052)	**(0.048)**
_League5		**0.095** **	**0.097** **
		(0.045)	**(0.040)**
_Region2		**-0.146***	-0.100
		(0.074)	(0.072)
_Region3		**-0.136*** **	**-0.083*** **
		(0.032)	**(0.024)**
_Region4		**-0.123*** **	**-0.073** **
		(0.030)	**(0.029)**
Sustain	0.003	0.008	0.006
	(0.010)	(0.009)	(0.012)
Size	-0.023	-0.007	-0.040
	(0.029)	(0.027)	(0.036)
Age	-0.001	**0.024***	0.018
	(0.009)	**(0.014)**	(0.012)
Intercept	-0.079	0.071	0.031
	(0.281)	(0.210)	(0.375)
pseudo R-sq	-0.163	-0.259	-0.296
Log likelihood	102.3	90.42	99.6
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

CED is measured by content analysis of 2011-12 annual reports of sample HEIs. TARGET is the carbon reduction target (%) for individual HEIs by 2020 from 2005 baseline from Higher Education Funding Council of England (HEFCE). EMISSION is the current carbon emissions (kgCO2) in the year 2012 which is the latest year for which data were available

at the time of data collection. SIZE is measured by the natural logarithm of total number of Staff and Students. All carbon target, emission and size were collected from HEFCE database. AUDIT is the point received by the University for carbon audit system in place scored out of 8. This score was collected from the People & Planet website. INVESTMENT denotes the facility spending information of year 2011/12 by HEIs got from Higher Education Statistics Agency (HESA). LEAGUE is a categorical variable where 1, if GuildHE; 2, if Million+Group; 3, if Russell Group; 4, if University Alliances; 5, if Not affiliated with any of the above. This information was collected from the specific university league websites. REGION is also a categorical variable 1, if England; 2, if Scotland or 3, if Wales and 4, if North Ireland. SUSTAIN represents the independent environmental reporting available on the website ranges from 0, if no disclosure to 5, if high disclosure. AGE represents HEI age in terms of completed years since its establishment. All region, sustainability and age were collected from specific HEI websites.

Table 3.18 confirms the hypothesis that the carbon reduction targets (%) on HEIs for year 2020 set by the HEFCE explains the extent of carbon emission disclosures by HEIs; Carbon emission reduction target is positively related to the HEI carbon emission disclosures in the annual reports, as hypothesised it has been found significant in all 3models. Understandably, HEIs having higher targets are more in pressure to achieve those targets and communicate their activities to achieve those targets. Activities here might include – facts regarding their performance to reduce carbon emission, involvement of the direct and active stakeholders in such activities, carbon policies among many others. This communication through media (e.g. annual report, which is arguably the most formal form of media to communicate with their stakeholders) is expected in reflection to the expectation management of HEFCE target.

Environmental audit is also found to have statistically significant positive impact on carbon emission disclosures. HEIs having more extensive environmental audit procedure and environmental management systems disclose more in the annual reports about their efficiency and are more transparent about their activities. They communicate their carbon performance, policy and risk to their stakeholders in a more transparent way by disclosing it in media. This in turn might allow them to have a positive reputation with their stakeholders.

Regression results also confirm the hypothesis that the university league groupings to which the HEIs belong have a significant role in determining the extent of its CED. Belongingness to different leagues demonstrates different

inherent characteristics of the HEIs. HEIs with similar characteristics chum up to form a league group. League authority becomes a powerful stakeholder for individual HEIs. Also there is an institutional pressure to abide by the general norms of the group on the member HEIs. To maintain their membership to those leagues they need to comply with the policy, rules and regulation of the leagues. Thus different leagues with their members would reasonably have different extent of carbon disclosures.

Also, the region of HEIs establishment is found to have a statistically significant role in determining the extent of its CED. Historically, universities in specific regions of UK are found to prioritize different factors for their performance, research and operations. For example, from the general experience universities in north east of UK do tend to priorities sustainability in their action compared to the rest. The study found statistically significant evidence to prove that disclosure in annual reports does depend on the region in which the HEI is established.

Present carbon emissions by HEIs is not found to be significant. Thus, there is not sufficient evidence found from this sample to prove the claim that HEI CED is explained by the current carbon emission.

Also, HEIs publishing separate sustainability reports and having carbon management plan in place were hypothesized to produce more CED in their annual reports, but is not proved in the regression results. This might be because HEIs disclosing in independent sustainability reports (SUSTAIN) and carbon management plan use those as supplementary medium of communication when communicating with stakeholders. HEIs having SUSTAIN in place do not disclose the same thing already disclosed in annual reports to avoid repeat of disclosures.

Surprisingly, universities spending more on their facilities development are not found to have disclosed their commitment in the annual reports, at least in terms of carbon reduction commitment. This might be because spending on facilities might not have reflected in carbon reduction in practice. The facilities spending can be related to many factors and carbon reduction is only one of them. The thesis hypothesized that facility spending would bring new technologies in place, and this probably would facilitate greener campus. However, the regression result

rejects this hypothesis and found no statistically significant relationship between facilities spending and carbon emission disclosures in annual reports.

Age of the university is also found to be not significant in explaining the CED of HEIs and thus rejecting the hypothesis that newer universities disclose more about carbon emission. The expectation was derived in the background where newer universities are in a better position to have newer and greener technologies in place and thus in a better position to control their carbon emission, which in terms put them in a very favourable position to disclose this in the media as their positive achievement. However, the regression results reject the hypothesis of any such relation.

Table 3.19 shows the summary of results from the hypothesis testing.

Table 3.19

Expected and Empirical Results with Significance

Statement of Hypotheses (alternative hypotheses)		Significance	Relationship with CED
H_{1a}:	Carbon reduction targets (%) on HEIs from 2005 baseline to 2020 by HEFCE have a positive effect on the extent of its CED	Yes	Supported
H_{1b}:	Present carbon emission volume by a HEI is positively related with its CED	No	Not supported
H_{1c}:	Universities having sound audit system in place are expected to disclose more than no universities	Yes	Supported
H_{1d}:	Spending on facilities has a positive influence on HEIs' CED in their annual reports	No	Not supported
H_{1e}:	The university league groupings in which the HEIs belong to have a role in determining the extent of its CED	Yes (at 10% level)	Weak support
H_{1f}:	The region of its establishment has a role in determining the extent of its CED	Yes	Supported

3.5.4 Sensitivity Analysis

The study used TOBIT regression models to find out the determinants of volume of carbon emission disclosures in HEI annual reports. However, acknowledging the fact that disclosure volume was measured by sentence-count and for count data in dependent variable poison regression or negative binomial regression (if the distribution has over dispersion) is suggested. The main regression model was shown as censored TOBIT model, compared with OLS model by transforming the count variable to square root. However, literature suggests that issues might occur, including loss of values and lack of capacity of the model to deal with over dispersion. Based on this argument, the study further checked the results with negative binomial distribution. However, the loss of values happens only in case of log transformation, unlikely for square root transformation; but issue with over dispersion might still be present.

The alpha parameter of negative binomial model shows that the distribution is over dispersed and thus poison regression is not suitable for the purpose of the study. A check for over dispersion (Stata output in Appendix C, Panel C1) confirms that over dispersion is present, i.e. the conditional variance exceeds the conditional mean and negative binomial model would be appropriate as it would ensure narrower confidence intervals. The negative binomial model fits (Stata output in Appendix C, Panel C2) again as p-value for _hatsq is very high (0.746).

Table 3.20 shows alternative regression models with negative binomial. Results confirm the results of the main regression results.

Table 3.20
Alternative Regression Model - Negative Binomial Regression

Models	**(3.1)**	**(3.2)**	**(3.3)**
Variables	**Dependent Variable = Carbon Emission Disclosures (CED)**		
Target	**0.628*** **		**0.466** **
	(0.23)		**(0.22)**
Emission	-0.0498		-0.0044
	(0.22)		(0.24)
Audit	**0.127*** **		**0.100*** **
	(0.04)		**(0.04)**
Investment	0.152		-0.0481
	(0.25)		(0.23)
_League2		**1.248*** **	**1.034** **
		(0.47)	**(0.45)**
_League3		0.565	0.669
		(0.55)	(0.52)
_League4		**1.209** **	**1.135** **
		(0.53)	**(0.45)**
_League5		**1.219*** **	**1.098*** **
		(0.46)	**(0.42)**
_Region2		**-1.445***	-0.914
		(0.78)	(0.83)
_Region3		**-1.995*** **	**-1.497*** **
		(0.36)	**(0.34)**
_Region4		**-1.982*** **	**-1.408*** **
		(0.36)	**(0.37)**
Sustainability	-0.0336	0.155	-0.0117
	(0.12)	(0.10)	(0.12)
Size	-0.23	-0.202	**-0.578***
	(0.34)	(0.29)	**(0.34)**
Age	0.0313	**0.380*** **	**0.325** **
	(0.11)	**(0.14)**	**(0.13)**
Intercept	1.942	1.634	4.551
	(2.24)	(2.38)	(2.88)
pseudo R-sq	0.03	0.048	0.065
Log likelihood	-362.9	-373	-319.2
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

However, considering count data can be converted to continuous variable by having natural logarithm, square root or arcsine transformation. Ordinary Least Square regression is suitable for such data. Table 3.21 shows the regression results of the three models identified before and shows the conformity with other model forms tested earlier.

Table 3.21
Alternative Regression Model – Ordinary Least Square

Models	**(3.1)**	**(3.2)**	**(3.3)**
Variables	**Dependent Variable = Carbon Emission Disclosures (CED)**		
Target	**0.0561*** **		**0.0406*** **
	(0.02)		**(0.02)**
Emission	-0.000742		-0.000275
	(0.02)		(0.03)
Audit	**0.0103*** **		**0.01** **
	(0.00)		**(0.00)**
Investment	0.01		0.01
	(0.03)		(0.03)
_League2		0.0624	**0.0882** **
		(0.05)	**(0.05)**
_League3		0.00	0.04
		(0.05)	(0.05)
_League4		0.0522	**0.0836***
		(0.05)	**(0.05)**
_League5		0.0549	**0.0836** **
		(0.04)	**(0.04)**
_Region2		**-0.106** **	-0.0779
		(0.05)	(0.06)
_Region3		**-0.113*** **	**-0.0776*** **
		(0.02)	**(0.02)**
_Region4		**-0.101*** **	**-0.0684*** **
		(0.02)	**(0.03)**
Sustainability	0.0025	0.01	0.01
	(0.01)	(0.01)	(0.01)
Size	-0.0258	-0.00276	-0.0533
	(0.03)	(0.02)	(0.04)
Age	0.00	**0.02***	**0.02***
	(0.01)	**(0.01)**	**(0.01)**
Intercept	0.112	0.0288	0.309
	(0.22)	(0.20)	(0.30)
R-sq	0.203	0.231	0.331
Adj. R-sq	0.144	0.154	0.211
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 3.22 presents the regression results by dividing the sample in high and low CED (dependent variable) groups. In line with prior similar studies done in disclosure literature, this thesis checks the robustness of the results found from the TOBIT regression analysis by running additional regression dividing the sample into a high CED and low CED (Reverte, 2009). Top and bottom one-third cases of the sample were taken on the basis of CED index score obtained based on the

CED index presented in Table 3.6. The first group has 45 HEIs in it with the highest CED scores, the second group has 45 HEIs with least CED scores and the third group includes 45 HEIs with average CED score. The dependent variable thus becomes dichotomous dummy variable with the value of 1 for high (top one-third) CED scores and the value of 0 for low (bottom one-third) CED scores. Thus, a LOGIT regression model would be the suitable model in this case. Table 3.22 presents sensitivity analysis where results agree with prior findings of the chapter.

Table 3.22
Alternative Regression Model – Top and Bottom One-Third Group

Models	**(3.1)**	**(3.2)**	**(3.3)**
Variables	**Dependent Variable = Carbon Emission Disclosures (CED)**		
Target	**1.526*** **		**0.991*** **
	(0.59)		**(0.98)**
Emission	0.395		1.521
	(0.74)		(1.23)
Audit	**0.414*** **		**0.261*** **
	(0.19)		**(0.23)**
Investment	0.383		-0.448
	(1.04)		(1.76)
_League2		2.051	3.441
		(1.62)	(2.48)
_League3		-0.578	**-0.705***
		(1.16)	**(2.09)**
_League4		**2.176***	3.447
		(1.25)	(2.13)
_League5		0.989	1.975
		(1.07)	(1.98)
_Region2		0	0
		(.)	(.)
_Region3		**-3.963*** **	**-4.561*** **
		(1.05)	**-1.51**
_Region4		0	0
		(.)	(.)
Sustainability	-0.113	-0.462	-0.57
	(0.44)	(0.35)	(0.45)
Size	-1.075	-0.084	2.939
	(1.35)	(0.73)	(1.86)
Age	-0.407	**-0.361***	**-0.177** **
	(0.33)	**(0.49)**	**(0.62)**
Intercept	-0.113	4.00	1.99
	(0.44)	(6.70)	(12.73)
pseudo R-sq	0.192	0.252	0.35
Log likelihood	-33.3	-32.03	-21.85
N	88	88	88
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 3.23 presents the regression results by dividing the sample in high and low CED groups. The robustness check of regression analysis has been repeated with two groups separated with median. The two groups are – high CED group and low CED group of HEIs. The first group with high CED holds HEIs with CED score (based on CED index in Table 3.6) above the median value. Whilst the second group with low CED score includes universities having lower than median CED score (based on CED index in Table 3.6).

The dependent variable thus again becomes dichotomous dummy variable with the value of 1 for high (top half) CED scores and the value of 0 for low (bottom half) CED scores, which shows that a LOGIT regression model would be the suitable model in this case. Table 3.23 tests with two groups (top half and bottom half HEIs) gives similar results as Table 3.22 where top and bottom one-third were compared.

Table 3.23
Alternative Regression Model – Top and Bottom Half – LOGIT Model

Models	**(3.1)**	**(3.2)**	**(3.3)**
Variables	**Dependent Variable = Carbon Emission Disclosures (CED)**		
Target	**-0.833*** **		**-0.506*** **
	(0.65)		**(0.58)**
Emission	-0.597		-0.939
	(0.53)		(0.75)
Audit	**-0.209*** **		**-0.151*** **
	(0.11)		**(0.13)**
Investment	0.309		0.657
	(0.63)		(0.73)
_League2		-0.838	-1.868
		(1.01)	(1.39)
_League3		-0.641	**-1.134***
		(1.03)	**(1.51)**
_League4		**-0.884***	-2.057
		(1.04)	(1.49)
_League5		-0.69	-1.309
		(0.86)	(1.23)
_Region2		0	0
		(.)	(.)
_Region3		**2.632*** **	**2.593*** **
		(0.80)	**(1.06)**
_Region4		**1.657*** **	**1.361*** **
		(0.83)	**(1.08)**
Sustainability	-0.128	-0.185	-0.258
	(0.28)	(0.24)	(0.34)
Size	0.597	0.0234	**1.95***
	(0.81)	(0.53)	**(1.08)**
Age	0.214	**-0.212***	**-0.178***
	(0.27)	**(0.31)**	**(0.43)**
Intercept	5.567	1.476	-2.427
	(5.81)	(4.58)	(8.85)
pseudo R-sq	0.066	0.118	0.139
Log likelihood	-64.53	-65.61	-52.59
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

3.6 CHAPTER CONCLUSION

Carbon emission has become a global issue and attracted much public awareness since seventies. This has resulted in stricter policies, acts, regulations and higher social expectation for the existence of organizations. HEIs being in possession of distinctive characteristics are in a great position to set an example of good practice in carbon sensitivity. Being motivated by this fact HEFCE has set definite targets for the HEIs. This public awareness and regulatory monitoring should act as a pressure from stakeholders and institutional norm and is expected to have an impact on the carbon disclosure to the stakeholders and the society as a whole. This chapter examines the characteristics and determinants of carbon emission disclosures within annual reports by the UK higher education institutions. This chapter also investigates the impact of regulatory intervention on CED, thus is important and expected to attract the policy interventions regarding HEIs.

HEIs were found to be consistent with the corporate sector in terms of types of carbon disclosure; non-monetary and declarative good news being the major types of CED by far. However, HEIs do tend to cover a wide variety of areas of carbon disclosures, all of them being comparable in terms of volume of disclosures, the area of 'Carbon initiatives, processing, reduction and abatement' was evident to have the most disclosures and by majority of the HEIs. The average volume of carbon emission disclosures in annual reports by the UK HEIs is approximately twelve sentences.

The second objective of this study was to investigate the determinants of carbon emission disclosures in annual reports by higher education institutions in the UK. This has been widely investigated in prior literature in different countries for profit seeking organizations. This study recognizes that the distinctive characteristics of HEIs make them different from general profit seeking organization and thus argues that a separate study on determinants of HEIs is the call of the time. The study results confirm this argument with different determinant factors for HEI CED, which proves the appropriateness of the study.

The study also adds to the literature by using TOBIT model, which is the correct model to use, considering the distribution here is essentially of censored nature.

However, the study also accounts for the counter argument with the transformed data in continuous form without any specific intention to make it censored. Thus an OLS model was also performed to account for the sensitivity. The study also acknowledges that the distribution is primarily comprised of sentence count with over dispersion, hence making negative binomial model suitable in case of untransformed count distribution. Sensitivity analysis comprises both OLS and negative binomial models in the study.

The results reported here show a strong relationship between the *HEFCE carbon target to be achieved by the year 2020* and *carbon disclosures in annual reports*. Basis for this research here is that the more critical particular stakeholder resources are to the existence and success of an organization, the more authoritative the stakeholder is and more likely the expectations of such stakeholders are to be fulfilled. This demand may relate to the provision of organisational carbon reporting (Ullman, 1985). This fact is supported by both *stakeholder and institutional theories* providing the motivation to manage important stakeholders' expectations and demands by disclosing more to signal their conformity with such expectations and demands to secure the existence. Carbon requirement imposed by HEFCE for availing CIF makes it an influential stakeholder. HEIs target their carbon disclosures to fulfil requirements set by HEFCE. The findings of this research are expected to impact the policy implementation and formulation in this regard.

Additionally, *environmental audit* and *region of establishment* were found to have a significant influence over the carbon disclosure. This suggests institutional audit for environmental efficiency is a valuable causal factor for HEIs to disclose more on carbon. This might be either in the sense that environmental audit itself is an important thing that HEIs disclose in their annual reports, or environmental audit persuades the HEIs to be more carbon responsible and emit less carbon, which in turn creates many more opportunities to get involved with carbon efficiency leading to vast reporting of these activities in the disclosure section of the annual reports to signal their conformity with *stakeholders and institutional expectations*. Region of establishment was found to be a significant explanatory factor of carbon emission disclosure in annual reports as well. This is as hypothesized that

universities in certain region tend to have more priority about sustainability and priorities do differ from one region to another. However, reason for this difference is not in the scope of this research.

In addition, influence of *belongingness to a specific university league* was found to be weakly supported (at 10% level). This needs to be perceived with caution. However, the existence of such influence is not surprising in the sense that all league groupings of universities do have their own norms and principles and universities who agree to these norms and principles sign up for appropriate league groupings. Any existence of such norms relating to carbon sensitivity may govern member HEIs' attitude towards carbon performances and disclosures.

This chapter contributes to the literature by finding the determinants of carbon emission disclosures with respect to higher education institutions in the UK. There existed a void in research with HEIs carbon disclosures, which was widely researched for profit seeking organisations. This study finds distinct causal determinants and proves the impact of regulatory intervention on HEI CED. It also shows how carbon disclosures vary in respect of region and league belongingness. Also, organizational own priority in the form of environmental audit proves to have significant influence from micro perspective. The findings of this study is a huge addition to Godemann et al. (2011); Nejati et al. (2011) and Mazhar et al. (2014) by having its own contribution to the disclosure literature. The outcome of the research will be of interest to stakeholders of the universities, HEFCE and other policymakers. Organisations disclose voluntary information to better manage its stakeholders' expectation, discharge institutional responsibility, legitimise its existence and build reputation base; managers use this to ensure their own benefit through managing stakeholders. Specifically, CED should help HEIs to manage the expectation of the HEFCE, society and other stakeholders given the target set on the motivation to have a reduced carbon emission. Future policies also evolve from this information. This study may also work as the reference of best practices to attract other universities which are following in the ranking from developing countries (Godemann et al., 2011) and trying to improve their standards through a holistic approach. Universities, which are less recognized, can follow this behaviour through well disclosure practice. Though they may wish to

modify it according to their socio-cultural situation, it is always helpful to have examples of best practice to get motivations and directions from others. This can be well facilitated through the research findings.

However, findings of this chapter apply in terms of volume of carbon disclosure only. Last decade was much concerned with the fact of difference between volume and quality of disclosures (Yekini and Jallow, 2012). Research on disclosure quality has been supported by several researcher in social reporting including Beattie et al. (2004), Hasseldine et al. (2005) and Toms (2002); emphasising quality measure as a valuable tool in the signalling theory of social disclosure. Also, high correlation found in chapter one and two (correlation of .80, supported in Figure 1.2) reveals an interesting insight and calls for further investigation on determinants of carbon disclosures quality. As such further investigation on the relationship shared among CED volume, CED quality and HEFCE intervention is going to be done more in depth in the following chapter.

CHAPTER FOUR

RELATIONSHIP BETWEEN CARBON DISCLOSURES QUALITY & VOLUME AND IMPACT OF CARBON REDUCTION TARGETS

CHAPTER 4

Relationship between Carbon Disclosures Quality & Volume and Carbon Reduction Targets

4.1 CHAPTER OVERVIEW

Carbon emission disclosure (CED)by higher education institutions (HEI) is recognised as a much under researched area (Mazhar et al., 2014). Chapter three investigated the determinants of CED volume in annual reports by UK HEIs. So, what follows? The next questions to answer here are: Are the determinant factors found in chapter two same for both volume and quality of CED? Also, is the impact of carbon reduction target on CED quality as effective as it was for CED volume? By answering these questions this chapter investigates the relationship shared between CED volume and quality. This thesis recognizes that the distinctive characteristics of HEIs make them different from general profit seeking organization. Thus, generalization of findings of prior studies with profit oriented organisations is likely to mislead. So, this chapter explores the relationship between CED quality and volume by HEIs in the UK, with special concern of the impact of Higher Education Funding Council of England (HEFCE) carbon reduction target on such disclosures. This is a follow up on the previous chapter where it found the HEFCE target, carbon audit and region of establishment to be significant estimator of CED. However, the authors investigate whether CED quality and volume mean different and thus have different determinant factors.

HEIs are well suited for becoming leaders in environmental protection, because of their influence on the society based on their research, teaching and policy development activities (Dahle and Neumayer, 2001). Universities disclosing and practising sustainable development and thus reducing carbon impact benefit from several aspects. First, “green” campuses could use resources efficiently and create less waste, e.g. through hazardous waste recycling, which reduces greenhouse gas (GHG) emissions such as carbon (Hazardous Waste Recycling Benefits, 2012). After all, hazardous waste recycling reduces air, water and soil pollution. Second, universities would have a competitive advantage by “greening” campuses

compared to others who do not act on sustainable development. Sustainability dimensions integrated into university programmes benefits university administration staff, teachers and students as they would like to live, work, and be associated with an environmentally friendly university (Filho, 2011). As a result, compared to the counterparts, "greener" universities are more likely to attract better staff and students. Third, "greening" of campuses has a positive impact on the reputation and image of universities. These are the potential benefits universities could achieve through their green activities.

HEIs also have general obligations towards society and the environment as part of their social responsibility towards natural environment (Glennie and Lodhia, 2013). Reduction of carbon emissions is a key social concern these days and HEIs need to consider efforts to reduce carbon emissions (Rondinelli and Berry, 2000) and should make proper disclosure for it towards the stakeholders to become responsible social citizens. Carbon disclosure is an important component of social responsibility (Huang and Kung, 2010). Carbon disclosure is a part of environmental responsibility to conform to social expectations (Schaltegger et al., 2013) and is very much demanded by the society. Thus, HEIs have social and environmental obligations rather than mandatory obligation on carbon disclosure.

Following recent research and calls for further research into universities' sustainability activities (Adams, 2013)this study focuses on quality of carbon emission disclosures of universities in the UK. Overall social reporting debate in last decade shifted from the question whether to report to a mature concern of scope, quality, type (both volume and quality), length or volume of such disclosure (Yekini and Jallow, 2012). Hasseldine et al. (2005) and Toms (2002) have supported the importance of quality measure as a valuable tool in the signalling theory of social reporting. Whether disclosed information on carbon truly reflects the carbon reduction promise is of question in the literature. Mere volume of disclosure might not result in increased quality of disclosure. Researchers differ in terms of relationship between volume and quality of carbon disclosures (Alotaibi and Hussainey, 2016; Beattie et al., 2004; Hasseldine et al., 2005). Additionally, debate exists on the quality of voluntary social reporting (Beattie et al., 2004)as there exists no congruence in literature on definition and measurement

technique of disclosure quality. In this backdrop, a definite importance of attention to the quality is evidenced in this study.

A highly positive correlation was found between volume and quality of CED with a preliminary study (Figure 4.1). This finding makes it even more interesting indicating some positive relationship between them. The study presents an investigation of the impact of volume of CED on the CED quality, as disclosed in annual reports. Besides, this chapter also investigates the impact of HEFCE carbon reduction target imposed on the HEIs on their CED quality. CED reporting, being a voluntary area of disclosure in annual report, it is an interesting study to find out whether the disclosures are merely stated in terms of volume or it really contains decision useful information and thus indicates more quality in it. That is to say, whether more disclosure means more quality in CED.

Figure 4.1

Relationship between Volume and Quality of Carbon Disclosures

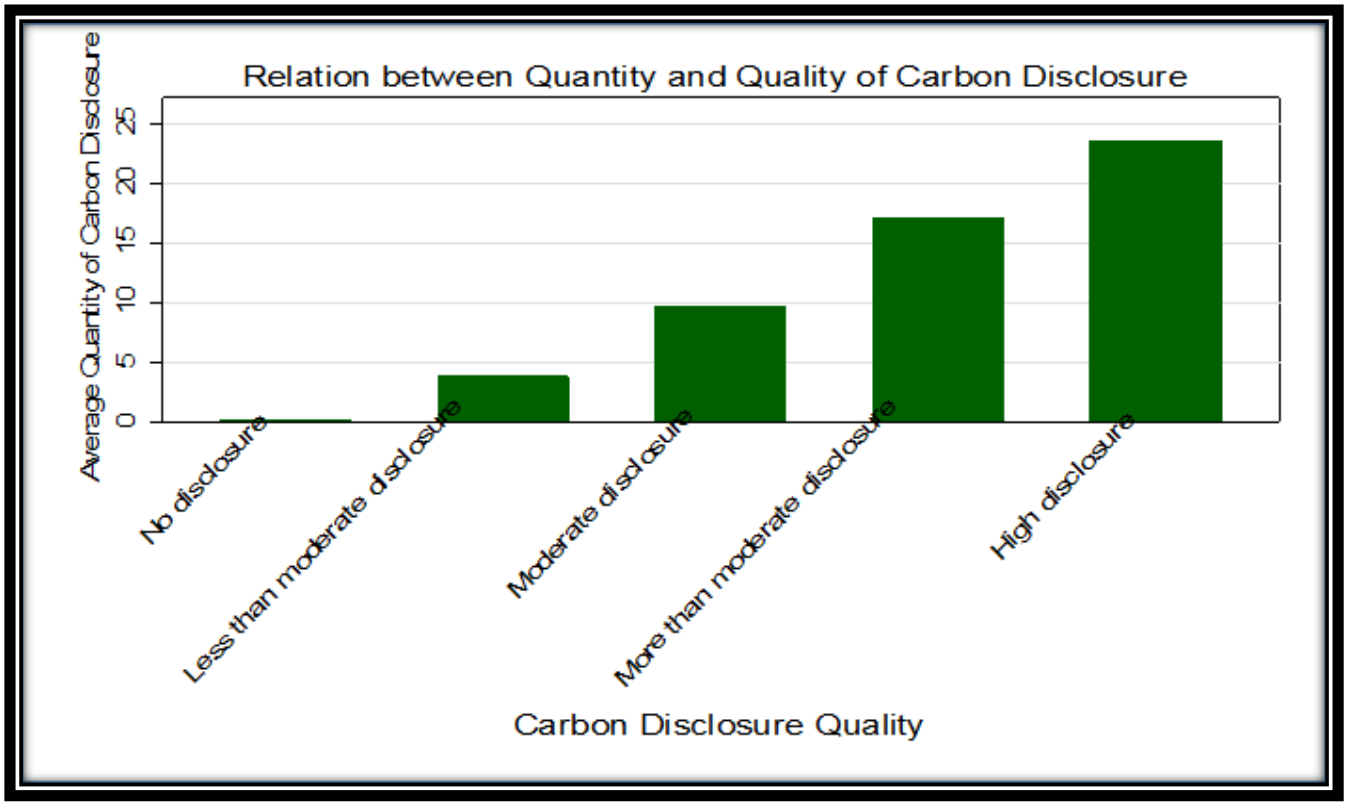


Figure 4.1 shows an interesting correlation between the volume and quality of CED with a high positive correlation (Spearman) of 0.8005 (Pearson = 0.6685), which calls for further investigation on the relationship shared among CED volume, CED quality and HEFCE intervention. This is going to be investigated more in depth in this study. *What is the relationship between volume and quality of HEI CED? What is the impact of HEFCE target on the quality of HEI CED? Is the impact same as on volume?*

This study is arranged in seven sections. The next section presents a view on literature used in the research based on the underpinning theoretical framework described in chapter two. Section 4.3 presents the hypotheses of this study. Research methods used for the research have been explained in section 4.4. Section 4.5 presents the results and relevant analyses. Finally, section 4.6 concludes with the importance of the research and scope for further research.

4.2 LITERATURE REVIEW

There is a growing literature which expresses concerns about the use of volume in the research of social and environmental disclosure. Very few research exists which analyses such criticism against either volume or quality of such disclosures. The issue with prior literature to choose from volume and quality of CED is much debated. Both qualitative and volumetric CED have their own limitations without proper consideration of the context. This section of the chapter reviews the prior literature to understand the relationship found from the analysis on carbon emission disclosure – volume and quality. Review helps to formulate the methodology unambiguously and objectively. Taking into consideration that literature on the nature of CED is fairly limited, this section broadens its focus to overall CSR disclosure and environmental disclosure as well. Major studies which are particularly concerned about the superiority or limitations of volumetric or qualitative disclosures are presented here:

4.2.1 Defining Disclosure Quality

CED quality can be defined using verifiability, quantifiability, location, news type, timing etc. Walden and Schwartz (1997) emphasized location, evidence and timing of items disclosed, for defining disclosure quality. Deegan and Gordon (1996) and Deegan and Rankin (1996) defined disclosure quality in terms of the nature of the news. Whereas, themes, volume and evidence of disclosure have been sought after in quest for disclosure quality by Gray et al. (1995a), Guthrie and Parker (1990), and Hackston and Milne (1996). However, the type of 'news' in the disclosure – whether good or bad is a matter of concern for quality (Gray et al., 1995b; Hackston and Milne, 1996) – in addition, 'location' of disclosure can also be important (Guthrie and Parker, 1990). Quality disclosures are those which are quantifiable and verifiable and thus not easy to imitate (Toms, 2002). Organisations who are not performing the environmentally responsible activities would find it hard to imitate those quality disclosures. Indeed, disclosure quality is a complex and "*multi-faceted concept"* (Beattie et al., 2004, p. 227). She acknowledges several attributes of disclose quality: historical/forward-looking; financial/non-financial and quantitative/non-quantitative.

4.2.2 Positive Relationship between Quality and Volume

Very few studies considered volume and quality of social disclosure systematically in the past, thus, missing an important link between volume and quality of such disclosure. Whether disclosures are meant only for verbal signals in order to have positive impact on reputation or the disclosed information truly reflects the carbon reduction promise is of question in the literature. Prior literature assuming a positive relationship between volume and quality of disclosure measures volume in absence of proper tool for measuring the disclosure quality. Beattie *et al.* (2004) argues that "*Organisations that say relatively more can be expected to provide disclosure of higher quality*" (Beattie et al., 2004, p. 230). However, mere volume of disclosure might not always result in increased quality of disclosure.

Alotaibi and Hussainey (2016) show a positive association between CSR disclosure quality and quantity. They investigated the impact of CSR disclosure

quantity and quality on firm value by using a sample of 171 non-financial firms listed in the Saudi stock market for the period 2013-2014. They measured the quantity and quality of CSR disclosure and found a positive relationship between them. To measure CSR disclosure quality, they capture all qualitative attributes of information quality as defined in the IASB conceptual framework. They use a CSR disclosure index to measure the volume of disclosure.

4.2.3 Superiority of Quality over Volume

In contrary, Hasseldine et al. (2005)showed that disclosure quality contains more information for readers. They measured the quantity and quality of CSR disclosure, examined their impact on firm value. The study uses a quality-adjusted method of content analysis. The results confirm that quality of environmental disclosure rather than mere volume has a stronger effect on the creation of environmental reputation amongst different groups. To measure the disclosure quantity in corporate annual report content analysis with number of sentences was used. Qualitative disclosure score was measured as defined by Toms (2002) ranges from (0) score for non-disclosure to (5) score for high quality disclosure. To create an aggregate variable quality-adjusted measure of disclosure was used by adding a rating or quality score for every sentence in the annual report. Corporate environmental reputation was found from the *Management Today* Britain's Most Admired Companies (MAC) survey. The study used a sample of 139 UK companies from the MAC survey and found impact of both qualitative and quantitative measure of environmental information within corporate annual reports has an impact on the creation of environmental reputation. However, quality of disclosure has stronger impact on reputation rather than mere volume of disclosures under the theory of signalling. It recommends institutional management to pay attention to the quality of disclosure instead of the mere volume of disclosure in order to create environmental reputation.

4.2.4 Information – Need for Decision Usefulness

Beattie et al. (2004) advises that the quality of the voluntary disclosures needs to be monitored. The quality of the disclosure should address the need for decision making. The information content has been prioritised by them for transparency

and accountability. They see the quality of such voluntary disclosure to be important enough to lead the way for substantial corporate reporting changes. They also show that the increasing number of accounting research coming up these days on disclosures. Hence, priority to develop tools for objective measurement of such narrative disclosures made in annual reports to identify its quality and decision usefulness. They suggested a new computer-assisted methodology that generates a comprehensive descriptive disclosure profile of annual report narratives. With this they analysed a single company's 1999 voluntary annual report disclosures. They reviewed the concept of quality and proposed possible attributes of quality, observable proxies for some of these and aggregation into a summary measure of disclosure quality.

Recent call in literature for the importance for disclosure quality was responded by Healy and Palepu (2001) and (Core, 2001). (Healy and Palepu, 2001) assume that firms' disclosure policies are endogenously determined by the same forces that shape firms' governance structures and management incentives. They provided a broad review of the empirical disclosure literature and focus on the empirical voluntary disclosure literature. They instigate the potential importance of financial reporting and disclosure for management to communicate firm performance and governance to outside investors. They also proposed a framework for analysing such reporting and disclosure decisions in a capital markets setting.

(Core, 2001) introduces to the academic literature a comprehensive four-dimensional framework for the holistic content analysis of accounting narratives and presents a computer-assisted methodology for implementing this framework. This procedure provides a rich descriptive profile of a company's narrative disclosures based on the coding of topic and three types of attributes. He also explores the complex concept of quality, and the problematic nature of quality measurement. It makes a preliminary attempt to identify some of the attributes of quality (such as relative amount of disclosure and topic spread), suggests observable proxies for these and offers a tentative summary measure of disclosure quality. He also urges using computer technology to lower the cost of computing disclosure quality indices. These measures are likely to empower most disclosure-

related research designs. Thus this paper introduces the relationship of information asymmetry with expected return or cost of capital.

This leads to the fact that current state of disclosures need to be more transparent (Boesso and Kumar, 2007) to reduce the information asymmetry. They examined factors in addition to the needs of financial markets those drive the voluntary disclosure practices of companies. They analysed information provided in the management discussion and analysis section of the annual reports of 72 companies in Italy and in the United States. Using content analysis to determine the volume and the quality of voluntary disclosures they found that in addition to investors' information needs, factors such as company emphasis on stakeholder management, relevance of intangible asset, and market complexity affect both the volume as well as the quality of voluntary disclosures. The study is based on the voluntary disclosures made in a single year, with relatively small sample size. The comprehensive framework developed in this study for organizing and evaluating voluntary disclosures is an initial step in the direction of examining voluntary disclosure from the stakeholder perspective.

The demand for this CED has been reinforced by the stakeholder and institutional approach to satisfy a wide range of stakeholders and institutional expectation taken place in form of targets, requirements, acts and regulations (Clarkson et al., 2011). They focused on CED in discretionary media such as standalone environmental reports, CSR reports and company web sites. They look for answering the question of whether the disclosed information by organisations really informative to the users. This is to say whether they are useful enough for decision making and thus analyse the extent of value addition by those CED. They used a sample of firms from the five most polluting industries in the U.S. and found that CED provides incremental information for stakeholders. This finding is consistent with firms using voluntary environmental disclosure to manage non-investor stakeholder perceptions about a firm's environmental performance.

The literature still express concern for the relevance and quality of CED and this continues to be of academic interest (Daub, 2007; Smith et al., 2005).Daub (2007) acknowledges the growing importance in corporate sustainability reporting. He covers the research project in 2003 by the Institute for Sustainable Management

at the University of OAS in Aargau, North-Western Switzerland. This study was one of the first attempts to perform a quantitative and qualitative analysis of corporate sustainability reporting in one country (Switzerland). It is the second and the most comprehensive national study worldwide on reporting practices at the time of its publication. Daub (2007) critiques the existing guidelines and methods for corporate sustainability reporting practice and proposes alternative to overcome the weaknesses of earlier approaches. With a study of interviews with managers from 25 Swiss companies he found that annual reports are good source of CED reporting, especially for companies which do not publish separate environmental reports, social reports, or carbon management reports. He found that companies were not always successful in reporting all facts related to carbon, indicating discrepancy between quantity and quality of such CED. Laan (2009) finds for the motivation behind the corporate social disclosures with the help of stakeholder theory and legitimacy theory. In doing so he argues that voluntary disclosures are intended to legitimize the organizational activities, which might be more to mould the perception of the stakeholders and may not always be decision useful.

Cormier et al. (2011)disclose their doubt and rightly states that the ability to satisfy the information need of the stakeholders is still questionable. They did a content analysis of 1998 and 1999 annual reports for 32 Norwegian/Danish companies and 26 US companies in the electric power generation industry. Their findings support the stakeholder explanation for observed international differences in corporate social disclosures. In the process of their research, Cormier et al. (2011) express their concern and call for more research on the quality and extent of corporate social and environmental disclosures.

4.2.5 Measuring Disclosure Quality

Disclosure quality is a complex subject to measure, which is a setback for accounting research involving disclosure quality. In spite of the limited literature supporting quality of disclosures, measuring disclosure quality is more important than volume as it conveys the meaning, appropriateness and importance of the information provided (Freedman and Stagliano, 1991, 2008).Healy and Palepu

(2001) identify the absence of disclosure quality measurement tool as a limitation of disclosure study in measuring the extent of voluntary disclosures. They emphasise the importance of objective quality measurement tool for financial reporting and disclosure for management to communicate to outside investors. Accordingly, academics strive to develop measures to capture disclosure quality (Core, 2001). As mentioned earlier, he introduced a framework for the content analysis of accounting narratives and presents a computer-assisted methodology for implementing this framework. He also contributes to the complex concept of quality and quality measurement. He emphasises use of computer technology to minimise the cost of computing disclosure quality indices and thus his attempt was to contribute to the complex measurement of the disclosure quality. However, measurement of such disclosure quality is still subject to research.

In absence of such measures to quantify disclosure quality, indices developed by researchers to record the volume of disclosures are used as proxies for disclosure quality (e.g. Lang and Lundholm, 2000). They used disclosure volume to proxy for quality in absence of appropriate measurement tool in their study for relationship between corporate voluntary disclosures and equity price. They found the disclosure quantity proxies for quality. However, disclosures volume can hype the share price and lower the cost of capital. They found that firms with consistent disclosure reduces information asymmetry and suffer less negative returns in comparison to the firms hyping the disclosures. Their study indicates disclosure hypes can be used to lower cost of capital, indicating the potential discrepancy between disclosure volume and quality. This calls for further research on disclosure quality for appropriate measure to quantify the quality.

Acknowledging its importance Botosan (1997) rightly remarks that disclosure quality is very difficult to assess. Because of this, researchers use disclosure volume to measure for disclosures quality assuming them to be positively related. In her study based on annual reports of 122 manufacturing firms in 1990 for disclosure level effect on cost of equity she found it difficult to quantify the disclosure quality.

However, Marston and Shrives (1991)indicates that the social and environmental disclosure literature provides no guidance as to the scoring or allocation of points

to quality of disclosure. They measured disclosures published in the financial reports with help of a disclosure index which is a list of selected items disclosed in company reports. However, they argue that index score are helpful to get the extent of disclosures but not the quality of disclosures (Marston and Shrives, 1991, p. 207). They did a comprehensive review of studies that have used the scoring system in accounting disclosure and suggest use of weights to reflect the importance of individual items in the index. Weighted disclosure items will ensure the relative importance of the disclosed issues. Thus items with more weight will show more importance and comparatively lower weight will indicate less importance.

With a view to this, Beattie (2000) suggested an alternative framework emphasizing topic as the main dimension along with three attributes such as whether the information is historical/forward-looking; financial/non-financial and quantitative/non-quantitative. She acknowledges the new corporate reporting practices regarding reported information type in particular forward-looking, non-financial and soft information. She suggests a new framework to measure the new information types and information quality. The debate is still not solved and researchers are reviewing literature on construct measurement to have advancement in measuring disclosure quality. Even new perspectives from other disciplines could be possible solution.

Using count study for measuring disclosures is beyond limitation. Counting words, sentences or even pages does not account for complexity involved with measuring graphics, photos in the disclosure or even position of the disclosure. Count disclosures also do not account for relative usefulness. Researchers came up with solution by providing different weights to different items of disclosure. Such weights of different items are assigned taking into consideration of different views of users (Chow and Wong-Boren, 1987). In their study of voluntary disclosures, they took a sample of 52 Mexican Stock Exchange enlisted firms and compared the relationship between voluntary disclosures with firm size, leverage and assets in place. They utilised weighting for different disclosure item on the basis of their mean importance rating. To get the weights they developed seven-point scale response tool for 89 different items to get relative importance of those.

Moreover, in measuring quality Freedman and Stagliano (2008a) argued that a weighting scheme can be justified by the fact that some classifications of disclosure contain more information than others. Environmental disclosure that is quantifiable and verifiable are argued to be of higher quality by (Toms, 2002). Therefore, mention of specific categories of CED should be weighted higher than general statements.

However, weights assigned can be subjective to differences between perceptions of different users groups (Beattie, 2000). Weights of different items are not often assigned in the most objective ways. Interviews of different stakeholders used by Chow and Wong-Boren (1987) were one of the way of doing it, but not free from subjectivity. Also, other ways for acknowledging the importance of the disclosure or accrediting the disclosure quality are not free from the same problem.

Alternatively, equal weights are also used users to avoid this subjectivity; thus an item takes value of one if reported, zero if not (Cooke, 1992). He used 100 Japanese firms as initial sample with a 35% response rate and studied the impact of size, stock market listing and industry type on disclosure, both voluntary and mandatory, in the annual reports of Japanese listed corporations. A modified dichotomous approach was adopted also by Cooke (1989) and Saha and Akter (2013). Researchers often found similar results when applied equal weights or different weights (Chow and Wong-Boren, 1987). Results showing similar impact of both different and equal weights for disclosure items to measure quality are interesting finding.

In contrast, only occasional significant different results have been reported by Naser and Nuseibeh (2003). They studied the quality of both mandatory and voluntary disclosure in annual reports by a sample of nonfinancial Saudi companies listed on the Saudi Stock Exchange. They included a sample consisting 63% and 66% of the total population of companies listed on the Saudi Stock Exchange in the years 1992 and 1999 and found significant compliance to mandatory disclosures and higher voluntary disclosures as compared to what stipulated by law. They used weighted indexes of disclosure by the mean and median responses of seven users of the annual reports. The weighted and

unweighted indexes produced relatively similar results except occasional differences.

4.2.6 Attributes of Disclosure Quality

Existing literature acknowledge a disclosure to be of high quality if it is verifiable, quantifiable and timely – forward looking. Disclosures in certain places of annual reports express more importance. Often bad news is thought to be expressing more reliability.

4.2.6.1 Verifiable Disclosures

Quality disclosures are those which are quantifiable and verifiable and thus not easy to imitate (Toms, 2002). Measuring disclosure quality requires a scoring system that allows us to give a higher score to inimitable verifiable disclosures and a lower score to general statements that have little or no substance in them (Hasseldine et al., 2005). In similar note in major literature, themes, volume and evidence of disclosure have been sought after in quest for disclosure quality by Gray et al. (1995a), Guthrie and Parker (1990), and Hackston and Milne (1996).

4.2.6.2 Quantitative Nature of Disclosures

Literature warns to take caution when dealing with narrative disclosures as they are also interested in impression management. Environmental disclosure to be of higher quality needs to be quantifiable (Toms, 2002). Quantitative information is more verifiable than qualitative information and contains more information content to be better decision useful (Gibbins et al., 1990). Botosan (1997) stated in her study that researchers were seen to assign more importance and credibility to quantitative information than qualitative ones. This is because of quantitative information are more often precise, decision useful and enhance reputation. Beattie et al. (2004, p. 227) acknowledges financial/non-financial and quantitative/non-quantitative along with other attributes including historical/forward-looking information.

4.2.6.3 Location of Disclosures

Researchers also argue that disclosure placement in annual reports also indicates there importance and quality (Beretta and Bozzolan, 2004). Walden and Schwartz (1997) also emphasized location along with evidence and timing of items disclosed, for defining disclosure quality. 'Location' of disclosure was also found to be important by Guthrie and Parker (1990). For example, disclosure placed in chairman's statement are found to have more importance (Smith and Taffler, 2000).

4.2.6.4 Type of News

Deegan and Gordon (1996) and Deegan and Rankin (1996) defined disclosure quality in terms of the nature of the news. Bad news disclosures are sometimes treated to be of better quality and timely (Skinner, 1994). Also, existing literature agrees that the type of 'news' in the disclosure – whether good or bad is a matter of concern for quality (Gray et al., 1995b; Hackston and Milne, 1996).

4.2.6.5 Timing of News

Walden and Schwartz (1997) emphasized timing of items disclosed, for defining disclosure quality along with location and evidence. Also Beattie et al. (2004, p. 227) acknowledges historical/forward-looking disclosures among several other attributes of disclose quality including - financial/non-financial and quantitative/non-quantitative types of disclosures.

4.3 HYPOTHESIS DEVELOPMENT

4.3.1 CED Quality and Volume

The debate of social disclosure has extended to a much matured stage from whether to report or not to the extent of such reporting (Yekini and Jallow, 2012). The relationship between quality and volume of disclosure is not widely convergent in the literature as some used to think volume of disclosures cannot indicate its quality (Yekini, 2012) and the other ideologist used to agree that

quality and volume should have a positive relationship (Beattie et al., 2004). The volume of disclosures can be used to deceive the readers of the disclosures by misleadingly producing narrative disclosures which can be imitated easily. Thus mere volume might not a good way to measure the quality of CED disclosure. However, it might be wisely argued that HEIs who disclose more in volume have more content and news to share and thus these disclosures are really of better quality having more news in them.

Having these counter arguments in place one should remember that HEIs are managed by highly knowledgeable personnel, which should lead to the fact that the HEI management should adhere to ethics and act as a steward of the organization and society. HEIs are unique and in a position to lead the society and teach the future leaders by setting examples of good deed to its present students (Adams, 2013; de Villiers et al., 2014). Thus HEI leaders act as a steward of the society at large present authentic news in whatever they disclose to the stakeholder and general public. As suggested by the stewardship theory HEI leaders, being in a unique position to influence the students, parents and the society as a whole are expected to act in an ethical way and should disclose the fact. Thus as the volume of disclosures done by them increases it is expected that the quality of such disclosures should rise as well.

H2a: CED quality has positive relationship with the CED volume.

4.3.2 HEFCE Carbon Reduction Target and CED Quality

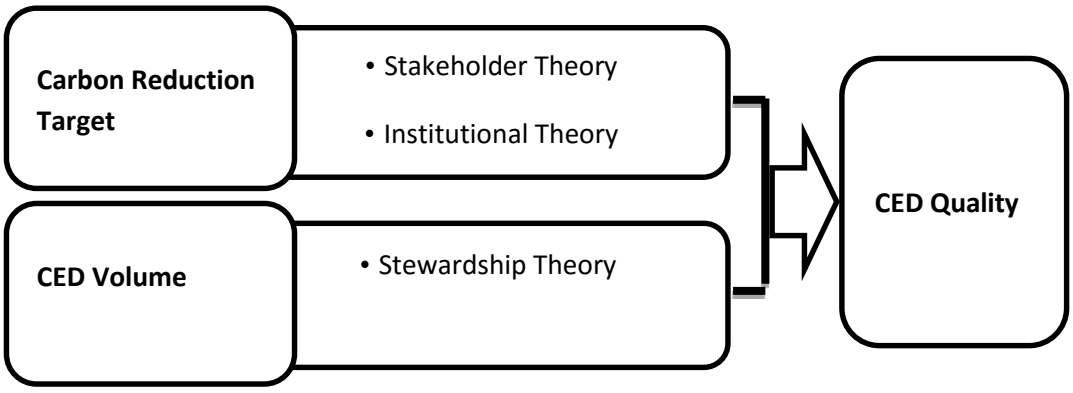
Most UK universities are publicly funded (with an exception of four private funded universities). This makes them subject to increased scrutiny of their sustainability practices due to the fact of being publicly funded. Also, the fact that university students and staff may be well informed of sustainability issues, some even specialising in sustainability HEIs are likely to urge the HEIs to act in a responsible way to disclose about their sustainability and carbon reduction activities (de Villiers et al., 2014). International public policies are also evolving to the direction of requiring carbon reduction activities from universities, e.g. in England (Climate Change Act 2008), in Scotland (Climate Change Act, 2009) and

in Norway (Norwegian Sectoral Klimakur plans). Thus, demand for adequate carbon disclosure by the universities to embrace sustainable practices is getting much louder everyday (de Villiers et al., 2014). The Higher Education Carbon Management (HECM) programme in Britain is assisting universities in developing carbon emissions dealing capacity (CMP, 2012). According to CMP (2012), HECM assists universities to set up a carbon management plan, which includes baseline identifying and setting carbon emissions reduction target. This target set by the HEFCE to reduce carbon emission by the HEIs by 2020 should act as sufficient stick to a true effort by the universities to reduce carbon and communicate those activities to the stakeholders and society (stakeholder and institutional theory). Universities with higher target should have more activities to chase the target down and thus should have more things to disclose in annual reports.

H2b: Carbon reduction target imposed by HEFCE have positive relationship with the CED quality.

Figure 4.2 summarises the hypothesised relationship amongst CED quality, volume and carbon target imposed by HEFCE.

Figure 4.2
CED Quality, Volume and Carbon Target by HEFCE



4.4 RESEARH DESIGN

The word ‘method’ comes from the Greek words ‘meta’ and ‘hodos’ meaning a way (Smith, 1988). Broadly, a method or methodology is the underlying principles and rules of organization of a philosophical system or inquiry procedure (Urdong, 1968). A Dictionary of Social Science observes Methodology is the systematic and logical study of the principles guiding scientific investigation (Gould and Kolb, 1964). Research Methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically (Kothari, 2004).According to Aminuzzaman (1991)research method is the functional action strategy to carry out a research project in the light of the theoretical framework and guiding research questions. A method is a planned and systematic approach of investigation. It denotes the detail framework of the unit of analysis, data gathering techniques, sampling focus and interpretation strategy and analysis plan.

This chapter is based on empirical analysis on HEIs disclosing their carbon related activities in annual reports. This section presents the methods adopted in the study. It contains sample selection, the index, techniques of analysis, sources of data and their collection procedure, variables used in this study, data analysis, various statistical techniques, concepts used in this study and model specification.

4.4.1 Sample Design

All the items under consideration in any field of inquiry constitute a ‘universe’ or ‘population’. A complete enumeration of all the items in the ‘population’ is known as a census inquiry. It can be presumed that in such an inquiry when all the items are covered no element of chance is left and highest accuracy is obtained. But in practice this may not be true. Even the slightest element of bias in such an inquiry will get larger and larger as the number of observations increases. Hence, quite often we select only a few items from the universe for our study purposes. The items so selected constitute what is technically called a sample (Kothari, 2004).

The population for the study would be all HEIs (universities) in the UK during the year 2011-12. For the purpose of the study all of the publicly funded (and one

private) universities in the UK[29] that return data to Higher Education Statistics Agency (HESA)[30] were included in the initial sample, which contained 168 HEIs in total. This study attempts to find the relationship between quality and volume of carbon emission disclosures (CED) and measure the determinants of the CED quality by HEIs with the help of empirical analysis. Annual reports of all HEIs were downloaded from the websites for the study year 2011-12, if available. Designated person of those universities were emailed for the annual report of 2011-12 on 20 March, 2014, if that was not available on the website. All annual reports found by 20 June, 2014 were included in the research database. The study includes all feasibly available HEIs in the sample to make the sampling robust and could get disclosure information of 168 universities. However, for the other variables like, carbon target, carbon emission, carbon audit, carbon investment, size and age - the thesis depends on the databases collected from HEFCE publication, HEI websites and the People and Planet organisation website. This return information of 135 HEIs from our sample and thus the final sample was reduced to 135.

Annual reports of 2011-12 were the most recent data available at the time of the study and were used for the same. This helps to capture the most recent awareness of the carbon emission and disclosure practices by HEIs. Annual reports have been selected as the primary source for CED and financial data since they are publicly available, produced regularly, management implement editorial control over them, formats are comparable with peer HEI annual reports (Al-Shaer, 2013; Saha and Akter, 2012, 2013; Schleicher, 2012; Schleicher and Walker, 2010; Wilmshurst and Frost, 2000). However, databases published by HESA and HEFCE were extremely helpful in collecting data for other independent variables.

This research uses cross-sectional analysis as the researcher does not expect any significant fluctuation in HEI CED around the study period and also does not find any influential fact happening around the study period to induce such significant fluctuation in HEI CED. Considering the nature of the research which requires content analysis of annual reports (AR) and the researcher actually has to read

[29] By the UK, I mean England, Scotland, Wales and North Ireland.
[30]HESA is a charitable company which is funded by the subscriptions of the HE providers from whom it collects data.

through great details of the AR, which requires time dedication; the researcher decides to limit the study to focus on 2011-12 annual reports only. Especially, as no significant year-to-year CED variation is expected around the selected study period, this study period seems to be a good choice for the research. This is in line with previous major research in social accounting of similar nature.

4.4.2 Dependent Variable Definition and Measurement

4.4.2.1 Carbon Emission Disclosure Quality

The variable of interest in this study is the carbon emission disclosures (CED) quality in the annual report. The issue with prior literature to choose from volume and quality of CED is much debated. Both qualitative and volumetric CED have their own limitations without proper consideration of the context. In spite of the limited literature supporting quality of disclosures, measuring disclosure quality is more important than volume as it conveys the meaning, appropriateness and importance of the information provided (Freedman and Stagliano, 1991, 2008). Quality measures provide a systematic and numerical basis for comparing objectively the content of social disclosures (Walden and Schwartz, 1997, p. 151). Also quality measure can be useful in signalling theory framework to assist in determining the CED quality as a true signal (Hasseldine et al., 2005; Toms, 2002). However, there exists no congruence in literature in defining disclosure quality.

Quality of CED disclosure needs to be defined first for using it in this research. Walden and Schwartz (1997) emphasized location, evidence and timing of items disclosed, for defining disclosure quality. Deegan and Gordon (1996) and Deegan and Rankin (1996) defined disclosure quality in terms of the nature of the news. Whereas, themes, volume and evidence of disclosure have been sought after in quest for disclosure quality by Gray et al. (1995a), Guthrie and Parker (1990), and Hackston and Milne (1996). However, the type of 'news' in the disclosure – whether good or bad is a matter of concern for quality (Gray et al., 1995b; Hackston and Milne, 1996) – in addition, 'location' of disclosure can also be important (Guthrie and Parker, 1990).Quality disclosures are those which are

quantifiable and verifiable and thus not easy to imitate (Toms, 2002). Organisations who are not performing the environmentally responsible activities would find it hard to imitate those quality disclosures. Indeed, disclosure quality is a complex and "*multi-faceted concept"*(Beattie et al., 2004, p. 227). She acknowledges several attributes of disclose quality: historical/forward-looking; financial/non-financial and quantitative/non-quantitative. This approach is likely to be most relevant to this research and likely to contribute to the investigation of the CED quality. Therefore, the quality of CED is defined in this study in terms of specific mention of the CED activities; the evidence provided – that is, financial or photographic – and the location of the disclosure in annual reports.

4.4.2.2 Measuring CED Quality

Measuring the quality of CED in annual reports thus, depends on following factors. Firstly, the form of disclosure – whether financial, physical, or just narrative (Adams et al., 1998; Gray et al., 1995b; Hackston and Milne, 1996; Ingram and Frazier, 1980; Toms, 2002); secondly, the relevance and importance attached to it (Gray et al., 1995b; Guthrie and Parker, 1990). Finally, detailed description of the specific carbon emission activities undertaken by the organisations.

However, contrary to Beattie *et al.*'s (2004) arguments that "*Organisations that say relatively more can be expected to provide disclosure of higher quality*" (Beattie et al., 2004, p. 230), this thesis argues that specificity and substance rather than volume of disclosure should determine quality. Consequently, in this thesis, volume is not considered as one of the measure of quality. Since CED requires actual involvement in carbon sensitive activities, this thesis argues that, the quality of such disclosure should include specific description of activities undertaken with evidence provided – financial or photographic wherever possible. In addition, establishing the reality of CED as a true measure of carbon awareness and activities – describing in detail the specific activities undertaken by the HEIs will distinguish such CED reports from that of a false image builder.

Measuring disclosure quality therefore will require a scoring system that allows us to give a higher score to inimitable verifiable disclosures and a lower score to general statements that have little or no substance in them (Hasseldine et al.,

2005). Although the social and environmental disclosure literature provides no guidance as to the scoring or allocation of points to classifications of disclosure such as this, Marston and Shrives (1991), did a comprehensive review of studies that have used the scoring system in accounting disclosure, found that most scoring systems involve are subjective and mostly measure extent rather than quality of disclosures (Marston and Shrives, 1991, p. 207). Nevertheless to measure quality, Freedman and Stagliano (2008a) argued that a differential weighting scheme can be justified by the fact that some classifications of disclosure contain more information than others. Environmental disclosure that is quantifiable and verifiable are argued to be of higher quality by (Toms, 2002).Therefore mention of specific categories of CED should be weighted higher than general statements (Beck et al., 2010). Following the suggested 5 point index by Beck et al. (2010) to quantify the quality of narratives in accounting reports this research has executed a modified version of the index to better suit the context of this research. This index has a different view and captured the quality direct rather than counting volume to proxy for quality.

Thus the study comes up with a unique scoring system to measure CED quality in annual reports.

Table 4.1

Scoring of Disclosure Quality

CED Characteristics	**Score**	**Typical Example**
No disclosure	0	-
General rhetoric, pure narrative description of category	1	Sustainability continues to be a high priority for Anglia Ruskin University. (Anglia Ruskin University) We will make a significant contribution to global efforts to achieve environmental sustainability. (De Monfort University) Environmental awareness and sustainability have become core values of the University influencing policy development, and estates and infrastructure investment. (Manchester Metropolitan University)
Specific endeavour, statement of targets, narrative without evidence	2	The University has prepared a Carbon Reduction Management Plan that sets out its approach to reducing carbon emissions, in line with the sector targets published by HEFCE in January 2010. (Bath Spa University) In undertaking its activities, the University aims for the highest environmental standards, and promotes environmental awareness and good practice among staff, its students, and major suppliers. (Birmingham City University) The University has an Environmental Policy which aims to limit any detriment or harm by managing its activities, buildings and estates in a way which promotes environmental sustainability; conserves and enhances natural resources; prevents environmental

		pollution and brings about a continual improvement in its environmental performances. (Brunel University)
Use of target, implementation, monitoring or results; narrative with evidence	3	This year's projects include … the It's Better Off energy consumption and carbon reduction campaign, and centralised timetabling, to streamline and improve student's experience. (Loughborough University) We are introducing an energy and carbon dashboard to help building users develop energy plans to reduce consumption. (Newcastle University) A newly formed Sustainability Strategy Group has been established to oversee the University's Carbon Management Plan, approved by Council on 18 July 2011. (University of Essex)
Implementation, monitoring or results; Kite marks or external accreditation of carbon initiatives; quantitative with evidence	4	The University is a mandated participant in the Carbon Reduction Commitment (CRC) Energy Efficiency Scheme, which introduced carbon reporting from July 2011 and annual carbon tax starting at £12 per tonne of carbon (based on energy consumption) from July 2012. The cost of purchasing carbon allowances will be approximately £97,000 in 2012. (Bournemouth University) We were awarded a 'First' in the People & Planet Green League, a league table of environmentally friendly universities, for the 6th consecutive year. (Leeds Metropolitan University) The School was recommended for ISO 14001 (the International Environmental Standard) and Eco Campus Platinum in July 2012. (London School of Economics and Political Science)

<table>
<tr>
<td>Implementation, monitoring or results with year comparisons; quantitative and comparable with evidence</td>
<td>5</td>
<td>From 2005 Carbon emissions were growing; however, since the implementation of the plan in 2009 emissions have reduced and are now 14% lower than the 2005 level. Last year there was an 8% reduction (year on year) to 15,400 tonnes of CO2.

<table>
<tr><td>Year</td><td>2005 /06</td><td>2006 /07</td><td>2007 /08</td><td>2008 /09</td><td>2009 /10</td><td>2010 /11</td><td>2011 /12</td></tr>
<tr><td>Tonnes CO2</td><td>17,971</td><td>18,093</td><td>20,166</td><td>19,161</td><td>17,393</td><td>16,664</td><td>15,400</td></tr>
</table>
(Cranfield University)

Carbon statistics for the third quarter of 2011/12 indicated a total reduction in CO2 emissions compared to the 2008/09 baseline year of 4.2%, a significant increase on prior year comparator of 1.7%. (Durham University)

Carbon emissions decreased by 11% against the previous year, bringing the School’s overall carbon emissions to 12% below the 2005 baseline, in line with the target set by HEFCE for the sector. (London Business School)</td>
</tr>
</table>

4.4.2.3 Data Collection- CED Quality

Instrument in Table 4.1 was used to record the information on carbon reduction activities based on prior literature on nature, type and location of disclosure supported by evidences. Most standard tool used by majority of prior literature is the content analysis approach to measure the quality (Freedman and Stagliano, 2008; Rankin et al., 2011; Yekini and Jallow, 2012)or the volume (Gray et al., 1995b; Hackston and Milne, 1996) of social disclosures.

Freedman and Stagliano (2008a) constructed a similar disclosure index by first determining the categories of emissions and environmental data disclosure for classification purposes and then determined the points to be given each category and classification. Similarly, since this study is concerned with the CED, the researcher adopted the categorisation of CED developed in the second chapter shown in Table 2.8. Then for the purpose of obtaining quality score, the researcher identified specific disclosure on carbon and identified which characteristics in Table 3.1 it belongs to. The research instrument used here strives to find out the quality carbon disclosures which are not easy to imitate (Toms, 2002) and thus of higher quality.

4.4.2.4 Reliability Test of Coding

With a view to ensure highest reliability, the well-developed instrument in Table 3.1 was used setting out explicit rules. This contributes towards the suitability of modified adoption of the CED index (Gray et al., 1995b; Hackston and Milne, 1996; Ullman, 1985) from the corporate sector to HE sector. A preliminary coding of 30 annual reports took place in the beginning by 3 independent coders along with reconciliation to achieve consistency in the coding process. This ensures reliability in extracting disclosure information in content analysis, which has been questioned in prior literature (Milne and Adler, 1999).

Different types of reliability was tested, which are stability reproducibility and accuracy (Krippendorf, 1980). First, Stability of coding where the researcher agrees with him/herself over time was ensured with a preliminary coding of 30 annual reports were performed in September, 2014 according to the predefined categories. The same annual reports were coded the after three weeks of interval

in October, 2014. Both rounds of coding were about in conformity with each other. Second, the reproducibility or inter coder reliability, ensures the consistency of the coding decision (Beck et al., 2010) irrespective of phenomenon and coder (Krippendorf, 1980). Ten annual reports were coded by additional two additional coders to test for reproducibility (Milne and Adler, 1999). For the purpose of this research, Krippendorf's α (alpha) coefficient was used, which showed an alpha value of 87%. Though there is no universally acceptable result in the literature, some argues that the cut off score should be at least 80% (Guthrie and Mathews, 1985, p. 261) match among the coded indices. However, the discrepancies were then talked through to reach a consensus. After reconciliation, an independent coding took place again by all 3 researchers. The alpha score increased to 99% in the second attempt, which evident objectivity and reliability of the coding process. Finally, accuracy testing is done against any standard set in the literature (Milne and Adler, 1999) or predetermined standards set by researchers to measure the performance of coders in terms of the predetermined standard (Krippendorf, 1980). This study takes into account previous standard set into by prior literature in construction of such index (Beck et al., 2010; Rankin et al., 2011; Toms, 2002).

4.4.3 Independent variables

4.4.3.1 Carbon Emission Disclosures

This research identifies the carbon disclosures (CED) with reference to the content as stated in the annual reports. Taking account of content of the disclosures made allows to derive quantitative scale for statistical analysis (Weber, 1988). In line with the arguments put forward by the disclosure literature, the annual report would be used by the current study as the most reliable source for corporate environmental information. Moreover, it is virtually impossible to monitor all available communication media of corporate social and environmental disclosure (Gray et al., 1995b). However, focusing solely on annual report, neglecting other media is not a prudent thing to do. Where there was specific cross reference to a supplementary report, this research considers the separate report as a part of annual report. Thus independent reporting was considered as supplementary to

annual report disclosures. Moreover, annual reports were mostly downloaded from the websites of the respective HEI. Disclosure reports published in the websites are in the context of other relevant information, which can be verified from the same place (website) by the readers as opposed to isolated paper reports (Craven and Marston, 1999; Crowther, 2000; Marston and Polei, 2004).

Volume of disclosures were measured using sentence counts (Hackston and Milne, 1996; Ingram and Frazier, 1980; Milne and Adler, 1999). Sentences have some advantages over words, phrases and pages (Milne and Adler, 1999) - they are easily identifiable, involve less subjectivity in identification, and have been supported by previous research (Ingram and Frazier, 1980). This ensures the reliability of the coding process (Hackston and Milne, 1996, p. 86). Sentence count stands better by overcoming the problem of page proportion by removing the need to standardize the number of words (Hackston and Milne, 1996). Sentences are conventional way of communication in speech and writing, while pages are not, hence more supported by researchers (Walden and Schwartz, 1997).Quantity of CED is expressed as a ratio and calculated as the number of sentences, for each of the categories and types reported in the HEI's 2012 annual report, divided by the total number of sentences in that annual report.

4.4.3.2 Carbon Reduction Target by HEFCE

Carbon reduction target (%) is measured as the percentage target mentioned by Higher Education Funding Council of England (HEFCE) for individual HEIs from 2005 baseline to 2020. This data can be found from HEFCE publication[31] and was collected by contacting them with email in person. Carbon reduction targets create a pressure on the individual HEIs to gradually reduce carbon emission, which is also a requirement to qualify for HEFCE's Capital Investment Framework CIF-2 fund. HEFCE requirement for institutions to introduce carbon management plans provides a collective sector target as part of the CIF-2 requirement in 2011. This capital requirement is encouragement for the HEIs to reduce their carbon emission. HEFCE targets for measurable carbon emission reductions are 34 per cent by 2020 and 80 per cent by 2050 against a 1990 baseline. Against a 2005

[31]http://www.hefce.ac.uk/workprovide/carbon/

baseline, this is equivalent to a reduction of 43 per cent by 2020 and 83 per cent by 2050. The requirement for institutions to set their own targets for 2020 for scope 1 and 2 emissions against a 2005 baseline is being used because it is used for reporting against UK targets. This provides consistency across the sector against which progress is monitored and reported.

4.4.3.3 Control Variables

Carbon Emissions (kgCO2) volume mentioned in the HEFCE publication for individual HEIs in the year 2012, which is the latest year for which data were available at the time of data collection. This data ensures how the HEIs are doing to date in response to the target set by HEFCE in consultation with individual HEIs. This data was collected from HEFCE publication by contacting them with email in person.

HEIs are expected to have **Carbon Audit** in place to have control over the carbon emission reduction. Universities were scored on two criteria – whether audited its environmental performances in last five years on several factors were scored. These factors are Biodiversity, Construction and refurbishment, Emissions and discharges, Energy, Sustainable procurement, Transport, Waste and Water; and whether operating any externally audited environmental management system (e.g. ISO14001, EMAS, Ecocampus, Green Dragon, IEMA Acorn Scheme [BS8885]) (People and Planet, 2013). This score was obtained from the People & Planet organization, which produces the sole comprehensive and independent league table of UK HEIs for their environmental performances. HEIs are scored on different bases, accumulating possible maximum score to 8. This data is published on the People and Planet website.

Carbon Investment was proxied by the facility spending of individual universities in the year 2012. Spending on facilities by individual HEIs in the year 2012 comprises of the indication about how much the university spent on supporting as all expenditure incurred (whether centrally or departmentally) on the management of premises (including academic buildings, central academic services, art centres, HE provider's health service premises, pavilions, sports buildings, etc.) and on roads and grounds, except residences and catering. This

also includes repairs and maintenance expenditure, the maintenance of premises including the pay of staff involved and maintenance provision charges. This data can be found from Higher Education Statistical Agency (HESA) Website.

Independent Environmental Reports available on the university website are the main form of reports produced by them. This can take different names but should have focus on carbon sustainability to be included in this research. Moreover, considering the purpose of the research dealing with carbon disclosure and thus impact of the HEFCE carbon reduction target, the researcher also includes carbon management plan produced by the universities in response to the HEFCE requirement. This is available from individual HEI Websites. Independent sustainability or environmental reporting available on the websites were analysed and scored from 0, if no disclosure to 5, if high disclosure. For the purpose of scoring the disclosures in independent reports the same instrument developed for scoring quality of CED in annual reports in Table 3.1 has been used. Independent reports were collected from individual HEI websites.

Size was found to affect organisations voluntary disclosures (Hussainey and Al-Najjar, 2011). HEI size was measured by the natural logarithm of total number of Staff and Students. This information was collected by contracting HEFCE by email from their publication. **Age** of the HEI in terms of completed years since its establishment was collected from consulting individual HEI websites.

4.4.4 Model Specification

With the aim to find out the determinants of CED quality in annual reports and the relationship shared between the CED quality and volume the following econometric model was used. Especially, this model aims to investigate the role of carbon reduction target of 43 percent carbon reduction to be achieved by the year 2020 on the baseline year 2005 (HEFCE, 2013) set by the HEFCE on the CED quality in annual reports by the UK HEIs; the role of CED volume and other determinants in affecting CED quality.

$$CEDQ_i = \beta_0 + \beta_1 CEDV_i + \beta_2 Carbon\ Target_{\ i} + \beta_3 Controls_i + \varepsilon_i \quad \ldots (4.1)$$

Where,

β_0	Intercept
$\beta_1 \; to \; \beta_3$	Coefficient of slope parameters
ε	Error term

Variables	*Definition*	*Source*
Dependent variable:		
CEDQ	Carbon emission disclosure quality - score ranges from 0 = no disclosure to 5 = high disclosure.	Content analysis of annual reports
Explanatory variables:		
CEDV	Carbon emission disclosure volume; CE disclosure score in annual reports. CED Volume is measured by content analysis of 2011-12 annual reports of sample HEIs.	Content analysis of annual reports
Carbon Target	Carbon reduction target (%) of individual HEIs from 2005 baseline to 2020 by Higher Education Funding Council of England (HEFCE).	HEFCE publication
Control variables		
Carbon Emission	Carbon emissions (kgCO2) in the year 2012 which is the latest year for which data were available at the time of data collection.	HEFCE publication
Audit	Points received by the University for carbon audit system in place scored out of 8	People and planet disclosure
Investment	Facility spending of HEIs in 2011/12.	HESA website
Sustain	Independent environmental reporting available on the website ranges from 0, if no disclosure to 5, if high disclosure.	HEI websites
Size	HEI size measured by the natural logarithm of total number of Staff and Students.	HEFCE publication
Age	Age of the HEI in terms of completed years since its establishment.	HEI websites

4.5 EMPIRICAL RESULTS AND ANALYSES

This section presents the descriptive and inferential statistics found in this chapter. First, it shows descriptive statistics including the frequency distribution of categorical variables and univariate analysis of explanatory variables. Then appropriate diagnostic tests were done to ensure the suitability of data for regression analysis, followed next by the statistical tests, which will provide support or rejection of the hypotheses. Later on it also presents sensitivity analysis to test the robustness of the analyses. At the end, it summarises the results found from the analysis in this section.

4.5.1 Descriptive Analysis

Table 4.2 shows the descriptive information (mean, median, standard deviation, maximum and minimum) for dependent variable – carbon emission disclosures (CED) quality and independent variables used in this study.

Table 4.2 shows that average CED quality score achieved by HEIs is 3.07 with a median of exact 3. The maximum score for quality of CED is 5 and minimum is 0 out of 5. It shows universities disclose evenly, some are disclosing it more objectively with evidence and some are keeping it mere narrative. However, there is no absolute tendency neither for good or bad quality disclosure. Average volume of CED is 2.78% of total disclosure made in HEI annual reports with a median of 1.88%. A maximum CED volume of 15.09% of total disclosure and minimum of 0% is evident in HEI annual reports. CED volume made by HEIs has some outliers on the higher side i.e. few universities put a lot of importance on CED whereas most others disclose less than the mean. Carbon reduction target set for individual HEIs is on average 35.8% (median 38.5%) with a maximum target of 60% reduction. This indicates more universities in the study have higher than average (mean) target set for carbon reduction by the year 2020.Carbonemission, audit, and investment have mean (median) of 15.4 million (9.6 million), 4.32 (4), and 360.74 (343.5) respectively. Independent sustainability report has a mean (median) of 4.22 (5). Unfortunately, no study to my knowledge used HEI independent sustainability report, carbon target, emission, audit, investment for

the purpose of analysis. However, the mean (median) size of HEIs is 14601.07 (15120) and that of age is 90.20 (46.5).

Table 4.2

Descriptive Statistics

Variables	Mean	Median	Standard Deviation	Maximum	Minimum
CEDQ	3.07	3	1.47	5	1
CEDV	2.78	1.88	2.97	15.09	0
Target	35.86	38.50	14.10	60	0
Emission	15.4m	9.6m	17.5m	28m	0.6m
Audit	4.32	4	2.11	8	0.5
Investment	360.74	343.50	140.43	840	126
Sustainability	4.22	5	1.38	5	1
Size	14601.07	15120	10065.07	42340	42340
Age	90.20	46.50	124.65	845	0

Normality test is done in Table 4.3 which presents skewness and kurtosis of individual data, S-K test and Shapiro-Wilk normality test results for all variables used in this study. The symmetry of the distribution is measured by skewness and the flatness or peakedness of the distribution is measured by the kurtosis. The rule of thumb is that skewness and kurtosis should be ideally within the range of $\pm$ 1.96 and $\pm$ 3 respectively (Haniffa & Hudaib, 2006). Since CED volume, carbon target, carbon performance, region and age fall outside this range of skewness and kurtosis, additional test of normality was done with Shapiro-Wilk test statistic for checking normality of the distributions.

Shapiro Wilk (S-W) is arguably the most widely accepted and powerful check for normality (Razali and Wah, 2011). Table 4.3 includes both S-W and skewness kurtosis (S-K) tests which shows that the CED quality, carbon volume, target, emission, audit, sustainability, size and age are not normally distributed as p-values are less than chosen alpha level of 5% and thus evident that the data tested

are not from a normally distributed population. Based on these results independent variables were log transformed except the variable CED volume which was square root transformed to get a more normal dataset. CED volume is a count variable based on the number of sentences disclosed in annual reports. Square root is arguably the most suitable for transforming count data for getting normal distribution (Salama, 2003). Descriptive statistics of transformed variables do not give any meaningful insight into the nature of the variables and thus are not presented here.

Table 4.3

Normality of Individual Variables

Variable	Skewness	Kurtosis	S-K Test	Shapiro Wilk Test
			adj chi2(2)	W
CEDQ	-.066	1.5419	.***	0.98*
CEDV	1.832	6.9539	1.39	0.96***
Target	-0.177	5.6366	69.08***	0.71***
Emission	2.164	7.6204	3.41	0.98**
Audit	0.072	1.8684	29.81***	0.97***
Investment	.863	3.9617	0.98	0.99
Sustainability	-1.508	3.6562	32.60***	0.91***
Size	0.323	2.2487	17.70***	0.87***
Age	3.628	18.9714	1.35	0.97**

** Shapiro-Wilk W test for normal data with significance <0.05, hence data not normally distributed.

4.5.1.1 Frequency Distribution

This subsection presents the distribution chart in Table3.4, which shows details of the findings of content analysis done for disclosing and non-disclosing HEIs, CED quality and independent sustainability report of UK HEIs.

Panel A of Table4.4 shows the numbers of HEIs who disclose carbon information in their annual reports and who do not. 28 universities do not spend even a word in their annual reports regarding carbon emission and reduction, which accounts for more than 19 per cent of total. In contrary, 116 universities disclose at least something in their annual reports, which is more than 80 per cent of the sample.

Panel B of Table4.4 presents the extent of CED quality in annual reports by UK HEIs. For the purpose of measuring the disclosure quality this thesis uses a CED index (presented in Table 4.1), which uses five levels of CED characteristics. Panel B shows that 28 HEIs in the sample do not do any CED in their annual reports i.e. about 20% HEIs do not say anything about carbon emission in their annual reports. Further, 34 HEIs disclose minimum about carbon emission i.e. 24% of HEIs disclose only narrative words without any factual indication of what they are doing on carbon reduction including specific endeavour, statement of targets, narrative without evidence. These HEIs limits their disclosures to imitable narratives e.g. carbon policies, aims, goals. Only 14 HEIs in the sample disclose moderately. That is approximately 10% HEIs use of target, implementation, monitoring or results to support their disclosures on carbon emission or reduction in annual reports. These universities use evidences of what they are doing to reduce carbon to support any narrative disclosures. Maximum number of HEIs (35 universities) disclose more than average but less than the highest quality. This means that 24.3% universities disclose how they implement and monitor carbon reduction activities; what results they achieve in controlling carbon emission. These universities also talk about kite marks or external accreditation of their carbon initiatives achieved. This is how they produce quantitative information on their carbon initiative with evidence. Quality of CED is the highest for 33 universities in the sample. This means 23% of HEIs includes implementation, monitoring or results of their carbon activities with yearly comparisons in carbon

disclosures made in annual reports; which accompany quantitative and comparable data and evidence.

Panel C of Table4.4 presents the extent of carbon disclosures made in independent sustainability reports by the UK HEIs. Again, the CED index presented in Table 4.1 has been used to measure the extent of CED in independent sustainability report. Interestingly enough, most HEIs report very high quality CED in their sustainability reports which is more than 70% if total HEIs. As such 119 universities in the sample discloses the implementation, monitoring or results of their carbon activities with year to year comparisons of carbon disclosures made in sustainability reports accompanying quantitative and comparable data and evidence. In contrast, the second highest number of HEIs does not disclose at all on carbon in their sustainability reports. Panel C in Table4.4 shows that 19 HEIs in the sample belongs to non-disclosing group i.e. about 11% HEIs do not say anything about carbon emission in their sustainability reports. 13 universities disclose more than average but less than the highest quality on carbon emission i.e. approximately 8% universities disclose how they implement and monitor carbon reduction activities; what results they achieve in controlling carbon emission. These universities also talk about kite marks or external accreditation of their carbon initiatives achieved. This is how they produce quantitative information on their carbon initiative with evidence. Further, 10 HEIs disclose minimum about carbon emission i.e. 6% of HEIs disclose only narrative words without any factual indication of what they are doing on carbon reduction including specific endeavour, statement of targets, narrative without evidence. These HEIs limits their disclosures to imitable narratives e.g. carbon policies, aims, goals. Least number of HEIs (only 8) in the sample disclose moderately. Approximately 5% HEIs use of target, implementation, monitoring or results to support their disclosures on carbon emission or reduction in sustainability reports. These universities use evidences of what they are doing to reduce carbon to support any narrative disclosures.

Table 4.4 shows the frequency distribution of categorical independent variables.

Table 4.4

Frequency Distribution of Categorical Independent Variables

Panel A. Disclosing and Non-Disclosing HEIs

Carbon Disclosing HEIs	Frequency	Percent
Non-disclosing HEIs	28	19.44
Disclosing HEIs	116	80.56
Total	144	100.00

Panel B. Carbon Emission Disclosure Quality

CED Quality	Frequency	Percent
No disclosure	28	19.44
General rhetoric, pure narrative description of category	34	23.61
Specific endeavour, statement of targets, narrative without evidence	14	9.72
Use of target, implementation, monitoring or results; narrative with evidence	35	24.31
Implementation, monitoring or results; Kite marks or external accreditation of carbon initiatives; quantitative with evidence	33	22.92
Total	144	100.00

Panel C.Independent Sustainability Reports

Sustainability	Frequency	Percent
No disclosure	18	10.71
General rhetoric, pure narrative description of category	10	5.95
Specific endeavour, statement of targets, narrative without evidence	8	4.76

Use of target, implementation, monitoring or results; narrative with evidence	13	7.74
Implementation, monitoring or results; Kite marks or external accreditation of carbon initiatives; quantitative with evidence	119	70.83
Total	168	100.00

4.5.1.2 Univariate Analysis

In line with previous literature this section presents the univariate statistics by analysing the differences in the explanatory variables between institutions with high CED quality and low CED quality (Reverte, 2009). Top and bottom one-third cases of the sample were taken on the basis of high and low CED quality. For that purpose, the sample has been split up in three groups based on the quality score assigned on the basis of quality index developed in Table4.1 – 'Scoring of Disclosure Quality'. The first group has 45 HEIs in it with the highest CED quality scores, the second group has 45 HEIs with least CED quality scores and the third group includes 45 HEIs with average CED quality scores. Table 4.5 reports the mean values of the explanatory variables under analysis across the several CED quality scores for both HEIs belonging to top and bottom CED quality score groups. To test the statistical significance of the mean differences in the explanatory variables between both groups, which correspondents top CED quality scoring HEIs and bottom CED quality scoring HEIs, a t-test has been performed and presented for the mean difference. However, considering many variables are not normally distributed a Wilcoxon signed-rank test also accompanies besides the t-test in the same table.

The results of the univariate analysis in panel A of the table shows that HEIs making higher quality CED have significantly more CED volume, use proportionately more space for CED purpose in their annual reports, have better disclosures in independent sustainability reports, have committed for higher carbon reduction targets, have more efficient environmental audit in place, and are bigger in size in terms of number of staffs and students as these are supported at

5% significance level by t-test. Also, non-parametric Wilcoxon rank test supports the results found with t-test.

However, although the findings also show that the HEIs making higher quality CED emit low carbon, invest more in the facilities and are more recently founded, these differences are not significant at a 5% level, between both groups of HEIs. Insignificant findings from this univariate analysis show that HEIs with lower quality CED emit more carbon. Thus, higher carbon emitters are found to be quiet about their carbon activities, which is quite understandable thing to do. Other findings include, though insignificant, HEIs with higher quality CED invest more on carbon reduction. The reason behind this is possibly that the HEIs spending more on carbon reduction have more to disclose on the topic, which leads to higher quality of CED. As the analysis shows that these HEIs with higher quality CED are also significantly newer universities as compared to their counterparts making lower quality CED. The newer universities are found to be making higher quality CED (however, not found to be significant). This is because they have greener technology in place to manage carbon emission in comparison to their older counterparts. This creates opportunity to disclose positive news to be shared through their annual reports.

The univariate test of mean difference was repeated with two groups of HEIs- each group consisting half of the sample on the basis of CED quality, separated by the median CED quality value. The two groups are – high CED quality HEIs and low CED quality HEIs. The first group with high CED quality HEIs in the analysis holds HEIs with CED quality value above the median value. Whilst the second group with low CED quality include universities having lower than the median CED quality index score. Panel B in Table4.5 reports the mean values of the explanatory variables under analysis for both HEIs with a CED index score higher than the median and those with a CED index score lower than the median. To test the statistical significance of the mean differences in the explanatory variables between both groups of HEIs, this chapter performs a t-test. Also considering the non-normal distribution of majority of explanatory variables, a Wilcoxon signed-rank test was done and presented in the same table. It should be noted that the results are generally consistent with earlier measure of univariate analysis in Panel

A having one-third top and bottom environmentally reputed HEIs of the total sample.

Table 4.5

Differences in the Variables between High and Low CED (Quality)Groups

Variables	Top CED Group	Bottom CED Group	Mean Difference	T-value	Wilcoxon Rank Test
Panel A. One Third Group					
CED volume-sentence count	23.55	2.18	21.37	11.23***	7.35***
CED - total sentences ratio	0.05	0.01	0.05	9.16***	7.77***
Target	44.36	31.49	12.88	4.01***	3.21***
Emission	21,000,000	15,000,000	6,000,000	1.49	1.75*
Audit	4.82	3.81	1.01	2.25**	2.16**
Investment	379.78	343.07	36.71	1.16	1.39
Sustainability	4.91	4.18	0.73	2.87***	2.42**
Size	18,487.12	14,228.92	4,258.20	1.98*	1.83*
Age	89.70	105.32	-15.63	-0.471	0.43
Panel B. Two Groups Separated by Median					
CED volume as sentence count	20.19	3.57	16.63	11.19***	9.44***
CED - total sentences ratio	0.05	0.01	0.04	8.96***	8.44***
Target	40.22	32.53	7.69	3.28***	2.49**
Emission	17,700,000	15,700,000	2,000,000	0.67	1.91*
Audit	5.11	3.68	1.43	4.07***	3.85***
Investment	373.25	343.00	30.25	1.12	1.02
Sustainability	4.78	4.09	0.69	3.38***	2.89***
Size	17,916	13,972	3,943.84	2.43**	2.48**
Age	71.06	100.43	-29.38	-1.36	-0.77

Notes: This table presents means, differences in means, t-values and Wilcoxon rank sum test values for the explanatory variables. *** p<0.01, ** p<0.05, * p<0.1.

4.5.2 Regression Diagnostics

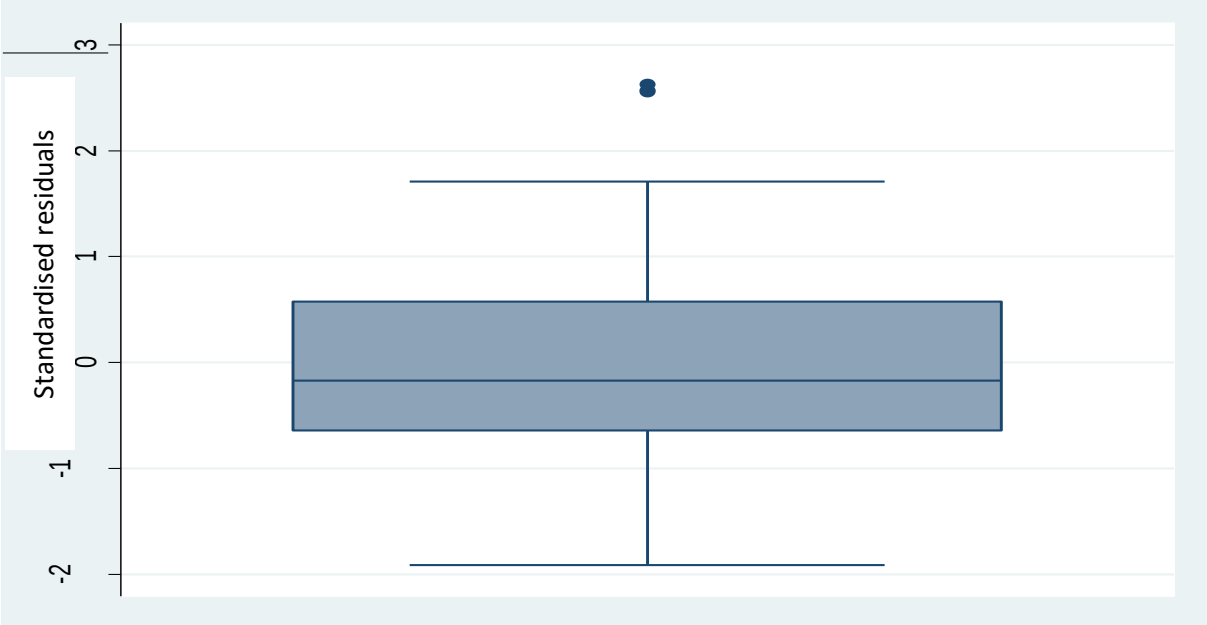
To find out whether the assumptions of regression analysis hold (Gujarati, 2004, pp. 65–80; Wooldridge, 2003) for the test model to be used in this sample study a couple of tests have been done in this section. The assumptions have been enumerated in chapter two. These assumptions ensure the best fit of the regression model, which allows the disturbance to be as small as possible i.e. $\widehat{\beta}_i$ is said to be a best linear unbiased estimator (BLUE) of β_i if the above assumptions hold (e.g. assumption *iv* above is not required for a model to be BLUE) (Gujarati, 2004, pp. 78–80). This section checks whether this assumption hold for the sample used for this study and thus would give a possible best fit for generalisation.

4.5.2.1 Test for Outliers

It is essential to check for single observations which are substantially different from other observations. Presence of this kind of observations can cause significant difference in the results of regression analysis. This type of observations should be treated with caution so that the distortion in the regression result can be controlled. Observations of this kind are named as outliers and leverage. Outliers are observations with large residuals in linear regression. This is an observation whose dependent variable value is unusual given its values of the predictor variables (Wooldridge, 2003). Box plot of residuals in Figure 4.4 indicates the presence of very few outliers in the data. Caution is needed for studentized residuals outside -2 to +2 (Chen, X., Ender, P., Mitchell, M. and Wells, 2003). Winsorising was done to mitigate with the effects of the presence of probable outliers in the sample, which means extreme values of the data set was replaced with a certain percentile value from both end, unlike Trimming or Truncating where extreme values need to be thrown away (Cox, 2006).

Figure 4.3

Check for Outliers – Box Plot



On the other hand, leverage is present if an observation has extreme values in predictor variables. Data suggests that presence of observations with high leverage (Chen, X., Ender, P., Mitchell, M. and Wells, 2003).A variable is said to be influential if removal of it makes significant change in the estimation of coefficient. Observations those are high in both of these measures are considered to be influential variables. Options are to remove extreme observations or changing the extreme values to less extreme values (Tukey, 1962). In presence of outliers, leverage and influential observations, primarily winsorising (Cox, 2006) was done following previous literature (Al-Shaer, 2013) to curb the influential observations. In the second stage continuous independent variables are log transformed and count variables were transformed with square root. These are expected to get rid of the impact of outliers, leverage and influential observations (Gujarati, 2004).

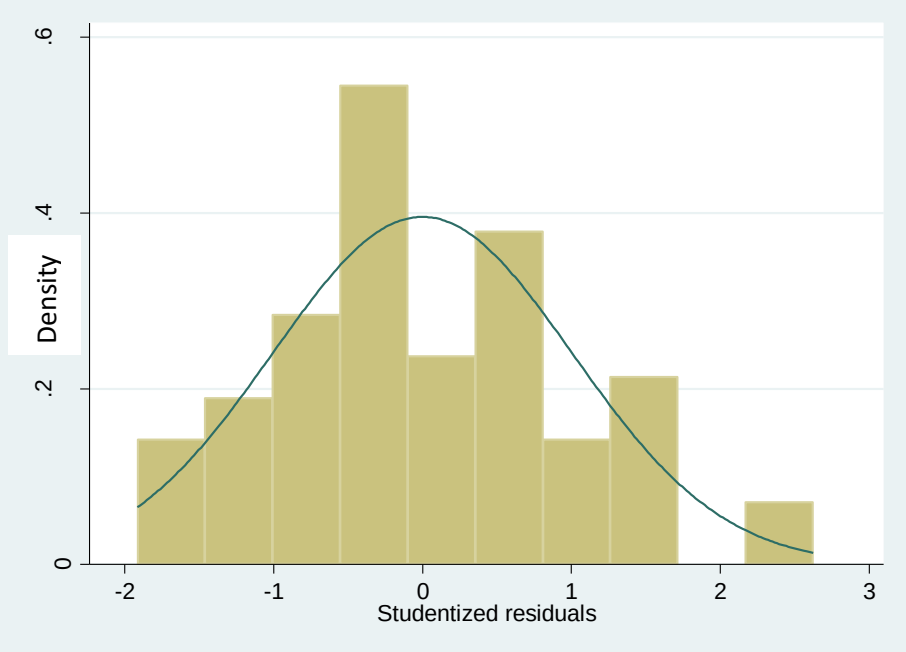
4.5.2.2 Normality Test

Normality assumption for regression analysis denotes that regression residuals should be normally distributed (Wooldridge, 2003). To ensure the validity of p-values of t-tests and F-test normality is an important assumption for hypothesis testing. A test of normality has been done with visual histogram plot of residuals

in Figure 4.5. Figure 4.5 shows that the histogram of residuals quite fits the line that indicates normality of data.

Figure4.4

Histogram Plot of Residuals



Additionally, an inter-quartile range test (Hamilton, 1991), Jarque-Bera (Skewness/Kurtosis) test (Jarque and Bera, 1980, 1987) and Shapiro-Wilk test (Shapiro and Wilk, 1965) statistic were used to check normality of the distribution. The interquartile range assumes symmetry of distribution. Presence of severe outliers[32] is sufficient to reject the normality assumption of any distribution. The test result presented in Table 4.6 confirms the absence of any severe (and mild as well) outlier and thus normality assumption holds for hypothesis testing.

[32] Severe outliers are the value 3inter-quartile-ranges above the 3rd quartile and 3inter-quartile-ranges below the 1st quartile.

Table 4.6

Inter Quartile Range

Outlier Type	Low	High
Mild Outliers		
Inner Fences	-2.479	2.408
Number of Mild Outliers	0	3
Percentage of Mild Outliers	0.00	3.23
Extreme Outliers		
Outer Fences	-4.412	.4.241
Number of Extreme Outliers	0	0
Percentage of Extreme Outliers	0.00	0.00

Jarque-Bera (Skewness/Kurtosis) test for testing the normality of residuals, (Jarque and Bera, 1980, 1987) confirms the normality of residuals (p value 0.2662) and thus suitability for hypothesis testing. Shapiro Wilk is arguably the most widely accepted powerful test for normality (Razali and Wah, 2011). The test is based on the hypothesis that the distribution is normally distributed (Shapiro and Wilk, 1965). Table 4.7 shows that residuals are normally distributed as the normality hypothesis could not be rejected based on the p value. It also shows that the *W statistic* of *Shapiro Wilk test* is close to 1 for the distribution, which also confirms the normality of the residuals.

Table 4.7

Shapiro-Wilk W Test

Variable	W Stat	P value
Residuals	.978	.131

4.5.2.3 Heteroskedasticity Test

The assumption of regression that the error term would have constant variance i.e. the variance of residuals would be homoscedastic. The violation of this assumption would make the distribution heteroskedastic, which means the variance of error term is not constant. Heteroskedasticity is more likely to occur

in cross sectional distribution, rather than time series data. Several reasons of heteroskedasticity include presence of outliers, misspecification of the model, skewed distribution, incorrect data transformation, error learning model, improvement of data collection method among others (Gujarati, 2004). In presence of heteroskedasticity i.e., when error term does not have constant variance, the model is no longer BLUE. The model is still linear and unbiased, but is no longer best with minimum variance. Whatever conclusions we draw or inferences we make will be misleading in presence of heteroskedasticity.

Considering the nature of the dependent variable is ordinal, and likely to suffer from the presence of heteroskedasticity, this study uses the more useful formal statistical tests, which are Breusch-Pagan (Breusch and Pagan, 1979) and White's tests (White, 1980), where null hypothesis is residuals are homogenous. The Breusch-Pagan test is designed to detect linear heteroskedasticity. Breusch-Pagan test does not reject the assumption of homogeneity (p value 0.7485).However, checking for heteroskedasticity with White test is supported in literature (Wallace and Silver, 1988). White test agrees with the Breusch-Pagan test and cannot reject the homogeneity assumption (p value 0.3181) at selected alpha level of 5% and thus suggests that the data is alright for regression analysis.

This makes the estimates obtained with robust standard error not only unbiased but are consistent estimates of the HEI CED quality in terms of CED volume and other determinants in cross sectional setting.

4.5.2.4 Correlation Analysis

Table 4.8presents both Pearson (Panel A) and Spearman (Panel B) correlation coefficients amongst the explanatory variables used in this study. The correlation coefficient values (between -1 and +1) show the degree and direction of correlation. The stars associated with the correlation coefficients show the statistical strength of the observed correlation, where significant findings (p-value<.05) are labelled with asterisks *.

Table 4.8

Correlation Matrices

Panel A - Pearson Correlation Matrix

	CEDV	Target	Emission	Audit	Invest	Sustain	Size	Age
CED Volume	1.000							
Target	0.290*	1.000						
Emission	0.195*	0.206*	1.000					
Audit	0.294*	-0.015	0.249*	1.000				
Investment	0.035	0.066	0.459*	0.092	1.000			
Sustainability	0.141	0.311*	0.463*	0.185*	0.171	1.000		
Size	0.213*	0.152	0.811*	0.393*	0.238*	0.570*	1.000	
Age	0.026	0.029	0.150	-0.133	0.282*	0.004	-0.178*	1.000

Panel B - Spearman Correlation Matrix

	CEDV	Target	Emission	Audit	Invest	Sustain	Size	Age
CED Volume	1.000							
Target	0.274*	1.000						
Emission	-0.067	0.007	1.000					
Audit	0.283*	0.093	-0.024	1.000				
Invest	-0.020	0.102	0.550*	0.002	1.000			
Sustainability	0.068	0.115	0.283*	0.245*	0.196	1.000		
Size	-0.133	-0.109	0.715*	0.110	0.343*	0.197	1.000	
Age	-0.013	-0.015	0.540*	-0.090	0.373*	0.158	0.124	1.000

4.5.2.5 Collinearity Test

Testing for collinearity is important as in presence of perfect collinear relation; regression model cannot be uniquely computed. The primary concern here is that as the multi-collinearity increases the coefficient estimates in the regression model gets unstable and standard errors get widely inflated. Correlation coefficients less than 0.8 among the explanatory variables do not pose any significant threat of multicollinearity problem and are not likely to cause any undue effect on the results (Gujarati, 2004; Haniffa and Cooke, 2005; Mendenhall and Sincich, 1989). Though there lacks any straightforward cut-off universal benchmark for

correlation coefficient (Alsaeed, 2006), the acceptable rule of thumb from existing literature shows that for checking problems of multicollinearity the correlation > 0.8 (Gujarati, 1995) is unacceptable while some suggest using 0.7 cutting point for the same purpose (Tabachnick and Fidell, 1996). Correlation coefficients presented in Table 3.8 show an evidence of a high correlation between the size and carbon emission, which calls for acknowledgment of the issue and further consideration in constructing models to capture individual and joint causal effect.

Table 4.9 presents collinearity statistics for the explanatory variables, which confirms both variance inflation factors (VIF) and tolerance are in acceptable limit (VIF < 10 and Tolerance > 0.10) and thus multicollinearity is not an issue in this model (Haniffa and Cooke, 2005). Based on the VIF, multicollinearity is a problem if VIF exceeds 10 tolerance gets lower than 0.10 (Kennedy, 1998; Neter et al., 1983), where the variable could be considered as linear combination of other independent variables.

Table 4.9
Collinearity Statistics

Variable	VIF	Tolerance (1/VIF)
Emission	5.46	0.1832
Size	3.39	0.2950
Age	2.32	0.4309
Investment	1.49	0.6728
CED Volume	1.40	0.7168
Target	1.26	0.7944
Sustainability	1.24	0.8083
Audit	1.22	0.8169
Mean VIF	2.05	

4.5.2.6 Model Specification Test

Model specification test includes testing validity of the functional form of the model and the variables included in the model. Model misspecification might occur primarily by omitted variables, including irrelevant variables and incorrect functional form. Omitted relevant variables might result in wrongly distributing the common variance they share with the included variables and the error term

will be inflated. Whilst, including irrelevant variables in the model will result in wrong attribution of common variance they share with included other variables. Model misspecification might significantly affect the estimation of regression coefficients (Chen, X., Ender, P., Mitchell, M. and Wells, 2003). Link test for model misspecification shows that the model does not have any misspecification error as the variable _hatsq is not significant and thus fails to reject the hypothesis of good model specification. Well specified model ensures validity of the functional form and suitability of the variables selected.

4.5.3 Regression Results

Results of multivariate analysis showing the causal effect of volume the carbon emission disclosures (CED)and the target to reduce carbon for HEIs by HEFCE in determining CED quality are presented in Table 4.10. Considering the inherent structure of the dependent data to be categorical and ordered, an Ordered Probit model has been used with robust standard error to account for the censoring. The traditional Ordered Probit model implies that all variables are constraints and it neglects possible heterogeneous effects of explaining factors (Al-Shaer, 2013).

Previous disclosure literature highlighted the endogeneity issue (Armstrong et al., 2010; Brown et al., 2011; Lim et al., 2007) arguing that using cross-sectional analysis will cause researchers to treat disclosure variables as exogenous in the model where they might have endogenous effects (Brown et al., 2011). Endogeneity exists due of simultaneity or omitted variables where explanatory variables will be endogenous and correlated with the error term which will lead to biased results. Independent variable CED volume was suspected to be potentially affected by the Carbon Target. Durbin-Wu-Hausman test (Hausman, 1978) has been used in the study to investigate the presence of endogeneity (Gujarati, 2004). Failing to reject the null hypothesis that variables are exogenous confirms the absence of endogeneity effects. Durbin-Wu-Hausman results confirm that the hypothesis could not be rejected at 5% significance level (p value 0.23).

For the purpose of the research three versions of the model were tested. First in model 4.1 only CED volume was entered as an explanatory factor along with the control variables dropping the TARGET imposed by HEFCE on HEIs for carbon

reduction, second in model 4.2 only TARGET was entered as explanatory variable after controlling for other variables dropping CED volume from the equation; and then finally both the explanatory variables CED volume and TARGET were entered at once along with the appropriate control variables in model 4.3. In all three equations, explanatory variables entered were proved to be significant causal factors of CED quality in HEI annual reports either at 1% or 5% significance level. Pseudo R^2 values prove that the models are able to explain between 32.7 per cent and 35.5 per cent of the variance in the CED quality in annual reports of the HEIs which is in line with prior literature.

Table 4.10

Regression Results – Ordered Probit Model

Models	**(4.1)**	**(4.2)**	**(4.3)**
Variables	**CED Quality**	**CED Quality**	**CED Quality**
CED Volume	**17.31*** **		**15.50*** **
	(2.36)		**(2.454)**
Target		**0.970*** **	**0.644*** **
		(0.253)	**(0.161)**
Emission	-0.158	-0.0208	-0.095
	(0.268)	(0.263)	(0.275)
Audit	-0.00816	0.105	-0.00287
	(0.0597)	(0.0558)	(0.0589)
Investment	**0.782** **	0.523	**0.731***
	(0.29)	(0.332)	**(0.32)**
Sustainability	0.125	0.0983	0.121
	(0.0856)	(0.11)	(0.085)
Size	0.274	-0.154	0.168
	(0.4)	(0.402)	(0.426)
Age	-0.053	-0.0805	-0.0754
	(0.14)	(0.143)	(0.149)
Intercept	**8.871** **	**6.038***	**10.48*** **
	(2.809)	**(2.732)**	**(2.778)**
pseudo R-sq	0.331	0.322	0.312

Log likelihood	-108.7	-106.1	-103
N	135	135	135
Robust standard errors in parentheses			*** p<0.01, ** p<0.05, * p<0.1

CED quality = Disclosure quality score awarded 1, for lowest quality to 5, for highest quality; CED volume = Carbon emission disclosure in annual reports is measured by number of sentences in 2011-12 annual reports; TARGET = Carbon reduction target (%) of individual HEIs from 2005 baseline to 2020 by Higher Education Funding Council of England (HEFCE); PERFORMANCE= Carbon Emission reported by HEIs in HEFCE database (in tonnes) for year 2012; SUST = Independent environmental reporting available on the website ranges from 0, if no disclosure to 5, if high disclosure; AUDIT = Points received by the University for carbon audit system in place scored out of 8; INVESTMENT = Facility spending in year 2011-12; LEAGUE = 1, if GuildHE; 2, if Million+Group; 3, if Russell Group; 4, if University Alliances; 5, if Not affiliated with any of the above; REGION = 1, if England; 2, if Scotland or 3, if Wales and 4, if North Ireland; SIZE = HEI size measured by the natural logarithm of total number of Staff and Students; AGE = Age of the HEI in terms of completed years since its establishment.

Table 4.10 provides evidence that CED volume and carbon reduction target imposed by HEFCE on UK HEIs are significant causal factors of CED quality in HEI annual reports. The regression results support Beattie et al.'s (2004) argument that increased volume of disclosures indicates increased quality of such disclosures and thus there exists a positive relationship. Additionally, the impact of carbon reduction target imposed on HEIs has also been proved to be another major causal factor of the CED quality. This study found a significant positive relation between the target set and the quality of CED in annual reports of HEIs.

Beattie et al. (2004)rightly argued that amount of disclosures likely to have positive relation with quality and usefulness of information disclosed. Regression results indicate carbon emission disclosure by UK higher educational institutions also have similar characteristics and HEIs who disclose more provide more useful information in comparison to HEIs who disclose less. This positive relation between the volume and quality of CED can be explained in light of institutional and stewardship theory where the leaders in HEIs act as the steward of the society and are self-motivated to monitor what they report to be useful to the readers of annual reports. They also acknowledge the fact that they are in position to act as an example for others. HEIs status and capability of leading the society in carbon reduction, due to their influence on the society based on their research, teaching

and policy development activities (Dahle and Neumayer, 2001)are acknowledged by the management of those universities, they oblige to take the stewardship role and work in greater benefit of the society and disclose useful information in justified way. In doing so - they do not misguide the readers with volume of CED as supported in the study findings.

Carbon sensitivity is argued to be an important component of social responsibility (Huang and Kung, 2010) and disclosure of such sensitivity is a part of such responsibility to conform to social expectations (Schaltegger et al., 2013) and also very much demanded by the society. HEIs obligations towards society and the environment as part of their social responsibility towards natural environment (Glennie and Lodhia, 2013)are discharged by carbon reduction sensitivity and proper disclosure through public media. HEIs need to consider efforts to reduce carbon emissions as this has become a key social concern at present (Rondinelli and Berry, 2000). With proper disclosure of their sensitivity to the stakeholders, HEI leaders strive to become responsible stewards and social citizens.

There exists a positive relation between the carbon reduction target imposed by the Higher Educational Funding Council England (HEFCE) and the quality of carbon disclosure reported in annual reports by the higher educational institutions in the UK. The strong causal relationship found from the multivariate analysis can be explained with the argument that the HEFCE target set as a requirement for the capital innovation fund acted as a sufficient stick to report more about their carbon activities. The higher targets create more pressure to work towards carbon sensitivity and results in HEIs with higher targets working more to achieve those targets. These increased activities to reduce carbon results in more news to disclose in the annual reports. However, universities not working much are not producing lower quality disclosures to misguide the stakeholders could be a kind of surprise to many. Here, HEI leaders are well knowledge people and they are aware of the ethics of their job and according to the theory of stewardship they only report what they should.

4.5.4 Sensitivity Analysis

To test the robustness of the regression result found earlier with ordered PROBIT model further regression analysis was done with robust least square model (Table

4.11), which is the most popular method for this kind of regression study among researchers. Thismodel agrees with the findings got from the original PROBIT model, which indicates that the results found earlier with original model is robust and does not contain any model bias.

Table 4.11
Regression Results – Robust Least Squared

Models	**(4.1)**	**(4.2)**	**(4.3)**
Variables	**Carbon Emission Disclosure Quality**		
CED Volume	**11.82*** **		**10.58*** **
	(0.896)		**(1.074)**
Target		**0.949*** **	**0.356** **
		(0.22)	**(0.124)**
Emission	-0.0471	-0.033	-0.0251
	(0.214)	(0.313)	(0.222)
Audit	0.0274	**0.138***	0.0296
	(0.0488)	**(0.0617)**	(0.0482)
Investment	0.453	0.525	0.421
	(0.232)	(0.377)	(0.256)
Sustainability	0.112	0.142	0.115
	(0.0782)	(0.145)	(0.0776)
Size	0.174	-0.145	0.128
	(0.312)	(0.465)	(0.342)
Age	-0.102	-0.113	-0.11
	(0.103)	(0.161)	(0.109)
Intercept	-2.371	-1.949	-3.131
	(2.04)	(2.983)	(2.072)
R-sq	0.616	0.587	0.576
Adj R-sq	0.59	0.57	0.54
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

4.5.5 Summary of Results

Table 4.12 shows the summary of the regression results found earlier. This shows that both CED volume and carbon reduction target imposed by HEFCE have positive and significant impact on the CED quality.

Table 4.12

Summary Results

Predictors		Carbon Emission Disclosure Quality	
		Results	Significance
H1	CED Volume	+	Highly Significant
H2	Carbon Reduction Target	+	Highly Significant

4.6 CHAPTER CONCLUSION

This research is a response to the overall social reporting debate in the last decade that has shifted from the question whether to report – to a mature concern of scope, quality, type (both quantity and quality), length or quantity of such disclosure (Yekini and Jallow, 2012). Importance of quality measure as a valuable tool in the social reporting has been highly supported in literature (Hasseldine et al., 2005; Toms, 2002). This research contributes to the existing knowledge of disclosure quality of carbon reporting by coming up with a unique tool and index for measuring quality. In the way of doing so, the research also comprehensively defines disclosure quality on the basis of existing literature.

This research investigates Beattie et al.'s (2004) argument that the organisations who are disclosing higher – are likely to produce more useful and quality information. This research found evidences to support that argument in the narrower scope of carbon emission disclosure by UK higher educational institutions. This study also investigates the impact of carbon reduction target imposed by the Higher Educational Funding Council England (HEFCE) on the quality of carbon disclosure reported in annual reports by the higher educational institutions in the UK. The strong causal relationship found from the multivariate analysis can be explained with the argument that the HEFCE target set as a

requirement for the capital innovation fund acted as substantial incentive to report more about their carbon activities. However, reporting more has led to increased quality and this can be explained in light of *stewardship theory* where the HEIs are self-motivated to monitor what they report to be useful to the readers of annual reports (primarily stakeholders).

The study contributes to the social disclosure literature by adding specialised reflection on HEIs regarding the argument going on with the relationship between the CED volume and quality. The positive relationship found in the study reconfirms Beattie et al.'s (2004) argument that higher amount of disclosures is likely to result in higher quality of the same. The reason likely to be is that the organisations disclosing higher are likely to have more concrete news to share. Thus they spend more words on these news and words spent do make sense. Also, the HEI managers having the *stewardship responsibilities* towards the organisations are rightly disclosing their performances – both good and bad – as expected.

The second contribution of the study is the finding that carbon reduction target set by the HEFCE results in higher CED quality, which follows the stakeholder and institutional theory. Basis for this argument here is that the more critical particular stakeholder resources are to the existence and success of an organization, the more authoritative the stakeholder is and more likely the expectations of such stakeholders are to be fulfilled. This demand may relate to the provision of organisational carbon reporting (Ullman, 1985). This fact is supported by both *stakeholder and institutional theories* providing the motivation to manage important stakeholders' expectations and demands by disclosing more to disclose their conformity with such expectations and demands to secure the existence. Carbon requirement imposed by HEFCE for availing CIF makes it an influential stakeholder. HEIs disclose their carbon activities to better manage their HEFCE – a critical stakeholder. The findings of this research are expected to impact the policy implementation and formulation in this regard.

This might be the fact that higher targets create more pressure to work towards carbon sensitivity as HEIs strive to achieve their targets. These extra efforts to reduce carbon results in availability of more news to disclose in the annual reports.

However, universities not working much are not producing lower quality disclosures to misguide the stakeholders could be a kind of surprise to many. Here, universities are expectedly managed by well knowledge people and they are aware of the ethics of their job and according to the *theory of stewardship* they only report what they should. Thus, this proof of more volume leading to more quality of carbon disclosure indicates readers can rely on the volume to assess the decision usefulness of the disclosure. Application of the *stewardship theory* in social disclosure research, which is highly dominated by the political economy theories, is another contribution of this present research.

Notwithstanding many contributions identified above, this chapter opens scope for further contribution in the area of carbon reporting research. Future research may study on the impact of the CED on the organizational reputation. Also, this chapter, in spite of the preliminary assumption of no year to year change in carbon disclosure, can be extended with a panel study of more than one year to see the trend. Further, studies can involve case studies, interviews to have a clearer insight into the quality of disclosures to capture its true intent. Comparing the studies with different approaches (content analysis with case studies or interviews with same respondents) and results might prove to be useful with future studies. In addition, future study can incorporate those external media to have better understanding of the relationship. Such media may include – internet reporting, reporting in news outlet like publicity in television, newspaper or radio, and many others. This chapter, nevertheless, paves the root for further research on HEI carbon disclosure.

CHAPTER FIVE

CARBON DISCLOSURES, CARBON PERFORMANCES AND GREEN REPUTATION: EVIDENCES FROM UK HIGHER EDUCATIONAL INSTITUTIONS

CHAPTER 5

Carbon Disclosures, Carbon Performances and Green Reputation: Evidences from UK Higher Educational Institutions

5.1 CHAPTER OVERVIEW

The previous two chapters presented empirical evidences on the determinants of carbon emission disclosures (CED); and the relationship between CED volume and quality. So the logical and valued question that follows: what benefits are brought to the higher educational institutions (HEI) by CED? Or in other words, what is the impact of this CED (both volume and quality) on the organization? This might include impact from various perspectives: financial, reputational etc. However, as the scope of this study is limited to UKHEI sector, which not particularly to do with financial performances. The earlier question can be put in an operational and a simpler form as: can carbon disclosure be related to HEI green reputation? Thus this chapter keeps the question of CED impact limited to reputation of UK HEIs.

This chapter investigates how CED together with carbon reduction performances might promote the HEIs' green reputation. Reputation leads to the creation of a better image and increased value of the organisation (Toms, 2002). This research argues that as HEIs can signal their carbon initiatives through CED to their various stakeholders to create a positive image of environment and carbon responsiveness. This is likely to enhance their green reputation to its wider stakeholders (Bebbington et al., 2008a; Hasseldine et al., 2005; Toms, 2002).The impact of CED and other carbon performances needs to have clear relationship to green reputation to motivate the HEIs to act and disclose. The research is distinct in investigating the impact of CED and carbon performances by UK HEIs on their environmental reputation. The study shows whether and how the HEI CED and carbon performances contribute towards the environmental reputation of the institution. This chapter also argues that HEIs being different from profit seeking organizations possess distinguished characteristics different from profit oriented companies. This calls for specific academic and research attention for HEIs.

Generalising the research study for profit oriented companies for the majorly publicly funded UK HEIs should mislead any outcome. Similar studies done in past for corporate environmental disclosure impact on environmental reputation in UK by Toms (2002) and Hasseldine et al. (2005). This study is distinct in extending the prior knowledge for HEIs, which are not profit seeking organisations and possess distinct characteristics. Toms (2002) tested the impact of environmental disclosure quality in annual reports on corporate environmental reputation. He found that quality of environmental disclosures contributes significantly to the creation of environmental reputation. However, this finding does not fully address the above questions as Toms (2002) does not address whether the volume of such disclosure have similar effect on the creation of environmental reputation, regardless of its qualitative content. This vacuum was addressed by Hasseldine et al. (2005), who studied the impact of both volumetric and qualitative measures of environmental disclosures in annual reports and compared their relative impact on the corporate environmental reputation. Such a comparison is useful in gathering the knowledge whether managers could use quality signals to create environmental reputation. They conclude that the quality of environmental disclosure rather than mere volumetric disclosure is more likely to create environmental reputation of the firm. However, both of these studies were done on a broader environmental perspective and were confined to only profit seeking organisations.

Over the last several years increasing number of academics are accepting that green reputation is an important component of competitive advantage. Organisations those act in an environmentally responsible manner and have a history of fulfilling their obligations to various stakeholder groups– create green reputational advantage, which is a subset of overall corporate reputation (Miles and Covin, 2000). Universities enjoy higher positions in green rankings as a result of their environmental activities. Reputation is the basis of choices for stakeholders in many instances, like- investment decisions, career decisions, and product choices. Reputation signals stakeholders about organizational effectiveness compared to that of competing organisations (Fomburn and Shanley, 1990; Riahi-belkaoui, 1999). Therefore, favourable reputation can cause generation of excess returns by inhibiting the mobility of rivals in an industry

(Caves and Porter, 1977); the capability of charging premium prices to consumers (Klein and Leffler, 1981); and the positive effect on the market value of firms through creation of a better image in the capital markets and to investors who are more willing to trust their investments with firms that enjoy superior reputations due to lower perceived risks a potentially enhanced financial performances (Miles and Covin, 2000).Compared to the counterparts, reputed universities are more likely to attract better staff and students. Higher reputation benefits university administration with better staff, teachers and students as they would like to live, work, and be associated with a higher reputed university. Reputation helps HEIs to become responsible social citizens and to conform to social expectations.

This scope of this chapter is much narrower with CED and its impact on HEI green reputation. It also does compare the impact of total volume of disclosures with effect of specific quality signals. The subject of relationship between voluntary carbon disclosures and organizational green reputation is rapidly attracting interest among business leaders, academics and researchers. CED is voluntary which means managers can choose the way they disclose their organizational carbon emission. They have to decide how they can send signals to the stakeholders and other readers about their carbon activities which in turn would add to their green reputation. The climate change and carbon disclosures seem to reflect public awareness, respond to regulatory pressure, and accommodate social concern to protect institutional reputation (Guthrie and Parker, 1990, pp. 171–172). While corporate social responsibility (CSR) gives an opportunity to contribute towards the well-being of the society, it also offers the organizations a conscious contribution towards their reputation (Dahan and Senol, 2012; Porter and Kramer, 2006; Smith, 2007). CSR reporting can enhance brand reputation (Ballou et al., 2006; Gray, 2006; Woods, 2003). D. L. Brown, Guidry, & Patten (2010, p. 86) argued that corporate reputation can lead to substantial institutional benefit. Toms (2002, p. 257) suggested from his empirical study that carbon implementation, auditing and disclosure in annual reports contribute to environmental reputation. Therefore, this instigates following research question: ***Do HEI CED and carbon performances have any impact on their green reputation?*** And ***is the impact different on HEI green reputation for volume and quality of CED?***

In response to recent research calls further research into HEIs' sustainability activities (Adams, 2013) this study focuses on CED of UK HEIs. HEIs are well suited for becoming leaders in environmental protection, because of their influence on the society based on their research, teaching and policy development activities (Dahle and Neumayer, 2001). HEIs may expect to be benefitted from CED practices from several aspects. Potential benefits universities could achieve through their green activities include following: "greening" of campuses has a positive impact on the reputation and image of universities. As a result, compared to the counterparts, "greener" universities are more likely to attract better staff and students. Sustainability dimensions integrated into university programmes benefits university administration staff, teachers and students as they would like to live, work, and be associated with an environmentally friendly university (Filho, 2011). Thus, HEIs would have a competitive advantage by "greening" campuses compared to others who do not act on sustainable development. Also, "green" campuses could use resources efficiently and create less waste, e.g. through hazardous waste recycling, which reduces greenhouse gas (GHG) emissions such as carbon (Hazardous Waste Recycling Benefits, 2012). After all, hazardous waste recycling reduces air, water and soil pollution. HEIs can address their social and environmental obligations (which are not exactly mandatory obligation)by doing these. Researchers acknowledge the general obligations those organisations should have towards the society and the environment as a part of their social responsibility towards natural environment (Glennie and Lodhia, 2013). Reduction of carbon emissions is a key social concern these days and HEIs need to consider efforts to reduce carbon emissions (Rondinelli and Berry, 2000) and should disclose it to the stakeholders to become responsible social citizens. CED is an important component of social responsibility (Huang and Kung, 2010), which can help HEIs to conform to the social expectations (Schaltegger et al., 2013) and build green reputation valued by the society.

The primary objective of this chapter is to find out the impact of CED on HEI reputation. In doing so the study compares the impact of volume of such disclosures with the impact of specific quality signals (Salama, 2003). This study thus investigates the impact on reputation with reference to both volume and quality measure of CED. In the process, the chapter introduces regression methods

with robust standard errors. This has become particularly popular among researchers in recent econometrics in comparing such relationships, where dataset tends to contain outliers. Robust regression method is argued to give better results and have better statistical properties than ordinary least square (OLS) method. If they are applied simultaneously and if their results agree then it is fine and the OLS method passes the diagnostic check for exploring the relationship between CED with green reputation. If it does not agree, then there needs to be an improvisation. The result obtained with robust regression analysis is generally better and should be accepted (Salama, 2003). This is because the robust regression is theoretically benefitted due to more accurate confidence intervals and tests. Thus it does not assume normality in the dataset and resists extreme values. This method considers the full data and gives less concentration on few outliers. This chapter attempts empirically to investigate the relationship between CED and HEI green reputation. In other words, this study strives to explore whether there is any impact of CED on green reputation of the HEIs.

The remainder of the chapter is designed as follows. Section 4.2 presents a view on literature following with a description of underpinning theoretical framework used in the research. Section 4.4 presents the hypotheses of this study. Research methods used for the research have been explained in section 4.5. Section 4.6 presents the results and relevant analyses. Finally, section 4.7 concludes with the importance of the research and scope for further research.

5.2 LITERATURE REVIEW

While there is a growing literature on the impact of CSR disclosure on corporate reputation, there exists a vacuum of research which studies CED impact on HEI reputation. This section presents a detailed review of literature related to disclosures and their impact on organisational green reputation. This disclosure would cover the CSR, environmental and carbon disclosure. Review helps to formulate the methodology unambiguously and objectively. Taking into consideration that the literature on CED impact on green reputation is fairly limited, this section broadens its focus to overall CSR disclosure and environmental disclosure as well. A brief summary of the major studies, which

are particularly relevant to the CED by HEIs and impact on green reputation, is presented here:

5.2.1 Reputation as an Impact

Over the last several years increasing number of academics are accepting that green reputation is an important component of competitive advantage. Organisations that act in an environmentally responsible manner and have a history of fulfilling their obligations to various stakeholder groups create green reputational advantage, which is a subset of overall corporate reputation (Miles and Covin, 2000). Reputation is the basis of choices for stakeholders in many instances, like- investment decisions, career decisions, and product choices. Reputation signals stakeholders about organizational effectiveness, compared to those of competing organisations (Fomburn and Shanley, 1990; Riahi-belkaoui, 1999). Therefore, favourable reputation can cause generation of excess returns by inhibiting the mobility of rivals in an industry (Caves and Porter, 1977); the capability of charging premium prices to consumers (Klein and Leffler, 1981); and the positive effect on the market value of firms through creation of a better image in the capital markets and to investors who are more willing to trust their investments with firms that enjoy superior reputations due to lower perceived risks a potentially enhanced financial performances (Miles and Covin, 2000).

The climate change and carbon disclosures seem to reflect public awareness, respond to regulatory pressure, and accommodate social concern to protect institutional reputation (Guthrie and Parker, 1990, pp. 171–172). While CSR gives an opportunity to contribute towards the well-being of the society, it also offers the organizations a conscious contribution towards their reputation (Dahan and Senol, 2012; Porter and Kramer, 2006; Smith, 2007). CSR reporting can enhance brand reputation (Ballou et al., 2006; Gray, 2006; Woods, 2003). D. L. Brown, Guidry, & Patten (2010, p. 86) argued that corporate reputation can lead to substantial institutional benefit. Toms (2002, p. 257) suggested from his empirical study that carbon implementation, auditing and disclosure in annual reports contribute to environmental reputation. Gibbins et al. (1990) also agreed that investor relations positively influence intangible assets such as corporate reputation.

5.2.2 CSR Disclosures and Environmental Disclosures in General

Few studies exist, which investigates impact of CSR and environment disclosures on organizational reputation of profit oriented companies. The available studies investigate the relationship between CSR disclosure and organizational reputation. Very few studies focus on carbon or green disclosures, but a gap exists in the knowledge of how HEI CED in annual reports impacts the green reputation. In case of profit oriented companies there are quite a few studies which find out the dynamics of voluntary social disclosures and its impact on organizational reputation. The impact of CED and other carbon performances needs to have clear relationship to green reputation to motivate the HEIs to act and disclose. Similar studies exist for CSR and environmental disclosure impact on environmental reputation in UK. Al-Shaer (2013), Hasseldine et al. (2005), and Toms (2002) studied the impact of corporate environmental disclosure on environmental reputation of the companies. CED in annual reports is likely to enhance their green reputation to its wider stakeholders (Bebbington et al., 2008a; Hasseldine et al., 2005; Toms, 2002).Reputation leads to the creation of a better image and increased value of the organisation (Toms, 2002). Al-Shaer (2013), Hasseldine, Salama, & Toms (2005), and Toms (2002) studied the impact of corporate social and environmental disclosure on the organizational green reputation. However, all these studies were limited to profit oriented companies. There is a vacuum in the CSR literature regarding HEI CED. CED might have an impact on their organisational green reputation and it is worthy to measure how it affects the HEIs reputation.

Toms (2002) uses quality signalling through accounting disclosures to create environmental reputation. The author investigates the relationship between environmental disclosure and environmental reputation with a theoretical explanation with quality signalling. He tested the impact of environmental disclosure quality in annual reports on corporate environmental reputation. The study argues that through environmental disclosures organisations can signal their environmental responsiveness, which in turn is likely to create green reputation. Quantifiable and verifiable signals are quality signals, difficult to replicate and results in positive public image that cannot be realized without making associated disclosures. He found environmental performance, monitoring and disclosure

creates environmental reputation. He used corporate rating for community and environmental responsibility as published in *The Management Today* survey of Britain's Most Admired Companies (MAC) as proxy for environmental reputation. Disclosure measurement was done by scoring on the basis of disclosure quality. Non quantifiable disclosures those are easily imitable were regarded as low quality disclosures. In contrast, Quantifiable and verifiable disclosures were regarded as of high importance. According to the author environmental disclosures creates green reputation. Mediating variables include governance variables, firm size, industry grouping and systematic risk. The study found a positive relationship between environmental disclosure and environmental reputation. Also, diverse share ownership and low systematic risk are also correlated with positive environmental reputation. He found that quality of environmental disclosure contributes significantly to the creation of environmental reputation. However, the study was reluctant about presence of similar relationship between quantitative disclosures and environmental reputation. These findings do not fully address the above questions as the study does not explore whether the volume of such disclosure have similar effect on the creation of environmental reputation, regardless of its qualitative content.

This vacuum was addressed by Hasseldine et al. (2005), who studied the impact of both volumetric and qualitative measures of environmental disclosures in annual reports and compares their relative impact on the corporate environmental reputation. Such a comparison is useful in gathering the knowledge whether managers could use quality signals to create environmental reputation. They conclude that the quality of environmental disclosure than mere volumetric disclosure is more likely to create environmental reputation of the firm.

Hasseldine et al. (2005) measure the quantity and quality of environmental disclosure and examine their impact on firm value and showed that the quality (not the quantity) is more information for UK companies' reputation. They measured corporate environmental disclosure is computed using quantitative, qualitative and hybrid measure. Content analysis with number of sentences was used to measure the disclosure quantity in corporate annual report. Qualitative disclosure score was measured as defined by Toms (2002) ranges from (0) score

for non-disclosure to (5) score for high quality disclosure. To create an aggregate variable quality-adjusted measure of disclosure was used by adding a rating or quality score for every sentence in the annual report. Corporate environmental reputation was found from the *Management Today* Britain's Most Admired Companies (MAC) survey. The study used a sample of 139 UK companies from the MAC survey and found that both qualitative and quantitative measure of environmental information within corporate annual reports have an impact on the creation of environmental reputation. However, quality of disclosure has stronger impact on reputation rather than mere volume of disclosures under the theory of signalling. It recommends institutional management to pay attention to the quality of disclosure instead of the mere volume of disclosure in order to create environmental reputation. Both Toms (2002) and Hasseldine et al. (2005)were done on a broader environmental perspective and were confined to only profit seeking organisations.

Brammer and Pavelin (2006) estimate the relationship between corporate reputation and social performance for a sample of UK companies based on different elements of corporate social performance. It also examines how reputation affected by firm's social performance, financial performance, market risk, the extent of long-term institutional ownership, and the nature of its business activities. The study found varied effect on reputation among different industries. They found firms' behaviour demonstrates different signals to create green reputation across types of social performance. Firms transmit those signals directly or through different information channels like the media or the stock market. Social performance, financial performance, ownership composition, media visibility, size and industry determine organisational reputation. The study uses a sample of 210 UK firms that represent almost 90 per cent of FTSE 100 companies. Reputational data are obtained from the MAC survey 2002, and social performance data are taken from Ethical Investment Research Services (EIRIS) that provide social performance scores to UK firms covering three social performance issues - employment, environment, and community issues. Control variables used in this study are: financial performance, leverage, systematic risk, size, media exposure, R&D and industry. Results show that social performance enhances corporate reputation. However, it varies across sectors and depends on

social performance categories. Firms highly engaged in environmental activities may improve or damage their reputation depending on whether their activities reduce stakeholders' environmental concerns; whereas community involvement has an overall positive impact on reputation as it is expected by stakeholders in all industrial contexts.

The relationship between CSR, environmental reputation, and corporate financial performance have been talked about in the literature (Ullman, 1985). According to them good corporate reputation is important for the strategic value of the firm. Ullman (1985) suggests ways to improve the relationship between social disclosure, social performance and economic performance, claiming that the lack of theories, incomplete specification of empirical models applied, measurement of variables included, and time period are behind the inconsistency in results. The correlation between social performance, social disclosure and economic performance is determined by overall management strategy. A three-dimensional model is offered to explain the conflicting results regarding the correlation between social disclosure, social and economic performance: (i) stakeholder power where it is positively associated with social performance; (ii) strategic posture where active managers seek to influence stakeholders through engaging in social and environmental activities; (iii) past and current economic performance that determine the level of social demands. Ullman (1985) suggests adopting a strategic framework and model enhancement that may affect the correlation of social disclosure, social performance and economic performance.

Al-Tuwaijri et al. (2004) further investigated the interrelationship shared among economic performance, social performance and social disclosure. A positive significant relationship was found between environmental performance and environmental disclosure using the three-dimensional research design. The study also found a significant positive relation between economic performance and environmental performance. They show that good environmental performance is significantly associated with good economic performance and also with environmental disclosure using quantitative pollution-related disclosure. Thus environmental reputation is more likely determined by independent and separable aspects of managerial strategy that should provide a potential theoretical solution

to the modelling problems. This research used a sample of 198 firms and employed an OLS regression to test the three dimensional association. Environmental disclosure was identified using quantitative disclosure of pollution information. Environmental performance was measured using a non-financial ratio based on the relative quantity of hazardous waste. Finally, economic performance was measured using a market-based measure, namely annual stock return. He also argued that the mixed results of previous literature regarding the interrelations among environmental disclosure, environmental performance and economic performance might be due to the fact that researchers have not considered that these constructs could be endogenous.

Roberts and Dowling (2002) investigated the relation between firm's financial performance and reputation i.e. whether firm previous financial performance can predict reputation. The study argues that corporate reputation becomes intangible as competitors find difficult to replicate. Therefore, this helps in sustaining competitive advantage and value creation. The study used reputational data from Fortune's *American Most Admired Corporations* and measured firm financial performance using return on assets. They used a sample of 3,141 firms over 15 years (1984-1998) to get results showing that firms with relatively good reputations are better able to sustain superior performance outcomes over time.

Herremans et al. (1993) investigated the association between CSR reputation and financial performance in US context and found a significant positive relationship between them. Considering that the concept and perception of corporate social responsibility may evolve over time the study used a longitudinal approach involving a six years sample from 1982 to 1987 to observe a company's reputation for social responsibility to ensure a robust assessment of its performance. The *Fortune* annual survey of corporate reputations was used to assess CSR reputation. Financial performance was measured using four accounting indicators- operating margin (operating profit before depreciation, as a percent of sales), net margin (after-tax profit as a percent of sales), ROA (operating profit as a percent of the net book value of assets), and ROE (after-tax profit as a percent of the book value of stockholders' equity).

Bebbington et al. (2008) investigates the interrelation between corporate social responsibility reporting and organizational reputation risk management processes and concluded that CSR could be viewed as both an outcome of, and part of reputation risk management process. According to them, the concept of reputation risk management could assist in the understanding of corporate social responsibility reporting practice. This paper explores the link between reputation risk management and existing theorizing in social accounting.

Landgraf and Riahi-belkaoui (2003) investigates the link between a firm's overall disclosure quality and its corporate reputation. They found that the measure of corporate reputation is positively related to the disclosure measure, after controlling for market and accounting signals indicating the size of assets, market assessment of the value of the assets in place and rate of return on assets. The authors argue that readers formulate own reputational rankings on the basis of overall organisational disclosures quality. The study was based on empirical study on large U.S. firms. Findings of the study that the stakeholders construct reputations on the basis of information about a firm's overall disclosure policy in addition to other market and accounting signals. Reputation rankings hint the status of the organisations in the peer social group (Shrum and Wuthnow, 1988). With the disclosure to corporate audiences through different channels, organisations signal about their reputation. These channels include annual reports, quarterly reports, proxy statements, other published information such as press releases and fact books, and direct disclosures to the analysts in the form of meetings and responses to analyst inquiries.

Cho et al. (2012) investigate the extent to which firms' environmental performance is reflected in perceptions of their environmental reputation and whether environmental disclosure serves to mediate the negative aspects of poorer environmental performance associated with those assessments. They used a cross-sectional sample of 92 US firms from environmentally sensitive industries and found that environmental performance is negatively related to reputation scores. The study used Trucost environmental performance scores for the purpose. They argue that is due to the extensive disclosure levels of firms that are worse performers and the finding of a significant positive relation between

environmental disclosure and the environmental reputation measures. The study results suggest that voluntary environmental disclosure appears to mediate the effect of poor environmental performance on environmental reputation.

5.2.3 Higher Education Institutions, CED and Reputation

Studies on CED are very limited in UK and to my best knowledge no study so far investigated the impact of CED for UK organizations. This vacuum in the social disclosure literature calls for an extensive study in this area. Moreover, HEIs have distinct characteristics and hence impact of CED would be different from that of profit-seeking organisations. Thus, CED in UK definitely calls for academic and research attention for its impact. The study investigates how the volume and quality of CED impact HEI green reputation. How the HEIs signal their carbon reduction performance to the major stakeholders, e.g. HEFCE? Whether this signalling adds to their green reputation?

The existing literature does not explain the factors determining of CED of HEIs. Nejati et al. (2011) studied top 10 world universities and found that almost all the universities covered in their sample do provide the CSR disclosure in their web pages. This study was based on a very small sample limited to ten, which is not enough to come up to any conclusion. However, this study did not focus on analysing the causal effects for such CSR engagement disclosure by the universities.

Godemann et al. (2011) in their research paper series on 100 business schools who signed in UN PRME (United Nations Principles for Responsible Management Education) found that the signatory universities worldwide proactively follow sustainable behaviour and disclose it. This study also lack in analysing the motivation behind such proactive behaviour of HEIs regarding sustainable behaviour. Additionally, both these studies focused on CSR as a whole, rather than carbon or green disclosures.

Mazhar et al. (2014) did a qualitative exploratory study on the strategic carbon management of HE sector. They came up with 17 semi-structured interviews with middle and senior managers in HEIs to investigate the issues related to HEI carbon management. Their proposed thematic framework includes – understanding

carbon management, leadership, funding & resources, carbon management planning, carbon reduction targets, communication, stakeholders' engagement – staff and students, ownership & governance, strategic decision-making, benchmarking and space management. They pointed out that there exists a 5% gap between aggregate individual target (38%) and sectors' overall target (43%), which is acknowledged by HEFCE in their publication (HEFCE, 2013). In justifying the argument in favour of further strengthening sector role, Mazhar et al. (2014) displayed interview results with a responsible person from each of their sample 17 HEIs in a logical manner. However, this study only explores key factors regarding strategic carbon management, without any back up of empirical analysis. Thus an investigation for the impact of HEI CED can add to the existing knowledge.

Recent research calls further research into HEIs' sustainability activities (Adams, 2013). HEIs are well suited for becoming leaders in environmental protection, because of their influence on the society based on their research, teaching and policy development activities (Dahle and Neumayer, 2001). HEIs may expect to be benefitted from CED practices from several aspects. Potential benefits universities could achieve through their green activities include following: "greening" of campuses has a positive impact on the reputation and image of universities. As a result, compared to the counterparts, "greener" universities are more likely to attract better staff and students. Sustainability dimensions integrated into university programmes benefits university administration staff, teachers and students as they would like to live, work, and be associated with an environmentally friendly university (Filho, 2011). Thus, HEIs would have a competitive advantage by "greening" campuses compared to others who do not act on sustainable development. Also, "green" campuses could use resources efficiently and create less waste, e.g. through hazardous waste recycling, which reduces green house gas (GHG) emissions such as carbon (Hazardous Waste Recycling Benefits, 2012). After all, hazardous waste recycling reduces air, water and soil pollution. HEIs can address their social and environmental obligations (which are not exactly mandatory obligation) by doing these. Researchers acknowledge the general obligations organisations should have towards society and the environment as part of their social responsibility towards natural

environment (Glennie and Lodhia, 2013). Reduction of carbon emissions is a key social concern these days and HEIs need to consider efforts to reduce carbon emissions (Rondinelli and Berry, 2000) and should disclose it to the stakeholders to become responsible social citizens. CED is an important component of social responsibility (Huang and Kung, 2010), which can help HEIs to conform to social expectations (Schaltegger et al., 2013) and build green reputation valued by the society.

5.2.4 Contributions of this research

Contributions of this study to the social disclosure knowledge are mainly in following areas. This is the first known research on the impact of HEI carbon disclosures. There has been decades of research on social reporting (Gray, Kouhy, & Lavers, 1995b; Ullman, 1985), however research on CED is comparatively new (Bebbington and Larrinaga-González, 2008; Rankin et al., 2011). However, existing research are primarily on the corporate side, leaving a vacuum of literature on CED in the HEIs. No study exists that investigates the effect of such HEI social disclosures, considering HEI is distinct from other organisations. Existing literature studies the compliance, nature and extent of social disclosures by HEIs. None attempted to measure the causal impact of such disclosures. This leads to the importance that the research investigates the impact of carbon emission disclosures by HEIs on organisational reputation. This research has the potential to impact policy evaluation and formulation in this regard. Basis for this research here is that organisations intend to create better reputation in the market. Reputation brings higher value and organisations perceive this value as a positive thing. Thus the organisations signal their positive activities through various disclosures to the society and stakeholders to create positive reputation. This is the first known research on CED of HEIs, which studies the impact of CED by HEIs.

5.3 HYPOTHESES DEVELOPMENT

5.3.1 Carbon Disclosures and Green Reputation

Organisations use voluntary disclosures both through public media to signal news – mostly likely positive – to manage social expectations. Hasseldine et al. (2005) and Toms (2002) supported by arguing that voluntary disclosures can be of use to signal positive issues of any organisation. Annual reports being the most formal reporting directed to general public is used effectively for CED. Thus a higher CED in annual reports are expected to result in higher green reputation in the society.

H3a: Green reputation increases in response to higher CED.

Independent sustainability reports can serve as an effective media for CED as it is the only formal public media to disclose about the efforts indicating sustainable measures undertaken by organisations. HEIs can effectively use independent reporting to signal their carbon sensitivity to the society to build their environment friendly image. This in turn should reflect in their green reputation in a positive way.

H3b: Independent sustainability reporting has positive impact on HEI green reputation.

5.3.2 Carbon Performances and Green Reputation

Carbon emission reduction is a form of showcasing organisational carbon performance. Reduction of carbon emission indicates better carbon performances and likely to result in higher green reputation. Empirical study that implementation of environmental performances contribute to environmental reputation (Toms, 2002, p. 207).

H3c: Carbon emission has a negative impact on HEI green reputation.

Toms (2002, p. 257) found environmental auditing to be a significant contributor to environmental reputation of any organisation. He also argued credibility of CED can be ensured by voluntary audit of environmental activities which signals

the readers about the credibility of claims made by the CED. Higher quality of carbon audit should induce the carbon performance in a very positive way. So, better audit quality regarding carbon should contribute to higher green reputation.

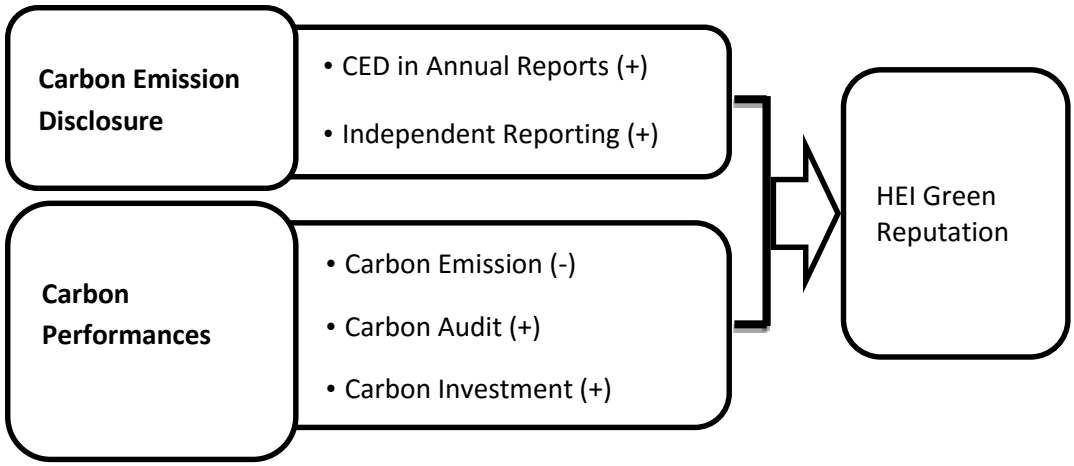
H3d: Carbon audit quality has a positive impact on HEI green reputation.

Higher investment to reduce carbon indicates better carbon performance. Thus more carbon investment is likely to result in higher green reputation.

H3e: Investment to reduce carbon has a positive impact on HEI green reputation.

Figure 5.1 summarises the hypothesised relationship amongst CED, Carbon performances and HEI green reputation.

Figure 5.1
CED, Carbon Performances and Reputation



5.4 RESEARCH METHODOLOGY

This chapter is based on empirical analysis based on HEIs disclosing their carbon related activities in annual reports and the green score they achieved by Peoples and Planet organisation for related activities. This section presents the

methodology adopted in the study. It contains sample selection, measuring variables, data analysis, and model specification.

5.4.1 Sample Selection

The initial sample chosen for this study includes all universities ranked and scored by the People and Planet organization in their website[33] for the Green League 2013. This organization produces the sole comprehensive and independent league table of UK HEIs for their environmental performances, which contained 152 HEIs in total. This study attempts to measure the impact of the carbon emission disclosures (CED) by the UK HEIs on their environmental reputation with the help of empirical analysis. The study uses the scores obtained by individual HEIs published in the People and Planet Green League 2013 for environmental performances to measure their green reputation. Latest annual reports at the time of the study was done was for year ending on 2012. It enables the researcher to study the impact of CED on the following year's green reputation. The year lag was taken on the assumption that the impact of the CED will not be on affecting the green league score until the next year. As such there is no logic of considering the green score of the same year, which is likely to have very little relationship with the CED of same year in annual reports. Annual reports of all HEIs were downloaded for the study year 2011-12 from their websites. In cases where annual reports were not available on the websites, an email was sent to the designated person of those universities for the annual report of 2011-12 on 20 March, 2014. All annual reports found before 20 June, 2014 were included in the database. This left with 144 HEIs. To make the sampling robust, the study includes all feasibly available HEIs in the sample. However, for the other variables like, carbon target, carbon emission, carbon audit, carbon investment, size and age - the thesis depends on the databases collected from HEFCE publication, HEI websites, the People and Planet organisation website and HESA. This return information of 135 HEIs from our sample and thus the final sample was reduced to 135.

The study uses most recent up-to-date data available at the time of the conducted study. This will help to capture the most recent awareness of the carbon emission

[33]https://peopleandplanet.org/green-league-2013/tables

and disclosure practices by HEIs. Reputation measurement was found from the latest Green league published during 2013. The scores awarded to each university facilitated to quantify the green reputation by each HEI during the time frame. The annual reports of 2011-12 have been selected as the primary source for CED – both quality and volume; and financial data. Annual reports are publicly available, produced regularly, management implement editorial control over them, formats are comparable with peer HEI annual reports (Al-Shaer, 2013; Saha and Akter, 2012, 2013; Schleicher, 2012; Schleicher and Walker, 2010; Wilmshurst and Frost, 2000) and thus provide a good source of disclosures and financial data. However, databases published by HESA and HEFCE were extremely helpful in collecting some data for independent variables.

This study constitutes cross-sectional analysis as any significant variation in HEI CED around the study period is not really expected and no influential facts happening around the study period to induce such significant variation in HEI CED. Considering the nature of the research which requires content analysis of CAR and the researcher actually has to get to great details of the CAR, which requires time dedication; the researcher decides to limit the study to focus on 2011-12 annual reports only. Especially, as no significant year-to-year CED fluctuation is expected around the selected study period, this study period seems to be a good choice for the research. This is in line with previous major research in social accounting of similar nature.

5.4.2 Dependent Variable Definition and Measurement

5.4.2.1 *Green Reputation*

The variable of interest i.e. dependent variable for this study is the environmental or green reputation of HEIs. University Green League by the People & Planet is the only comprehensive and independent league table that scores, and rank UK universities each year on the basis of their environmental performances and reputation. UK universities receiving public authority funding and being legally registered as a 'Higher Education Institution' is assessed and ranked in the green league. Universities are being asked a set of questions about their environmental and ethical commitments and actions. Answers to the questions are assessed and

scored on total of 100. People and Planet assess 37.5% of all questions using data taken from the Estates Management Statistics, published every spring by HESA. The remaining 62.5% of questions are asked through a survey which is issued as a freedom of information or environmental information request. People & Planet ask universities to support their survey with evidence allowing for the answers to be checked and audited. The full methodology is published on People & Planet's website. Universities are asked over 100 questions covering 13 sustainability topics; including carbon reduction, student and staff engagement, sustainable food, workers' rights, ethical investment and education for sustainability. Thus universities receive a score out of 100 and on the basis of total scores received by individual universities they are ranked in the green league (People and Planet, 2013).

5.4.3 Independent Variables

5.4.3.1 Carbon Emission Disclosures

This research identifies the carbon disclosures (CED) with reference to the content as stated in the annual reports. Taking account of content of the disclosures made allows to derive quantitative scale for statistical analysis (Weber, 1988). In line with the arguments put forward by the disclosure literature, the annual report would be used by the current study as the most reliable source for corporate environmental information. Moreover, it is virtually impossible to monitor all available communication media of corporate social and environmental disclosure (Gray et al., 1995b). However, focusing solely on annual report, neglecting other media is not a prudent thing to do. Where there was specific cross reference to a supplementary report, this research considers the separate report as a part of annual report. Thus independent reporting was considered as supplementary to annual report disclosures. Moreover, annual reports were mostly downloaded from the websites of the respective HEI. Disclosure reports published in the websites are in the context of other relevant information, which can be verified from the same place (website) by the readers as opposed to isolated paper reports (Craven and Marston, 1999; Crowther, 2000; Marston and Polei, 2004).

Quantity of disclosures were measured using sentence counts (Hackston and Milne, 1996; Ingram and Frazier, 1980; Milne and Adler, 1999). Sentences have some advantages over words, phrases and pages (Milne and Adler, 1999) - they are easily identifiable, involve less subjectivity in identification, and have been supported by previous research (Ingram and Frazier, 1980). This ensures the reliability of the coding process (Hackston and Milne, 1996, p. 86). Sentence count stands better by overcoming the problem of page proportion by removing the need to standardize the number of words (Hackston and Milne, 1996). Sentences are conventional way of communication in speech and writing, while pages are not, hence more supported by researchers (Walden and Schwartz, 1997).

While measuring the quality of disclosures this study acknowledges that it is a complex and "*multi-faceted concept"* (Beattie et al., 2004, p. 227). She considers several attributes of disclose quality: historical/forward-looking; financial/non-financial and quantitative/non-quantitative. This approach is likely to be most relevant to this research and likely to contribute to the investigation of the CED quality. Therefore, the quality of CED is defined in this study in terms of specific mention of the CED activities and the evidence provided. Instrument in Table 3.1 in chapter 3 was used to record the information on carbon reduction activities based on prior literature on nature and type of disclosure supported by evidences. Most standard tool used by majority of prior literature is the content analysis approach to measure the quality (Freedman and Stagliano, 2008; Rankin et al., 2011; Yekini and Jallow, 2012) or the volume (Gray et al., 1995b; Hackston and Milne, 1996) of social disclosures. Freedman and Stagliano (2008a) constructed a similar disclosure index by first determining the categories of emissions and environmental data disclosure for classification purposes and then determined the points to be given each category and classification. Similarly, since this study is concerned with the CED volume, the researcher adopted the categorisation of CED developed in the second chapter shown in Table 2.8. Then for the purpose of obtaining quality score, the researcher identified specific disclosure on carbon and identified which characteristics in Table 3.1 it belongs to. The research instrument used here strives to find out the quality carbon disclosures which are not easy to imitate (Toms, 2002) and thus of higher quality.

5.4.3.2 Other Explanatory Variables

Independent environmental reports available on the university website are the main form of sustainability reports produced by them. This can take different names but should have focus on carbon sustainability to be included in this research. Moreover, considering the purpose of the research dealing with carbon disclosure and thus impact of the HEFCE carbon reduction target, the researcher also includes carbon management plan produced by the universities in response to the HEFCE requirement. This is available from individual HEI Websites. Independent sustainability or environmental reporting available on the websites were analysed and scored from 0, if no disclosure to 5, if high disclosure. For the purpose of scoring the disclosures in independent reports the same instrument developed for scoring quality of CED in annual reports in Chapter 3 Table 3.1 has been used. Independent reports were collected from individual HEI websites.

Carbon emissions (kgCO2) volume mentioned in the HEFCE publication for individual HEIs in the year 2012, which is the latest year for which data were available at the time of data collection. This data ensures how the HEIs are doing to date in response of the target set by HEFCE in consultation with individual HEIs. This data was collected from HEFCE publication by contacting them with email in person.

HEIs are expected to have **carbon audit** in place to have control over the carbon emission reduction. Universities were scored on two criteria – whether i. audited its environmental performances in last five years on several factors were scored. These factors are Biodiversity, Construction and refurbishment, Emissions and discharges, Energy, Sustainable procurement, Transport, Waste and Water; and ii. whether operating any externally audited environmental management system (e.g. ISO14001, EMAS, Ecocampus, Green Dragon, IEMA Acorn Scheme [BS8885]) (People and Planet, 2013). This score was obtained from the People & Planet organization, which produces the sole comprehensive and independent league table of UK HEIs for their environmental performances. HEIs are scored on different bases, accumulating possible maximum score to 8. This data are published on the People and Planet website.

Carbon investment was proxied by the facility spending of individual universities in the year 2012. Spending on facilities by individual HEIs in the year 2012 comprises of the indication about how much the university spent on supporting as all expenditure incurred (whether centrally or departmentally) on the management of premises (including academic buildings, central academic services, art centres, HE provider's health service premises, pavilions, sports buildings, etc.) and on roads and grounds, except residences and catering. This also includes repairs and maintenance expenditure, the maintenance of premises including the pay of staff involved and maintenance provision charges. This data can be found from Higher Education Statistical Agency (HESA) Website.

5.4.3.1 *Control Variables*

Size was found to affect organisations voluntary disclosures (Hussainey and Al-Najjar, 2011). HEI size was measured by the natural logarithm of total number of Staff and Students. This information was collected by contracting HEFCE by email from their publication. **Age** of the HEI in terms of completed years since its establishment was collected from consulting individual HEI websites.

5.4.4 Model Specification

The following econometric models were used to investigate the impact of CED volume and quality in annual reports on the HEI environmental reputation.

$$Reputation_i = \beta_0 + \beta_1 CED_i + \beta_2 Sustain_i + \beta_3 Emission_i + \beta_4 Audit_i + \beta_5 Investment_i + \beta_6 Controls_i + \varepsilon_i \quad \ldots \quad (5.1)$$

Where,

β_0	Intercept
β_1 *to* β_6	Coefficient of slope parameters
ε	Error term

Variables	*Definition*	*Source*
Dependent variable:		
Reputation	Green score achieved by individual HEIs in the People and Planet ranking	People and Planet website
Explanatory variables:		
CED	Carbon emission disclosure; CED volume is measured by content analysis of 2012 annual reports of sample HEIs. CED quality - score ranges from 0 = no disclosure to 5 = high disclosure.	Content analysis of annual reports
Sustainability	Independent environmental reporting available on the website ranges from 0, if no disclosure to 5, if high disclosure.	HEI websites
Emission	Carbon emissions (kgCO2) in the year 2012 which is the latest year for which data were available at the time of data collection.	HEFCE publication
Audit	Points received by the University for carbon audit system in place scored out of 8	People and Planet disclosure
Investment	Facility spending of HEIs in 2011/12.	HESA website
Control variables:		
Size	HEI size measured by the natural logarithm of total number of Staff and Students.	HEFCE publication
Age	Age of the HEI in terms of completed years since its establishment.	HEI websites

5.5 EMPIRICAL ANALYSES AND RESULTS

This section deals with the econometric analyses and results of analyses regarding this chapter. In the beginning, the descriptive statistics is presented including the frequency distribution of categorical variables and univariate analysis of explanatory variables. Then appropriate diagnostic tests were done to ensure the

suitability of data for regression analysis, followed next by the inferential statistics to support or reject the hypotheses. It also includes sensitivity tests at the end to check the robustness of the analyses. At the end, it summarises the results found from the analysis in this section.

5.5.1 Descriptive Statistics

Table 5.1 shows the descriptive information (mean, median, standard deviation, maximum and minimum, skewness and kurtosis) for the dependent variable – green reputation score and the independent variables used in this study. Even though these descriptive statistics e.g. mean, median, standard deviation, maximum, minimum, skewness and kurtosis do not reveal much for categorical variables, this chapter does not exclude the two categorical variables - CED quality (CEDQ) and independent sustainability report from the table of descriptive statistics (Table 5.1). Later, in the section – sub section 5.5.1.1 – frequency distributions for these two categorical variables are presented to reveal more meaningful insight into their characteristics. The symmetry of the distribution is measured by skewness and the flatness or peakedness of the distribution is measured by the kurtosis. The rule of thumb is that skewness and kurtosis should be ideally within the range of $\pm$ 1.96 and $\pm$ 3 respectively (Gujarati, 2004; Haniffa and Cooke, 2005).

For dependent variables prior literature never included the People and Planet green ranking data. The mean (median)for green reputation score of HEIs 35.94 (35), which is much higher than Hasseldine et al. (2005) and Toms (2002) mean or median reputation of companies, which were all around 5. This is normal because of two reasons, first Hasseldine et al. (2005) and Toms (2002) did their research on profit oriented companies in UK; and second, the index and basis are completely different from the one used here. Further mean (median) for green reputation rank is 70.97 (70) and green reputation class is 2.48 (2). Regarding the CED, mean (median) volume of disclosure is 2.78 (1.88) and that of CED quality is 3.07 (3). Independent sustainability report, carbon target, emission, audit, and investment have mean (median) of 4.22 (5), 35.86 (38.5), 15.4million (9.6 million), 4.32 (4), and 360.74 (343.5) respectively. Unfortunately, no study to my knowledge used HEI independent sustainability report, carbon target, emission,

audit, investment for the purpose of analysis. However, the mean (median) size of HEIs is 14601.07 (15120) and that of age is 90.20 (46.5).

Table 5.1

Descriptive Statistics for Variables

Variables	Mean (Median)	Standard deviation	Maximum (Minimum)	Skewness	Kurtosis
Panel A. Dependent variables					
Green Score	35.94 (35)	10.23	59.5 (8.5)	.139	2.79
Green Rank	70.97 (70)	41.26	143 (1)	.022	1.80
Green Class	2.48 (2)	1.31	5 (1)	.3965	1.99
Panel B. Independent variables					
CEDV	2.78 (1.88)	2.97	15.09 (0)	1.83	6.95
CEDQ	3.07 (3)	1.47	5 (1)	-.066	1.54
Emission	15400000 (9672079)	17500000	82800000 (613760)	2160000	7620000
Audit	4.32 (4)	2.11	8 (.5)	0.072	1.86
Investment	360.74 (343.5)	140.43	840 (126)	.863	3.96
Sustainability	4.22 (5)	1.38	5 (1)	-1.50	3.65
Size	14601.07 (15120)	10065.07	42340 (320)	0.323	2.24
Age	90.20 (46.5)	124.65	845 (0)	3.62	18.97

Notes: Green Score = Score achieved by individual HEIs in the People and Planet ranking; Green Class = Class given by the People and Planet ranking to individual HEIs; Green Rank = Ranking of HEIs based on their green score achieved; CEDV= Carbon emission disclosure in annual reports is measured by number of sentences in 2011-12 annual reports; CEDQ = CED quality ranges from 0, if no disclosure to 5, if high disclosure; Sustainability = Independent environmental reporting available on the website ranges from 0, if no disclosure to 5, if high disclosure; EMISSION = Carbon Emission reported by HEIs in HEFCE database (in tonnes) for year 2012; AUDIT = Points received by the

University for carbon audit system in place scored out of 8; INVESTMENT = Facility spending in year 2011-12; SIZE = HEI size measured by the natural logarithm of total number of Staff and Students; AGE = Age of the HEI in terms of completed years since its establishment.

Since CED volume, carbon emission, and age fall outside this range of skewness and kurtosis additional tests of normality were done with Shapiro-Wilk test and S-K test statistics for checking normality of the distributions.

Shapiro Wilk (S-W) is arguably the most widely accepted and powerful check for normality (Razali and Wah, 2011). Table 5.2 includes both S-W and skewness kurtosis (S-K) tests which show that the CED quality, carbon investment, league and age are not normally distributed as p-values are less than chosen alpha level of 5% and thus evident that the data tested are not from a normally distributed population. Based on these results independent variables were log transformed, where necessary except the variable CED volume which was square root transformed to get a more normal dataset. CED volume is a count variable based on the number of sentences disclosed in annual reports. Square root is arguably the most suitable for transforming count data for getting normal distribution (Salama, 2003). Descriptive statistics (e.g. mean, median, maximum, minimum and others described above) of transformed variables do not give much meaningful insight into the nature of the variables and thus are not presented here.

Table 5.2

Normality of Individual Variables

	Shapiro Wilk Test				Skewness Kurtosis test			
Variable	**W**	**V**	**Z**	**Prob>z**	**Pr(Skewness)**	**Pr(Kurtosis)**	**adj chi2(2)**	**Prob>chi2**
CEDV	0.987	1.38	0.73	0.23	0.47	0.76	0.60	0.74
CEDQ	0.969	3.43	2.79	0.00	0.30	0.56	1.39	0.49
Emission	0.981	2.27	1.87	0.03	0.18	0.20	3.41	0.18
Audit	0.973	2.91	2.41	0.00	0.71	0.00	29.81	0.00
Investment	0.992	0.72	-0.73	0.76	0.33	0.87	0.98	0.61
Sustainability	0.917	10.63	5.39	0.00	0.00	0.09	32.60	0.00
Size	0.874	15.41	6.22	0.00	0.00	0.83	17.70	0.00
Age	0.978	2.71	2.28	0.01	0.66	0.28	1.35	0.51

** Shapiro-Wilk W test for normal data with significance <.05, hence data not normally distributed.

5.5.1.1 Frequency distribution

This chapter uses categorical variables of CED quality (CEDQ) and independent sustainability report. The distribution chart in this section (Table 5.3) shows details of the findings of content analysis done for CED quality and independent sustainability report of UK HEIs.

Panel A of Table 5.3 presents the extent of CED quality in annual reports by UK HEIs. For the purpose of measuring the disclosure quality this thesis uses a CED index (presented in Table 5.1), which uses five levels of CED characteristics. Panel A shows that 28 HEIs in the sample do not do any CED in their annual reports i.e. about 20% HEIs do not say anything about carbon emission in their annual reports. Further, 34 HEIs disclose minimum about carbon emission i.e. 24% of HEIs disclose only narrative words without any factual indication of what they are doing on carbon reduction including specific endeavour, statement of targets, narrative without evidence. These HEIs limits their disclosures to imitable narratives e.g. carbon policies, aims, goals. Only 14 HEIs in the sample disclose moderately. That is approximately 10% HEIs use of target, implementation, monitoring or results to support their disclosures on carbon emission or reduction in annual reports. These universities use evidences of what they are doing to reduce carbon to support any narrative disclosures. Maximum number of HEIs (35 universities) disclose more than average but less than the highest quality. This means that 24.3%universities disclose how they implement and monitor carbon reduction activities; what results they achieve in controlling carbon emission. These universities also talk about kite marks or external accreditation of their carbon initiatives achieved. This is how they produce quantitative information on their carbon initiative with evidence. Quality of CED is the highest for 33 universities in the sample. This means 23% of HEIs includes implementation, monitoring or results of their carbon activities with yearly comparisons in carbon disclosures made in annual reports; which accompany quantitative and comparable data and evidence.

Panel B of Table5.3 presents the extent of carbon disclosures made in independent sustainability reports by the UK HEIs. Again, the CED index presented in Table

4.1 has been used to measure the extent of CED in independent sustainability report. Interestingly enough, most HEIs report very high quality CED in their sustainability reports which is more than 70% if total HEIs. As such 119 universities in the sample discloses the implementation, monitoring or results of their carbon activities with year to year comparisons of carbon disclosures made in sustainability reports accompanying quantitative and comparable data and evidence. In contrast, the second highest number of HEIs does not disclose at all on carbon in their sustainability reports. Panel B in Table5.3 shows that 19 HEIs in the sample belongs to non-disclosing group i.e. about 11% HEIs do not say anything about carbon emission in their sustainability reports. 13 universities disclose more than average but less than the highest quality on carbon emission i.e. approximately 8% universities disclose how they implement and monitor carbon reduction activities; what results they achieve in controlling carbon emission. These universities also talk about kite marks or external accreditation of their carbon initiatives achieved. This is how they produce quantitative information on their carbon initiative with evidence. Further, 10 HEIs disclose minimum about carbon emission i.e. 6% of HEIs disclose only narrative words without any factual indication of what they are doing on carbon reduction including specific endeavour, statement of targets, narrative without evidence. These HEIs limits their disclosures to imitable narratives e.g. carbon policies, aims, goals. Least number of HEIs (only 8) in the sample disclose moderately. Approximately 5% HEIs use of target, implementation, monitoring or results to support their disclosures on carbon emission or reduction in sustainability reports. These universities use evidences of what they are doing to reduce carbon to support any narrative disclosures.

Table 5.3 shows the frequency distribution of categorical independent variables.

Table 5.3

Frequency Distribution of Categorical Independent Variables

Panel A. Carbon Emission Disclosure Quality

CED Quality	Frequency	Percent
No disclosure	28	19.44
Less than moderate disclosure	34	23.61
Moderate disclosure	14	9.72
More than moderate disclosure	35	24.31
High disclosure	33	22.92
Total	144	100.00

Panel B. Sustainability

Sustainability	Frequency	Percent
No disclosure	18	10.71
Less than moderate disclosure	10	5.95
Moderate disclosure	8	4.76
More than moderate disclosure	13	7.74
High disclosure	119	70.83
Total	168	100.00

5.5.1.2 Univariate Analysis

In line with prior similar studies done in disclosure literature, this thesis checks the robustness of the results found from the robust regression analysis (Table 5.12 and Table5.13) by analysing the differences in the explanatory variables between institutions with a high green reputation and low green reputation (Reverte, 2009). Top and bottom one-third cases of the sample were taken on the basis of green score obtained from the People and Planet to proxy high and low green reputation. For that purpose, the sample has been split up into three groups based on the People and Planet green score. The first group has 45 HEIs in it with the highest green scores, the second group has 45 HEIs with least green scores and the third group includes 45 HEIs with average green score. Table 4.4 reports the mean values of the explanatory variables under analysis across the several green scores

for both HEIs belonging to top and bottom green score groups. To test the statistical significance of the mean differences in the explanatory variables between both groups, which correspondents top green scoring HEIs and bottom green scoring HEIs, a paired t-test (if the variable is normally distributed) and a Wilcoxon signed-rank test (if the variable is non-normally distributed) have been performed.

The results of the univariate (supported by paired t-test and Wilicoxon rank sum test) in panel A of the table shows that HEIs with higher green reputation make significantly more CED disclosures, use proportionately more space for CED in annual reports, have higher CED quality, have more efficient environmental audit in place, make better disclosure in independent sustainability reports, are bigger in size in terms of number of staffs and students, and newer as compared to those HEIs with lower green reputation. Although the findings also show that the higher environmentally reputed HEIs emit less carbon and invest less on facilities, these differences are not significant at a 5% level, between both groups of HEIs.

Interestingly, though insignificant, higher reputed HEIs were found to invest on average less on carbon reduction facility spending. The reason behind this is possibly that the environmentally lower reputed HEIs are spending much, to maintain their estates. However, the estates were already existing there and were much inefficient. As the analysis shows that these environmentally lower reputed HEIs are also significantly older universities as compared to their higher environmentally reputed HEIs. This shows that older universities used to have old buildings and other estates already in place, which are much carbon inefficient. This increases the maintenance cost of these estates and do not add to create greener technology. The newer universities, which in this analysis were found to be more environmentally reputable have newer and efficient estates in place and thus have low maintenance cost. These newer estates are also very much environmentally sensitive and carbon friendly.

The univariate test of mean difference has been repeated with two groups. The two groups were – high environmentally reputed and low environmentally reputed HEIs. The first group with high environmentally reputed HEIs in the analysis holds HEIs with the People and Planet green score above the median value. Whilst

the second group with low environmentally reputed HEIs include universities having lower than median green score by the People and Planet green ranking. Panel B in Table 5.4 reports the mean values of the explanatory variables under analysis for both HEIs with a score higher than the median and those with a score lower than the median. To test the statistical significance of the mean differences in the explanatory variables between both groups of HEIs, this chapter performs again a paired t-test. Also considering the non-normal distribution of majority of explanatory variables, a Wilcoxon signed-rank test was done and presented in the same table. It should be noted that the results are generally consistent with earlier measure of univariate analysis in Panel A having one-third top and bottom environmentally reputed HEIs of the total sample.

Table 5.4

Differences in Explanatory Variables between High and Low Reputation Groups

Variables	Highest Reputation Group	Least Reputation Group	Mean Difference	T-value	Wilcoxon Rank test
Panel A. Top and Bottom One Third Group					
CED volume as sentence count	16.89	6.72	10.17	-3.801***	-4.001***
CED –ratio of total sentences	0.042	0.017	0.025	-3.643***	-3.918***
CED Quality	3.690	2.550	1.14	-4.101***	-3.751***
Emission	13,000,000	17,700,000	-4,700,000	1.317	-0.922
Audit	5.86	2.92	2.94	-7.935***	-6.007***
Investment	357.38	385.93	-28.55	0.773	0.602
Sustainability	4.91	4.12	0.79	-3.287***	-3.448***
Size	18,809.66	11,824.79	6984.87	-3.751***	-3.884***
Age	40.07	122.41	-82.34	3.219***	3.824***
Panel B. Top and Bottom Two Groups Separated by Median					
CED volume as sentence count	15.65	8.58	7.07	-3.423***	-3.591***
CED – ratio of total sentences	0.036	0.022	0.014	-2.703***	-3.087***
CED Quality	3.63	2.76	0.87	-3.608***	-3.422***
Emission	14,700,000	18,600,000	-3,900,000	1.282	0.309
Audit	5.24	3.39	1.85	-5.675***	-5.076***
Investment	347.82	383.52	-35.70	1.341	1.155

Sustainability	4.78	4.29	0.49	-2.647***	-2.151**
Size	18302.50	14182.22	4120.28	-2.59**	-2.85***
Age	56.49	123.86	-67.37	3.131***	3.377***

Notes: This table presents means, differences in means, t-values and Wilcoxon rank sum test values for the explanatory variables. *** p<0.01, ** p<0.05, * p<0.1.

5.5.2 Research Diagnostics

To find out whether the assumptions of regression analysis (Gujarati, 2004, pp. 65–80; Wooldridge, 2003) hold for the econometric model to be used in this sample study a couple of tests have been done in this section. The assumptions have been enumerated in chapter two. Ordinary least square (OLS) is the most common form of regression models used in literature. These assumptions also ensure the best fit of the regression model, which allows the disturbance to be as small as possible i.e. $\hat{\beta}_i$ is said to be a best linear unbiased estimator (BLUE) of β_i if the above assumptions hold (Gujarati, 2004, pp. 78–80). Prior to running the final regression analyses to find out the impact of CED volume and quality on HEIs' institutional green reputation, some diagnostics done in this subsection to find out the suitability of the data for such analysis. Necessary data transformation and operations will be made, if required by the diagnostic results.

5.5.2.1 Check for Extreme Data

A variable is said to be influential if removal of it makes significant change in the estimation of coefficient. Caution needs to be taken for influential and exceptional data. It is also essential to check for single observations which are substantially different from other observations. Presence of this kind of observations can cause significant difference in the results of regression analysis. This type of observations should be treated with caution so that the distortion in the regression result can be controlled. Observations of this kind are named as outliers and leverage. Outliers are observations with large residuals in linear regression. This is an observation whose dependent variable value is unusual given its values of the predictor variables (Wooldridge, 2003). On the other hand, leverage is present if an observation has extreme values in predictor variables. Data suggests that presence of observations with high leverage (Chen, X., Ender, P., Mitchell, M.

and Wells, 2003). Check for influential variables supports the presence of a few outliers in the observations.

Options are to remove extreme observations or changing the extreme values to less extreme values (Tukey, 1962). In presence of outliers, leverage and influential observations, primarily winsorising (Cox, 2006) was done following previous literature (Al-Shaer, 2013) to curb the influential observations. In the second stage continuous independent variables are log transformed and count variables were transformed with square root. These are expected to get rid of the impact of outliers, leverage and influential observations (Gujarati, 2004).

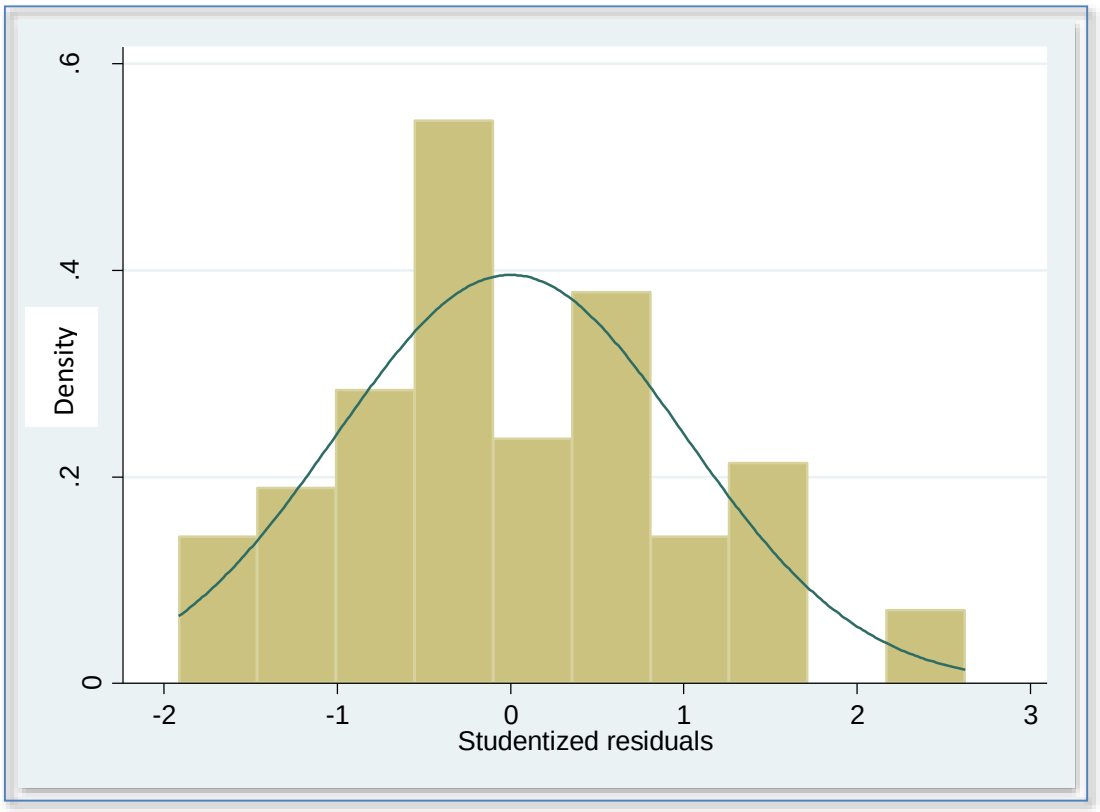
5.5.2.2 Test of Normality

Normality assumption of a regression model assumes that the errors are normally distributed (Wooldridge, 2003). Normality check is an important step for hypothesis testing; normally distributed error terms ensure the validity of p-values of t-tests and F-test. A test of normality has been done with visual histogram plot of residuals. Additionally, an inter-quartile range test (Hamilton, 1991), Jarque-Bera (Skewness/Kurtosis) test (Jarque and Bera, 1980, 1987) and Shapiro-Wilk test (Shapiro and Wilk, 1965) statistic were used to check normality of the distribution.

The skewness and kurtosis measure confirm the normality of the residuals (Skewness = 0.39 and Kurtosis = 2.92). Also, Figure 5.2 shows that the histogram of residuals quite fits the line that indicates normality of data.

Figure 5.2

Histogram Plot



The interquartile range assumes symmetry of distribution. Presence of severe outliers[34] is sufficient to reject the normality assumption of any distribution. The test result presented in Table 5.5 confirms the absence of any severe outlier and thus normality assumption holds for hypothesis testing.

[34] Severe outliers are the value 3inter-quartile-ranges above the 3rd quartile and 3inter-quartile-ranges below the 1st quartile.

Table 5.5

Inter Quartile Range

Outlier Type	Low	High
Mild Outliers		
Inner Fences	-2.479	2.408
Number of Mild Outliers	0	3
Percentage of Mild Outliers	0.00	3.23
Extreme Outliers		
Outer Fences	-4.312	4.241
Number of Extreme Outliers	0	0
Percentage of Extreme Outliers	0.00	0.00

Jarque-Bera (Skewness/Kurtosis) test is for testing the normality of residuals, (Jarque and Bera, 1980, 1987). It confirms the normality of residuals (p value 0.2662) and thus suitability for hypothesis testing. However, Shapiro Wilk is arguably the most widely accepted powerful test for normality (Razali and Wah, 2011). The test is based on the hypothesis that the distribution is normally distributed (Shapiro and Wilk, 1965). Table 5.6 shows that residuals are normally distributed as the normality hypothesis could not be rejected based on the p value. It also shows that the *W statistic* of *Shapiro Wilk test* is close to 1 for the distribution, which also confirms the normality of the residuals.

Table 5.6

Shapiro-Wilk W Test

Variable	W Stat	P value
Residuals	.978	.131

5.5.2.3 Heteroskedasticity test

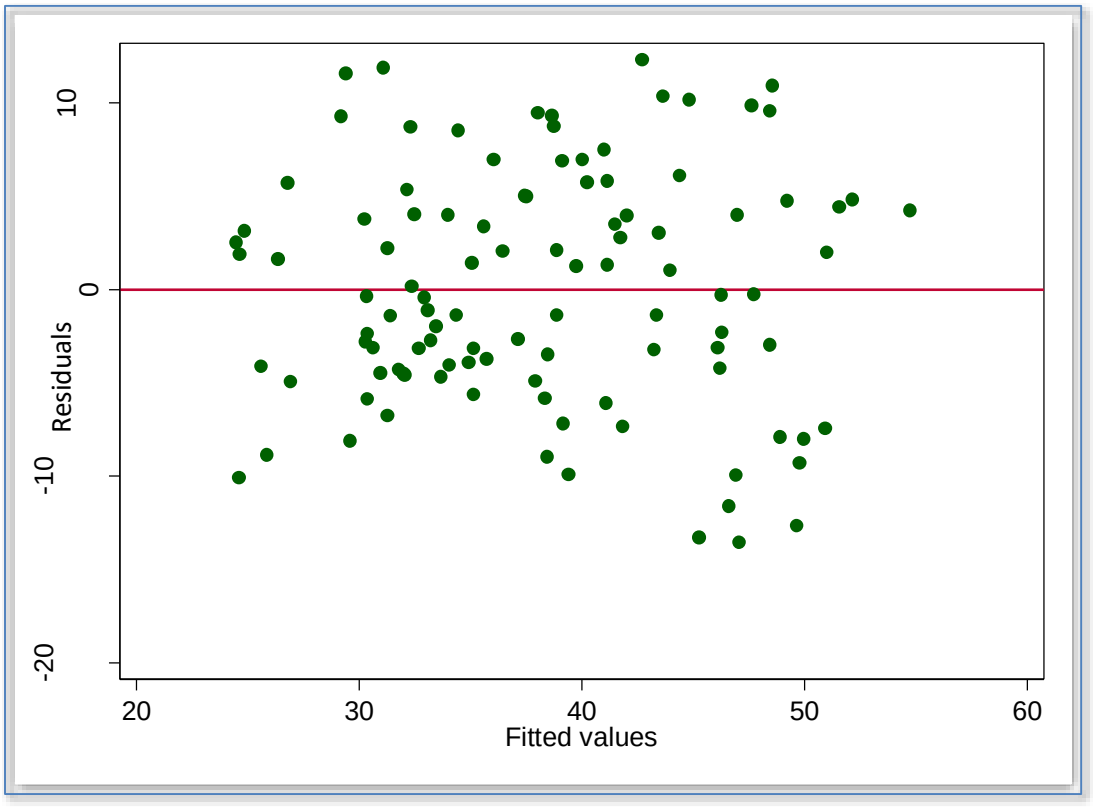
One of the regression assumptions is that the variance of residuals would be homoscedastic indicating that the error term would have constant variance. Violation of this assumption would make the distribution heteroskedastic, which means the variance of error term is not constant. In presence of heteroskedasticity

i.e., when error term does not have constant variance, the model is still linear and unbiased, but is no longer best with minimum variance. Whatever conclusions we draw or inferences we make will be misleading in presence of heteroskedasticity. Presence of heteroskedasticity might be checked with informal visual test or formal statistical tests.

The visual check of heteroskedasticity in Figure 5.3 shows no presence of heteroskedasticity, which indicates that this is a homoscedastic distribution.

Figure 5.3

Visual Check for Heteroskedasticity



The indicated absence of heteroskedasticity by informal visual check is further tested in this study with more useful formal statistical tests, which are Breusch-Pagan (Breusch and Pagan, 1979) and White's tests (White, 1980), where null hypothesis is residuals are homogenous. The Breusch-Pagan test is designed to detect linear heteroskedasticity. Breusch-Pagan test cannot reject (p value 0.5384) the assumption of homogeneity. However, Wallace & Silver (1988) argued in

favour of having routine check of heteroskedasticity with White test. White test also cannot reject (p value .6386) the homogeneity assumption at selected alpha level of 5% and thus indicates the suitability of the data for regression analysis.

This makes the estimates obtained with robust standard error not only unbiased but are consistent estimates of the impact of HEI CED both volume and quality on HEI green reputation in the cross sectional setting.

5.5.2.4 Test for Endogeneity

Endogeneity issue is argued to be one of the major challenges in prior literature (Armstrong et al., 2010; Brown et al., 2011; Lim et al., 2007). Baum (2006) argues that the presence of endogeneity might cause researchers using cross-sectional analysis to treat explanatory variables as exogenous in the model suffering from endogenous effects. Endogeneity exists due of simultaneity or omitted variables where explanatory variables will be endogenous and correlated with the error term which will lead to biased results (Gujarati, 2004).

The amount of carbon investment (INVESTMENT) is likely to have an effect on the volume of current carbon emission (EMISSION). To test for the presence of endogeneity effect in the relationships between carbon investment and current year carbon emission, this thesis carried out Durbin–Wu–Hausman tests (Durbin, 1954; Hausman, 1978; Wu, 1973)as suggested in (Reverte, 2009). In both cases, no evidence of endogeneity was found. The null hypothesis here is that variables are exogenous, failing to reject this confirms the absence of endogeneity effects (Nakamura and Nakamura, 1981). Durbin-Wu-Hausman test results proved that the hypothesis could not be rejected at 5% significance level ($p = 0.35$) and thus confirm the absence of endogeneity effect. This proves that the estimates to be provided by regression analysis are consistent.

5.5.2.5 Correlation Matrices

Table 5.7 reports both Pearson and Spearman correlation coefficients among the explanatory variables used in this study. Pearson correlation coefficients are presented in the bottom left diagonal segment. However, the Spearman Rank correlation coefficients are presented in upper right diagonal segment. The correlation coefficient values (between -1 and +1) show the degree and direction of correlation.

Table 5.7

Pearson and Spearman Correlation Matrix for Explanatory Variables

	CEDV	CEDQ	Emit	Audit	Invest	Sustain	Size	Age
CEDV	1	0.750	-0.065	0.297	0.037	0.046	-0.068	-0.014
CEDQ	0.765	1	-0.010	0.277	0.166	0.082	0.006	0.009
Emission	-0.073	-0.006	1	0.004	0.539	0.201	0.673	0.527
Audit	0.277	0.282	0.012	1	0.052	0.149	0.180	-0.087
Investment	0.068	0.172	0.508	0.087	1	0.126	0.304	0.302
Sustain	0.030	0.106	0.168	0.098	0.178	1	0.163	0.130
Size	-0.055	0.045	0.74	0.208	0.301	0.157	1	0.074
Age	0.008	-0.037	0.541	-0.085	0.312	0.142	0.110	1

5.5.2.6 Multicollinearity Test

Testing for multicollinearity is important because in presence of a perfect collinear relation, the coefficient estimates in the regression model gets unstable and standard errors get widely inflated. Though there is no straightforward universal benchmark for correlation coefficient (Alsaeed, 2006), the acceptable rule of thumb from existing literature shows that for checking problems of multicollinearity the correlation > 0.8 (Gujarati, 1995) is unacceptable. Correlation coefficients in Table 5.7 do not show any evidence of clear presence of any unacceptable level of multicollinearity issue amongst the explanatory variables. However, as Table 5.7 indicates presence of some high correlation amongst CED quality and volume, which calls for acknowledgment of the issue and further consideration in constructing models to capture individual and joint causal effect. However, this would not pose any threat to the regression model as

they are not going to enter into the model at a time. These to variable will be entered into the regression model interchangeably.

Table 5.8 shows collinearity statistics for the explanatory variables, which confirms both variance inflation factors (VIF) and tolerance are in acceptable limit (VIF < 10 and Tolerance > 0.10) indicating that multicollinearity is not an issue in this model (Haniffa and Cooke, 2005). Based on the VIF, multicollinearity is a problem if VIF exceeds 10 tolerance gets lower than 0.10 (Kennedy, 1998; Neter et al., 1983), where the variable could be considered as linear combination of other independent variables.

Table 5.8

Collinearity Statistics

Variable	VIF	Tolerance (1/VIF)
Emission	5.00	0.1998
CED Volume	2.51	0.3984
CED Quality	2.48	0.4032
Size	3.35	0.2987
Age	1.96	0.5097
Investment	1.46	0.6869
Audit	1.31	0.7624
Sustain	1.07	0.9375
Mean VIF	**2.39**	

5.5.2.7 Model Specification Test

Model specification test helps to find whether the model is well fitted or not. This includes the validity of the functional form of the model and the variables included in the model. Model misspecification might occur primarily by omitted variables, irrelevant variables and incorrect functional form. Omitted relevant variables might result in wrongly distributing the common variance they share with the included variables and the error term will be inflated. Whilst, including irrelevant variables in the model will result in wrong attribution of common variance they share with included other variables. Model misspecification might significantly

affect the estimation of regression coefficients (Chen, X., Ender, P., Mitchell, M. and Wells, 2003). Link test for model misspecification that the model does not have any misspecification error as the variable _hatsq is not significant (p value .287) and thus fails to reject the hypothesis of good model specification. Ramsey test for omitted variables also comply by failing to reject (p value 0.4412) the hypothesis of no omitted variables.

5.5.3 Regression Results

Regression results presented in Table 5.9 show the impact of CED and carbon performances on the HEI green reputation. The models are specifically developed for cross sectional analysis (Wooldridge, 2003). Considering the inherent structure of the data which is continuous in nature for the dependent variable – green reputation (score awarded by people and planet) the ordinary least square regression method has been used.

All three versions of the model were tested in the study to find evidence of causal relationship amongst CED, carbon performances and the HEI green reputation. First, in Model 5.1 only CED in annual reports was entered as an explanatory variable along with the control variables dropping independent sustainability reporting and carbon performances, and second, in Model 5.2 CED and independent sustainability reports were entered as explanatory variables after controlling for other variables excluding carbon performances from the equation. Last, CED, independent sustainable reporting and other carbon performances were entered in the final model. In all three models, CED was proved to have highly significant determinant relationship with HEI green reputation at 1% significance level. Carbon emission and carbon audit also came out to be highly significant in explaining changes in HEI green reputation. Impact of independent sustainability reporting was found to have very weak significance in determining HEI reputation. R^2 values prove that the models are able to explain 28, 31 and 57 per cent of the variance in HEI green reputation respectively, which are satisfactory according to prior literature.

Table 5.9
Regression Results – Robust Least Square with CED Volume

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Volume	**38.70*** **	**39.10*** **	**28.89*** **
	(7.82)	**(7.74)**	**(7.15)**
Sustain		**1.595***	**1.302***
		(0.75)	**(0.65)**
Emission			**-7.114*** **
			(1.46)
Audit			**2.030*** **
			(0.36)
Investment			1.521
			(1.97)
Size	**3.181****	**2.466***	**10.49*** **
	(1.00)	**(1.07)**	**(2.57)**
Age	**-1.915****	**-2.015****	0.0448
	(0.67)	**(0.65)**	(0.72)
Intercept	8.243	8.025	23.65
	(10.58)	(10.18)	(16.37)
R Squared	0.284	0.31	0.579
Adj. R-squared	0.266	0.288	0.549
RMSE	8.548	8.424	6.58
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 5.9 used volumetric definition of CED while investigating the impact of CED on green reputation. However, considering the study in chapter 3, where CED volume and quality were found to have a very high positive correlation indicating that CED volume and quality can be used interchangeably to prove the robustness of CED impact on green reputation. Quality measure for CED can also be used in signalling theory framework to assist as a true signal (Hasseldine et al., 2005; Toms, 2002). This is in line with Beattie et al. (2004), who argued that

organizations disclosing more have more news in them and that is an indication of CED quality. Counting this to be true CED quality were used to replace the volumetric measure of CED used in Table 5.10 to test the robustness of the model to investigate the impact of HEI CED (along with other explanatory variables) on HEI green reputation. Robustness check done with the regression test in Table 5.10 confirms the results found in Table 5.9 and confirms the impact of CED - both volumetric and qualitative measure to be same – highly significant positive impact on green reputation of HEIs as measured with the score obtained in Green League by the People and Planet.

Table 5.10
Regression Results – Robust Least Square with CED Quality

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Quality	**2.492*** **	**2.415*** **	**1.722*** **
	(0.49)	**(0.50)**	**(0.48)**
Sustain		1.223	1.072
		(0.74)	(0.62)
Emission			**-7.082*** **
			(1.48)
Audit			**2.112*** **
			(0.34)
Investment			0.847
			(2.02)
Size	**3.143** **	**2.621***	**9.933*** **
	(0.95)	**(1.05)**	**(2.56)**
Age	**-1.839** **	**-1.920** **	0.268
	(0.65)	**(0.63)**	(0.73)
Intercept	5.994	5.892	**31.19***
	(10.18)	(10.01)	**(15.64)**
R Squared	0.29	0.305	0.574
Adj. R-sq	0.283	0.543	0.273
RMSE	8.45	6.619	8.508
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Regression results in Table 5.9 and 5.10 present evidence to prove that CED, carbon emission and carbon audit are highly significant determinant factors for explaining the variation in HEI green reputation. Disclosures are effectively used by organizations to provide signal about their commitment, activities, or results. CED is an effective tool used by the organizations to signal their commitment regarding the carbon sensitivity to the readers of annual reports, which is expected to build a positive image of the reporting entities. HEIs, thus, by disclosing CED in annual reports signals about their carbon initiatives in quest for positive reputation, which is reflected on the score they receive for the green reputation. Thus a positive causal impact is evidenced on the green reputation of the HEIs. Carbon sensitivity is argued to be an important component of social expectation (Huang and Kung, 2010) and disclosing such sensitivity is a response to that expectation (Schaltegger et al., 2013), which is very much demanded by the society. HEI has obligations towards society and the environment as part of their social responsibility towards natural environment (Glennie and Lodhia, 2013), which are discharged by carbon reduction sensitivity and proper disclosure through various public media including annual reports and independent sustainability reports. With proper disclosure of their sensitivity to the stakeholders, HEI leaders strive to become responsible stewards and social citizens.

HEIs should consider efforts to reduce carbon emissions as this has become a key social concern at present (Rondinelli and Berry, 2000). Carbon performances factors as indicated in this study – carbon emission, carbon audit in place, and investment in carbon management seemed to have mixed results from regression analyses. Table 5.9 and 5.10 presents evidence that there is a highly significant negative relation between HEI carbon emission and their green reputation. This implies that HEIs emitting more carbon are likely to have lower green or environmental reputation as per the score received in the Green League by People and Planet. HEIs failing to reduce their carbon emission are likely to suffer their reputation and organisational image in the society. Carbon audit in place is evidenced to have a highly significant positive causal relationship with HEI reputation. It is likely that an efficient carbon audit system would impact carbon sensitivity of the organisation in various ways and thus should end up in higher

green reputation score. An efficient audit system in place – both internal and external is in response to the stakeholders' expectation for carbon sensitivity. However, investment in carbon management could not be proved to have any significant deterministic relationship with HEI reputation.

Regression results in both Tables 5.9 and 5.10 also evidence in support of a positive deterministic relationship in existence between independent sustainability reporting and HEI reputation with a low significance at 10%.

5.5.4 Sensitivity Analysis

To provide additional evidence about the impact of CED on HEI environmental reputation alternative measures of HEI reputation have been used i.e. green class and green ranking have been used to check the robustness in place of green score in two separate models. Green class and green rankings serve the same purpose as green score and produced by the same organization – The People and Planet.

Table 5.11 presents the sensitivity analysis with the help of green class as the dependent variable. This requires an ordered PROBIT model and could be done with the current statistical software used for the analysis of the data in this thesis – STATA. The people and planet awards different classes to different universities on the basis of their carbon emission policies and performances. The green classes awarded based on the green scores. This green classes include – First Class Awards, Upper Second Class Awards, Lower Second Class Awards, Third Class Awards, Failed or no award – universities those did not sit for exam or did not supply any information for ranking. This allows categorization of the sample universities using a qualitative scale of 0-4 as a dependent variable instead of the scores given for their green reputation. This qualitative scaling also serves the purpose of coding the reputational classes. Linear regression would not be able to treat this coding of 0, 1, 2, 3, and 4 properly as linear regression treats the difference between a 3 and a 4 the same as that of a 2 and a 3, whereas they are only ranking. In this situation ordered PROBIT is a better alternative to use. The ordered PROBIT has come into fairly wide use as a framework for analysing such scaled responses (Greene, 2012). Table 5.11 found similar results as the main regression results in Table5.9. CED volume came out significant in all three

separate models at 1% level of significance. Carbon emission and carbon audit also came out to be highly significant at 1% level of significance.

Table 5.11

Regression Results – Green Class with CED Volume (Oprobit)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Volume	**4.917*** **	**5.062*** **	**5.241*** **
	(1.12)	**(1.12)**	**(1.37)**
Sustain		0.163	0.118
		(0.10)	(0.13)
Emission			**-1.334*** **
			(0.31)
Audit			**0.333*** **
			(0.07)
Investment			0.391
			(0.35)
Size	**0.306** **	0.233	**1.806*** **
	(0.11)	(0.12)	**(0.54)**
Age	**-0.215***	**-0.229***	0.061
	(0.10)	**(0.10)**	(0.15)
Intercept	**3.307** **	**3.336** **	1.595
	(1.25)	**(1.22)**	(2.86)
pseudo R-sq	0.095	0.103	0.272
AIC	366	364.8	243.7
Log likelihood	-176	-174.4	-110.8
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 5.12 presents the similar statistical results with CED quality instead of CED volume as an independent variable. This is a robustness check again with green class as the dependent variable. This also requires an ordered PROBIT model; where STATA – a statistical software package again came in handy for the analysis purpose of this thesis. Robustness check in Table5.12 does not differ with the study findings in Table 5.10 with CED quality as independent variable and

green class as dependent variable. CED quality came out significant in all three separate models at 1% level of significance. Carbon emission and carbon audit also came out to be highly significant at 1% level of significance.

Table 5.12
Regression Results – Green Class CED Quality (Oprobit)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Quality	**0.296*** **	**0.290*** **	**0.268** **
	(0.07)	**(0.07)**	**(0.08)**
Sustain		0.112	0.0694
		(0.10)	(0.13)
Emission			**-1.275*** **
			(0.32)
Audit			**0.348*** **
			(0.07)
Investment			0.257
			(0.36)
Size	**0.311** **	**0.264***	**1.651** **
	(0.11)	**(0.12)**	**(0.53)**
Age	**-0.207***	**-0.217***	0.093
	(0.09)	**(0.09)**	(0.15)
Intercept	**3.623** **	**3.630** **	0.317
	(1.22)	**(1.21)**	(2.84)
pseudo R-sq	0.093	0.097	0.262
AIC	366.7	367.2	246.7
Log likelihood	-176.3	-175.6	-112.3
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 5.13 presents the robustness check with the help of green ranking as the dependent variable. Universities have been ranked by the People and Planet on the basis of their achieved score and this green ranking of universities has been used as the dependent variable in the next sensitivity test in Table 5.13 with

independent variable of CED volume and Table 5.14 with independent variable of CED quality. Linear regression would not be suitable for this type of regression study with green ranking as the dependent variable, which is not essentially a continuous type of variable. Linear regression treats the difference between a 3 and a 4 the same as that of a 2 and a 3, whereas they are only ranking. In this situation ordered PROBIT again is a better alternative to use.

Robustness check in Table5.13 also finds similar results as found in the study findings in Table 5.9 with CED volume as independent variable and green ranking as dependent variable and other similar analysis. CED volume was found significant in all three separate models at 1% level of significance. Carbon emission and carbon audit also came out to be highly significant at 1% level of significance.

Table 5.13
Regression Results – Green Rank with CED Volume (Oprobit)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Volume	**4.774*** **	**4.905*** **	**5.059*** **
	(0.95)	**(0.93)**	**(1.07)**
Sustain		**0.185***	0.19
		(0.09)	(0.11)
Emission			**-1.193*** **
			(0.25)
Audit			**0.305*** **
			(0.06)
Investment			0.259
			(0.30)
Size	**0.403*** **	**0.325** **	**1.794*** **
	(0.12)	**(0.13)**	**(0.43)**
Age	**-0.213***	**-0.230** **	0.050
	(0.08)	**(0.08)**	(0.12)
Intercept	**6.608*** **	**6.718*** **	**6.281***
	(1.26)	**(1.20)**	**(2.55)**
pseudo R-sq	0.044	0.048	0.112
AIC	1114.5	1112.1	849.7
Log likelihood	-492.2	-490	-362.9

N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 5.14 presents sensitivity analysis with CED quality as an independent variable. This is a robustness check with ordered PROBIT model again with green ranking as the dependent variable. Robustness check in Table 5.14 also agrees with the earlier study findings in the thesis. As before CED quality was found significant in all three separate models at 1% level of significance. Carbon emission and carbon audit also came out to be highly significant at 1% level of significance.

Table 5.14
Regression Results – Green Rank CED Quality (Oprobit)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Quality	**0.312*** **	**0.306*** **	**0.311*** **
	(0.06)	**(0.06)**	**(0.08)**
Sustain		0.137	0.145
		(0.09)	(0.11)
Emission			**-1.196*** **
			(0.25)
Audit			**0.315*** **
			(0.06)
Investment			0.134
			(0.30)
Size	**0.401*** **	**0.345** **	**1.724*** **
	(0.11)	**(0.12)**	**(0.42)**
Age	**-0.204***	**-0.216** **	0.0967
	(0.08)	**(0.08)**	(0.12)
Intercept	**6.936*** **	**6.992*** **	**5.043***
	(1.22)	**(1.19)**	**(2.46)**
pseudo R-squared	0.045	0.048	0.112
AIC	1112.8	1112.4	850.5

Log likelihood	-491.4	-490.2	-363.2
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 5.15 presents the regression results by dividing the sample in high and low green reputation groups. In line with prior similar studies done in disclosure literature, this thesis checks the robustness of the results found from the robust regression analysis (Table 5.9 and Table5.10) by running additional regression dividing the sample in a high green reputation and low green reputation (Reverte, 2009). Top and bottom one-third cases of the sample were taken on the basis of green score obtained from the People and planet to proxy high and low green reputation. For that purpose, the sample has been split up in three groups based on the People and Planet green score. The first group has 45 HEIs in it with the highest green scores, the second group has 45 HEIs with least green scores and the third group includes 45 HEIs with average green score. The dependent variable thus becomes dichotomous dummy variable with the value of 1 for high (top one-third) green scores and the value of 0 for low (bottom one-third) green scores. Thus, a LOGIT regression model would be the suitable model in this case. Table 5.15 presents sensitivity analysis with CED volume as an independent variable. Results presented in Table 5.15 agree with the earlier study findings in the thesis.

Table 5.15

Regression – Top and bottom one-third Green Score CED Volume (LOGIT)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Volume	**13.06*** **	**14.00*** **	26.86
	(3.81)	**(4.25)**	(20.21)
Sustain		0.906	1.356
		(0.65)	(1.08)
Emission			**-5.444*** **
			(1.91)
Audit			**2.506*** **
			(0.82)
Investment			1.219
			(1.88)
Size	**1.254** **	1.053	**4.913***
	(0.50)	(0.67)	**(2.93)**
Age	**-0.906*** **	**-1.120*** **	-2.247
	(0.33)	**(0.35)**	(1.84)
Intercept	**-10.42** **	**-12.15** **	22.61
	(4.79)	**(6.15)**	(20.33)
pseudo R-squared	0.344	0.401	0.843
AIC	83.28	78.76	30.06
Log likelihood	-37.64	-34.38	-7.029
N	90	90	90
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 5.16 presents the results of same kind of sensitivity analysis as earlier in Table 5.15 with LOGIT regression model with the exception of CED quality as an independent variable instead of CED volume. This LOGIT model is appropriate considering that the green scores are separated in two groups with top one-third and bottom one-third green scores. Thus, the dependent variable – reputation becomes a dummy variable with 1 for high green scores and 0 for low green scores. Robustness check in Table5.16 also agrees with the earlier study findings in the thesis. As before CED quality was found significant in all three separate

models at 1% level of significance. Carbon emission and carbon audit also came out to be highly significant at 1% level of significance.

Table 5.16
Regression – Top and bottom one-third Green Score CED Quality (LOGIT)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Quality	**0.854*** **	**0.847*** **	1.118
	(0.24)	**(0.25)**	(1.10)
Sustain		0.724	1.087
		(0.54)	(0.78)
Emission			**-5.906*** **
			(2.18)
Audit			**2.546*** **
			(0.71)
Investment			0.766
			(2.07)
Size	**1.199*** **	**1.067** **	**4.442***
	(0.44)	**(0.51)**	**(2.29)**
Age	**-0.913*** **	**-1.090*** **	-1.862
	(0.32)	**(0.33)**	(1.54)
Intercept	**-10.56** **	**-12.06** **	**37.42** **
	(4.18)	**(4.91)**	**(15.63)**
pseudo R-squared	0.34	0.381	0.814
AIC	83.74	81.08	32.63
Log likelihood	-37.87	-35.54	-8.315
N	88	88	88
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

Table 5.17 presents the regression results by dividing the sample in high and low green reputation groups. The robustness check of regression analysis has been repeated with two groups separated with median. The two groups are – high environmentally reputed and low environmentally reputed HEIs. The first group with high environmentally reputed HEIs in the analysis holds HEIs with the People and Planet green score above the median value. Whilst the second group

with low environmentally reputed HEIs include universities having lower than median green score by the People and Planet green ranking.

The dependent variable thus again becomes dichotomous dummy variable with the value of 1 for high (top half) green scores and the value of 0 for low (bottom half) green scores, which shows that a LOGIT regression model would be the suitable model in this case. Table 5.17 presents sensitivity analysis with CED volume as an independent variable. As before CED volume, Carbon emission and carbon audit came out to be highly significant at 1% level of significance. These results also confirm the earlier study findings in the thesis.

Table 5.17
Regression – Top and bottom half Green Score CED Volume (LOGIT)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Volume	**6.006*** **	**6.120*** **	**6.488*** **
	(2.30)	**(2.31)**	**(3.01)**
Sustain		0.339	-0.00163
		(0.24)	(0.27)
Emission			**-1.672*** **
			(0.62)
Audit			**0.510*** **
			(0.17)
Investment			0.114
			(0.67)
Size	0.43	0.282	**2.206***
	(0.30)	(0.31)	**(1.00)**
Age	**-0.481** **	**-0.514** **	-0.206
	(0.18)	**(0.18)**	(0.30)
Intercept	-3.082	-3.118	3.057
	(2.94)	(2.76)	(6.20)
pseudo R-squared	0.118	0.134	0.333
Log likelihood	-79.38	-77.97	-48.66
N	135	135	135
Robust standard errors in parentheses	*** p<0.01, ** p<0.05, * p<0.1		

Table 5.18 presents the results of sensitivity analysis which agrees to the earlier results. Here also a LOGIT model is appropriate considering that the green scores are separated in two groups with top one-third and bottom one-third green scores. Thus, the dependent variable – reputation again becomes a dummy variable with 1 for high green scores and 0 for low green scores. As before CED quality, Carbon emission and carbon audit came out to be highly significant at 1% level of significance.

Table 5.18
Regression – Top and bottom half Green Score CED Quality (LOGIT)

Models	**(5.1)**	**(5.2)**	**(5.3)**
Variables	**Dependent variable = Green Reputation**		
CED Quality	**0.456*** **	**0.440*** **	**0.404*** **
	(0.15)	**(0.15)**	**(0.18)**
Sustain		0.276	-0.0698
		(0.24)	(0.28)
Emission			**-1.645*** **
			(0.63)
Audit			**0.521*** **
			(0.17)
Investment			-0.0738
			(0.71)
Size	0.401	0.295	**2.100***
	(0.27)	(0.29)	**(1.05)**
Age	**-0.484** **	**-0.513** **	-0.152
	(0.18)	**(0.18)**	(0.31)
Intercept	-3.371	-3.48	4.468
	(2.70)	(2.60)	(6.27)
pseudo R-squared	0.138	0.149	0.336
Log likelihood	-77.59	-76.67	-48.45
N	135	135	135
Robust standard errors in parentheses		*** p<0.01, ** p<0.05, * p<0.1	

The robustness tests done in this section show the results using all variations remain comparable and thus confirm the validity of the results found in the main regression analysis.

5.5.5 Summary of Results

Table 5.19 shows the summary of the regression results for the study. This shows that CED, carbon emission and carbon audit have highly significant impact on the CED quality. Independent carbon reporting is significant only at 10% level and the impact is positive, whilst investment to reduce carbon has no evidence to be a significant determinant of HEI green reputation.

Table 5.19

Summary Results

Predictors		CED Quality	
		Results	**Significance**
H1	CED	+	Highly Significant
H2	Sustainability Reporting	+	Significant only at 10%
H3	Carbon Emission	-	Highly Significant
H4	Carbon Audit	+	Highly Significant
H5	Carbon Investment	+	Not Significant

5.6 CHAPTER CONCLUSION

The research is distinct in investigating the impact of CED and carbon performances by UK HEIs on their environmental reputation. It shows whether and how the HEI CED and carbon performances contribute towards the environmental reputation of the institution. It argues that as HEIs can *signal* their carbon initiatives through CED to their various stakeholders to create a positive image of environment and carbon responsiveness. The chapter also argues that HEIs are different from profit seeking companies and thus possess distinguished characteristics those differentiate them from profit oriented companies. This calls for specific academic and research attention for HEIs. Generalising the research study for profit oriented companies for the majorly publicly funded UK HEIs should mislead any outcome. Thus, this chapter investigates the factors affecting the HEI green reputation including carbon disclosures in both annual reports and independent reports and other carbon performances – i.e. emission, audit and

investment. This research contributes to the existing knowledge of carbon disclosures by providing evidences of factors impacting organisational green reputation. In the way of doing so, the research measures organisational reputation taking a proxy from external reputation score after consultation with existing literature (Toms, 2002). Carbon emission disclosures were measured with both volume and quality of disclosures in annual reports together with disclosure in separate independent reports, whereas carbon performances were measured with three variables carbon emission, carbon audit in place and carbon investment.

This chapter found evidences to support that there is a strong causal relationship in existence between environmental reputation of HEIs and carbon emission disclosures by HEIs – both volume and qualitative. The strong causal relationship found from the multivariate analysis can be explained with the argument that HEIs are motivated to disclose more and authentic news on their carbon sensitivity – not only in larger volume but also they are motivated to provide more useful information to readers through annual reports. Carbon disclosures in annual reports signal their carbon sensitivity which adds to their image of environmentally responsible organisation and result in higher green reputation. However, disclosures in independent sustainability reports had only a limited evidence to impact HEI green reputation.

This study is distinct in extending the prior knowledge for HEIs, which are different from profit seeking organisations and possess distinct characteristics. The chapter shows CED impact on HEI green reputation. It also does compare the impact of total volume of disclosures with effect of specific quality signals. The chapter contributes to the social disclosure literature by adding specialised reflection on HEIs regarding the relationship between carbon performances and green reputation. Carbon performances as measured by emission, audit and investment were evidenced to have a mix result in terms of effecting green reputation. Carbon emission quite expectedly has negative impact on the green reputation, whereas effective carbon audit has a positive impact on the green reputation as evidenced from the study. Society comes to know the actual carbon performances of the HEIs and evaluates their image accordingly. Thus, the green reputation is likely to reflect the carbon performances by HEIs. However,

interestingly the study did not find any significant relationship between investment on carbon reduction and the green reputation of HEIs. Further study with wider database can reveal deeper into the relationship. Such future study may involve longer time span, qualitative approach with case studies or interviews, media coverage beyond annual reports and sustainability report e.g. internet, television, newspaper etc.

CHAPTER SIX

CONCLUSION

CHAPTER 6

Conclusion

6.1 CHAPTER OVERVIEW

This thesis expectedly contributes to the existing knowledge base in environmental reporting and higher education sector in several ways. *First,* this study examines the characteristics and determinants of carbon emission disclosures within annual reports by the UK higher education institutions (HEI). HEIs are distinct in characteristics and thus the study finds out different determinants of such disclosures from the profit seeking organizations, which has been widely researched in literature. Generalising the research study of profit oriented companies for the majorly publicly funded UK HEIs should mislead any outcome. This study investigates the impact of regulatory intervention on carbon emission disclosures (CED) by HEIs, thus is important and expected to attract the policy interventions regarding HEIs. *Second,* this research investigates Beattie et al.'s (2004) argument that the organisations who are disclosing more is more likely to produce useful and quality information. This research finds evidences to support that argument in the narrower scope of carbon emission disclosure by UK higher educational institutions. This study also investigates the impact of carbon reduction target imposed by the Higher Educational Funding Council England (HEFCE) on the quality of carbon disclosure reported in annual reports by the higher educational institution in the UK. *Third,* this study contributes to the existing knowledge of carbon disclosures by providing evidences of factors impacting organisational green reputation. This research investigates the factors effecting the HEI green reputation including carbon disclosures in both annual reports and independent reports and other carbon performances – i.e. emission, audit and investment.

This chapter summarizes the thesis in relation to its main objectives and findings. It depicts the objectives and contribution of the thesis in relation to the research on the carbon disclosure determinants, relationship of volumetric and qualitative disclosures, and carbon reputation. An understanding of the limitations of this

research can give a direction to the future research and may define the scope of this thesis.

A summary of the empirical findings in this thesis has been provided in following sections. They also depict overall conclusions and comprehensive recommendations for further research based on the results. The implications of findings are also indicated in following sections.

6.2 SYNOPSIS AND FINDINGS

The thesis is divided into three main parts. First, this study examines the determinants of carbon emission disclosures within annual reports by the UK higher education institutions. In the process, it investigates the impact of regulatory intervention on CED, thus is important and expected to attract the policy interventions regarding HEIs. Carbon reduction target imposed by HEFCE was found to have significant positive impact on CED. The results also show that carbon audit and HEI region have significant impact in determining CED volume in annual reports.

HEIs were found to be consistent with the corporate sector in terms of types of carbon disclosure, non-monetary and declarative good news being the major types of CED by far. However, HEIs do tend to cover a wide variety of areas of carbon disclosures, all of them being comparable in terms of volume, the area of 'Carbon initiatives, processing, reduction and abatement' was evident to have the most disclosures and by majority of the HEIs. The average volume of carbon emission disclosures in annual reports by disclosing UK HEIs is approximately twelve sentences.

This study investigates the determinants of carbon emission disclosures in annual reports by higher education institutions in the UK. This has been widely investigated in prior literature in different countries for profit seeking organizations. This study recognizes that the distinctive characteristics of HEIs make them different from general profit seeking organization and thus argues that a separate study on determinants of HEIs is the call of the time. The study results confirm this argument with different determinant factors for HEI CED, which proves the appropriateness of the study.

This part of the thesis also adds to the literature by using Tobit model, which is the correct model to use, considering the distribution here is essentially of censored nature. However, the study also accounts for the counter argument with the transformed data in continuous form without any specific intention to make it censored. Thus an OLS model was also performed to account for the sensitivity. The study also acknowledges that the distribution is primarily comprised of sentence count with over dispersion, hence making negative binomial model a suitable in case of untransformed count distribution. Sensitivity analysis comprises both OLS and negative binomial models in the study.

The results reported here show a strong relationship between the *HEFCE carbon target to be achieved by the year 2020* and *carbon disclosures* in annual reports. Basis for this research here is that the more critical particular stakeholder resources are to the existence and success of an organization, the more authoritative the stakeholder is and more likely the expectations of such stakeholder are to be fulfilled. This demand may relate to the provision of organisational carbon reporting (Ullman, 1985). This fact is supported by both *stakeholder and institutional theories* providing the motivation to manage important stakeholders' expectations and demands by disclosing more to signal their conformity with such expectations and demands to secure the existence. The findings of this research are expected to impact the policy evaluation and formulation in this regard.

Additionally, *carbon audit* and *region of establishment* were found to have a significant influence over the carbon disclosure volume. This suggests institutional carbon audit for carbon efficiency is an important causal factor for HEIs to disclose more. This might be either in the sense that carbon audit itself is an important thing that HEIs disclose in their annual reports, or environmental audit persuades the HEIs to be more carbon responsible and emit less carbon, which in turn creates many more opportunities to get involved with carbon efficiency leading to vast reporting of these activities in the disclosure section of the annual reports to signal their conformity with *stakeholders and institutional expectations.* Region of establishment was found to be a significant explanatory factor of carbon emission disclosure volume in annual reports as well. This is as

hypothesized that universities in certain region tend to have more priority about sustainability and priorities do differ from one region to another. However, reason for this difference is not in the scope of this research.

The second part of the thesis is a response to the overall social reporting debate in last decade that has shifted from the question whether to report – toa mature concern of scope, quality, type (both quantity and quality), length or quantity of such disclosure (Yekini and Jallow, 2012). Importance of quality measure as a valuable tool in the social reporting has been highly supported in literature (Hasseldine et al., 2005; Toms, 2002). This part of the thesis contributes to the existing knowledge of disclosure quality of carbon reporting by coming up with a unique tool and index for measuring quality. In the way of doing so, the research also comprehensively defines disclosure quality on the basis of existing literature.

This study investigates Beattie et al.'s (2004) argument that the organisations who are disclosing higher are more likely to produce useful and quality information. This research found evidences to support that argument in the narrower scope of carbon emission disclosure by UK higher educational institutions. This study also investigates the impact of carbon reduction target imposed by the HEFCE on the quality of carbon disclosure reported in annual reports by the higher educational institutions in the UK. The strong causal relationship found from the multivariate analysis can be explained with the argument that the HEFCE target set as a requirement for the capital innovation fund acted as a sufficient influence and motivation to report more about their carbon activities. However, reporting more has led to increased quality and this can be explained in light of *stewardship theory* where the HEIs are self-motivated to monitor what they report to be useful to the readers of annual reports.

The third part of the thesis investigates the factors affecting the HEI green reputation including carbon disclosures in both annual reports and independent reports and other carbon performances – i.e. emission, audit and investment. This study contributes to the existing knowledge of carbon disclosures by providing evidences of factors impacting organisational green reputation. In the way of doing so, the research measures organisational reputation taking a proxy from external reputation score after consultation with existing literature (Toms, 2002).

Carbon emission disclosure was measured with both volume and quality of disclosure together with independent reporting, whereas carbon performances were measured with three variables carbon emission, carbon audit in place and carbon investment.

This part of the thesis found evidences to support that there is a strong causal relationship in existence between CED – both volume and qualitative and environmental reputation of HEIs. The strong causal relationship found from the multivariate analysis can be explained with the argument that HEIs are motivated to disclose more and authentic news on their carbon sensitivity – not only in larger volume but also they are motivated to provide more useful information to readers through annual reports. This CED in annual reports signals their carbon sensitivity which adds to their image of environmentally responsible organisation and results in higher green reputation. However, disclosures in independent sustainability report only a limited evidence to impact HEI green reputation.

6.3 IMPLICATIONS OF THE STUDY

First, this thesis contributes to the literature by finding the determinants of carbon emission disclosures with respect to higher education institutions in the UK. Carbon emission has become a global issue and attracted much public awareness since seventies. This has resulted in stricter policies, acts, regulations and higher social expectation for the existence of organizations. There existed a void in research with HEIs carbon disclosures, which was widely researched for profit seeking organisations. HEIs being in possession of distinctive characteristics are in a great position to put on an example of good practice in carbon sensitivity. Being motivated by this fact HEFCE has set definite targets for the HEIs. This public awareness and regulatory monitoring should act as a pressure from stakeholders and institutional norm and is expected to have an impact on the carbon disclosure to the stakeholders and society as a whole. This study finds distinct causal determinants and proves the impact of regulatory intervention on HEIs CED. It also shows how carbon disclosures vary in respect of region and league belongingness. Also, organizational own priority in the form of environmental audit proves to have significant influence from micro perspective.

The findings of this study adds to Godemann et al. (2011), Mazhar et al. (2014) and Nejati et al. (2011) by having its own contribution in the disclosure literature.

Second, the thesis contributes to the social disclosure literature by adding specialised reflection on HEIs regarding the argument going on with the relationship between the CED volume and quality. The positive relationship found in the study reconfirms Beattie et al.'s (2004) argument that higher amount of disclosures is likely to result in higher disclosure quality. The probable reason might be that the organisations disclosing higher are likely to have more concrete news to share. Thus they spend more words on these news and words spent do make sense. Also, the HEI managers having the *stewardship responsibilities* towards the organisations are rightly disclosing their performances – both good and bad – as expected. The second contribution of the study is the finding that carbon reduction target set by the HEFCE results in higher CED quality. This might be the fact that higher targets create more pressure to work towards carbon sensitivity as the HEIs strive to achieve their targets. These extra efforts to reduce carbon results in availability of more news to disclose in the annual reports. However, universities not working much are not producing lower quality disclosures to misguide the stakeholders could be a kind of surprise to many. Here, universities are expectedly managed by well knowledge people and they are aware of the ethics of their job and according to the *theory of stewardship* they only report what they should. Application of the *stewardship theory* in social disclosure research, which is highly dominated by the political economy theories, is another contribution of this thesis.

Third, the thesis also contributes to the social disclosure literature by adding specialised reflection on HEIs regarding the relationship between carbon performances and green reputation. Carbon performances as measured by emission, audit and investment were evidenced to have a mix result in terms of effecting green reputation. Carbon emission quite expectedly has negative impact on the green reputation, whereas effective carbon audit has a positive impact on the green reputation as evidenced from the study. Society comes to know the actual carbon performances of the HEIs and evaluates their image accordingly. Thus the green reputation is likely to reflect the carbon performances by HEIs.

6.4 LIMITATIONS AND FUTURE RESEARCH

Well identified limitations extend the scope for future research. While assessing the study findings the limitations should be kept in mind. The thesis examines only a single year - 2012 annual reports and sustainability report and UK higher education institutions (HEI).That is why the findings from the thesis needs to be assumed to cover beyond UK HEIs or extended time span with sufficient caution. Future research may look for evidence of similar relationship over longer time span. Further study with wider database can reveal deeper into the relationship.

This study uses content analysis – dealing with both quantitative and qualitative content of the disclosure in annual reports and stand-alone reports. However, focus into other qualitative approach and other media can be interesting. Also, it is possible that the intent of the communicator is not possible to identify with content analysis. Further, studies can involve case studies, interviews to have a clearer insight. Comparing the studies with different approaches (content analysis with case studies or interviews with same respondents) and results might prove to be useful with future studies.

This thesis controls for disclosures in standalone reports while focusing mainly on annual reports disclosures. Nevertheless, there could possibly be other sources of such disclosures. It might be the case that the other media used to disclose the carbon issues by the HEIs happen to be more important and disclose unique information as compared to annual reports and standalone reports. Such media may include – internet reporting, reporting in news outlet like publicity in television, newspaper or radio, and many others. This thesis argued that all the unique carbon disclosures are covered by annual reports and stand-alone reports and thus other media only repeat the news without containing any uniqueness. However, it might be misleading to confine the scope of carbon reporting only to annual reports and standalone reports (Zeghal and Ahmed, 1990). Considering the HEIs might use other media for disclosing unique information across the public, future study can incorporate those external media to have better understanding of the relationship.

Future research may consider studying the reports and disclosures on the internet, which is becoming a big display board for sustainability related issues by HEIs and other institutions. Possible extension could be to find out the determinants of carbon emission disclosures by HEIs and quality of those reports. Another extension would be to provide insights into how British universities use internet to disclose carbon related information on the internet. Further, how disclosures reported in the annual and stand-alone reports compare with disclosures reported in internet? Do the disclosures provided on the internet have any new information as compared to that of annual reports? In addition, whether there are any additional factors determining the extent of internet disclosures? Additionally, this study deals only with universities in the UK and the results of this thesis cannot be generalised for other countries. Future studies can consider international comparison regarding the carbon disclosures by universities.

This thesis uses the People and Planet database to investigate relationship between carbon emission disclosures and environmental reputation. People and Planet produces a scoring and ranking of UK universities based on their environmental performances. There might be other and ways to measure the carbon reputation. Further study can be introduced considering other measurement of carbon reputation to have a robust measurement. Thus, an addition to this thesis would be to use multiple sources of data to assess the carbon reputation of UK HEIs.

Further, this study considers only a single year sample and does not account for any yearly inconsistency. This indicates that the results might not hold on year-to-year basis. Though the study does not find any significant fluctuation of carbon emission disclosures by UK HEIs around the sample year of the study period, the robustness could be further strengthened with panel data analysis, which has become very popular among researchers in recent time. Panel data analysis has its own advantages. It allows the investigation to be free from heterogeneity and thus gives more scope for unbiased results. Panel data also allows using data with more variability and less collinearity. Above all, it allows measuring more details effects, which are not detectable with cross section analysis.

6.5 CHAPTER CONCLUSION

This concluding chapter briefly explains what has been conducted throughout the thesis and motivations for doing it. The thesis is unique regarding following aspects. First, this thesis investigates the determinants of CED in annual reports of HEIs in the UK, with special concern of the impact of the HEFCE carbon reduction target on such disclosures. It explores and compares the determinants of CED by UK HEIs. Second, this thesis explores the determinants of carbon emission disclosures quality by HEIs in the UK, with special concern of the impact of HEFCE carbon reduction target on such disclosures. It is distinct investigating the relationship between CED volume and quality. CED volume has been criticised arguing that mere wordy CED is not good enough. This study explores the decision usefulness of the CED by HEIs i.e. investigates whether the more CED means more useful it is. Third, the thesis investigates the impact of CED and other carbon performance by HEIs on their green reputation. The impact of CED and other carbon performances needs to have clear relationship to the reputation to motivate the HEIs to act and disclose. The study shows whether and how the HEI CED and carbon performances contribute towards the environmental reputation of the institution.

Within this chapter, the limitations and implications of the thesis have also been discussed along the suggestion areas for future research. These stem from both the limitations and findings of the research conducted here.

REFERENCES

Abbott, W.F. and Monsen, R.J. (1979), "On the Measurement of Corporate Social Responsibility: Self-Reported Disclosures as a Method of Measuring Corporate Social Involvement", *Academy of Management Journal*, Vol. 22 No. 3, pp. 501–515.

Abeysekera, I. and Guthrie, J. (2004), "Human capital reporting in a developing nation", *British Accounting Review*, Vol. 36 No. 3, pp. 251–268.

Adams, C.A. (2002), "Internal organisational factors influencing corporate social and ethical reporting: Beyond current theorising", *Accounting, Auditing & Accountability Journal*, Vol. 15 No. 2, pp. 223–250.

Adams, C.A. (2013), "Sustainability reporting and performance management in universities: Challenges and benefits", *Sustainability Accounting, Management and Policy Journal*, Vol. 4 No. 3, pp. 384–392.

Adams, C.A., Hill, W. and Roberts, C.B. (1998), "Corporate social reporting practices in western europe: legitimating corporate behaviour?", *British Accounting Review*, Vol. 30, pp. 1–21.

Akerlof, G.A. (1970), "The market for 'lemons': Quality uncertainty and the market mechanism", *Quarterly Journal of Economics*, Vol. 84 No. 3, pp. 488–500.

Al-Shaer, H. (2013), *The Relationship between Audit Committees, Corporate Environmental Disclosure, and Environmental Reputation: UK Evidence*, Durham University Business School.

Al-Tuwaijri, S.A., Christensen, T.E. and Hughes II, K.. (2004), "The relations among environmental disclosure, environmental performance, and economic performance: a simultaneous equations approach", *Accounting, Organizations and Society*, Vol. 29 No. 5–6, pp. 447–471.

Aldrich, H.E. and Fiol, C.M. (1994), "Fools rush in? The institutional context of industry creation", *The Academy of Management Review*, Vol. 19 No. 4, p. 645.

Alnajjar, F.K. (2000), "Determinants of social responsibility disclosures of U.S. fortune 500 firms: an application of content analysis", *Advances in Environmental Accounting & Management*, Vol. 1, pp. 163–200.

Alotaibi, K. and Hussainey, K. (2016), "Quantity Versus Quality : the Value Relevance of CSR Disclosure of Saudi Companies", *Corporate Ownership and Control Journal*, Vol. 13 No. 2, pp.

167–179.

Alsaeed, K. (2006), “The association between firm-specific characteristics and disclosure: The case of Saudi Arabia”, *Managerial Auditing Journal*, Vol. 21 No. 5, pp. 476–496.

Aminuzzaman, S.M. (1991), *Introduction to Social Research*, Bangladesh Publishers.

Andrew, B.H., Gul, F.A., Guthrie, J. and Teoh, H.Y. (1989), “A note on corporate social disclosure practices in developing countries: the case of Malaysia and Singapore”, *British Accounting Review*, Vol. 21, pp. 371–376.

Andrew, J. and Cortese, C. (2011), “Accounting for climate change and the self-regulation of carbon disclosures”, *Accounting Forum*, Elsevier Ltd, Vol. 35 No. 3, pp. 130–138.

Armstrong, C.S., Guay, W.R. and Weber, J.P. (2010), “The role of information and financial reporting in corporate governance and debt contracting”, *Journal of Accounting and Economics*, Elsevier, Vol. 50 No. 2–3, pp. 179–234.

Arrow, K.J. (1972), *Some Models of Racial Discrimination in the Labor Market*, *Racial Discrimination in Economic Life*.

Ballou, B., Heitger, D.L. and Landes, C.E. (2006), “The Future of corporate sustainability reporting”, *Journal of Accountancy*, Vol. 202 No. 6, pp. 65–74.

Baum, C.F. (2006), “An Introduction to Modern Econometrics Using Stata”.

Beattie, V. (2000), “The future of corporate reporting: A review article”, *Irish Accounting Review*, Vol. 7 No. 1, pp. 1–36.

Beattie, V., McInnes, B. and Fearnley, S. (2004), “A methodology for analysing and evaluating narratives in annual reports: A comprehensive descriptive profile and metrics for disclosure quality attributes”, *Accounting Forum*, Vol. 28 No. 3, pp. 205–236.

Bebbington, J. (1997), “Engagement, education and sustainability accounting”, *Accounting, Auditing & Accountability Journal*, Vol. 10 No. 3, pp. 365–381.

Bebbington, J. and Larrinaga-González, C. (2008), “Carbon Trading: Accounting and Reporting Issues”, *European Accounting Review*, Vol. 17 No. 4, pp. 697–717.

Bebbington, J., Larrinaga-González, C. and Moneva-Abadía, J.M. (2008a), “Legitimating

reputation/the reputation of legitimacy theory", *Accounting, Auditing & Accountability Journal*, Vol. 21 No. 3, pp. 371–374.

Bebbington, J., Larrinaga-González, C. and Moneva-Abadía, J.M. (2008b), "Corporate social reporting and reputation risk management", *Accounting, Auditing & Accountability Journal*, Vol. 21 No. 3, pp. 337–361.

Beck, A.C., Campbell, D. and Shrives, P.J. (2010), "Content analysis in environmental reporting research: enrichment and rehearsal of the method in a British – German context", *British Accounting Review*, Elsevier Ltd, Vol. 42, pp. 207–222.

Belkaoui, A. (1980), "The impact of socio-economic accounting statements on the investment decision: an empirical study", *Accounting, Organizations and Society*, Vol. 5 No. 3, pp. 263–283.

Belkaoui, A. and Karpik, P.G. (1989), "Determinants of the Corporate Decision to Disclose Social Information", *Accounting, Auditing & Accountability Journal*, Vol. 2 No. 1, pp. 36–51.

Beretta, S. and Bozzolan, S. (2004), "A framework for the analysis of firm risk communication", *International Journal of Accounting*, Vol. 39 No. 3, pp. 265–288.

Beretta, S. and Bozzolan, S. (2008), "Quality versus Quantity: The Case of Forward-Looking Disclosure", *Journal of Accounting, Auditing & Finance*, Vol. 23 No. 3, pp. 333–376.

Bini, L., Daielli, F. and Giunta, F. (2011), "Signalling theory and voluntary disclosure to the financial market. Evidence from the profitability indicators published in the annual report", *34th EAA Annual Congress*, Rome, pp. 1–29.

Blacconiere, W.G. and Patten, D.M. (1994), "Environmental disclosures, regulatory costs, and changes in firm value", *Journal of Accounting and Economics*, Vol. 18, pp. 357–377.

Boesso, G. and Kumar, K. (2007), "Drivers of corporate voluntary disclosure: A framework and empirical evidence from Italy and the United States", *Accounting, Auditing & Accountability Journal*, Vol. 20 No. 2, pp. 269–296.

Botosan, C.A. (1997), "Disclosure level and the cost of equity capital", *The Accounting Review*, Vol. 72 No. 3, pp. 323–249.

Boyce, G., Greer, S., Blair, B. and Davids, C. (2012), "Expanding the horizons of accounting

education: Incorporating social and critical perspectives", *Accounting Education*, Vol. 21 No. 1, pp. 47–74.

Brammer, S. and Pavelin, S. (2006), "Corporate reputation adn social performance: The importance of fit", *The Journal of Management Studies*, Vol. 43 No. 3, pp. 435–456.

Branco, M.C. and Rodrigues, L.L. (2008), "Factors Influencing Social Responsibility Disclosure by Portuguese Companies", *Journal of Business Ethics*, Vol. 83 No. 4, pp. 685–701.

Brandy, A. and Honey, G. (2007), "Corporate reputation : perspectives of measuring and managing a principal risk", *CimaGlobal*.

Breusch, T.S. and Pagan, R. (1979), "A Simple Test for Heteroscedasticity and Random Coefficient Variation", *Econometrica*, Vol. 47 No. 5, pp. 1287–1294.

Brignall, S. and Modell, S. (2000), "An institutional perspective on performance measurement and management in the 'new public sector'", *Management Accounting Research*, Vol. 11 No. 3, pp. 281–306.

Broadbent, J., Jacobs, K. and Laughlin, R. (2001), "Organisational resistance strategies to unwanted accounting and finance changes: The case of general medical practice in the UK", *Accounting, Auditing & Accountability Journal*, Vol. 14 No. 5, pp. 565–586.

Brown, D.L., Guidry, R.P. and Patten, D.M. (2010), "Sustainability reporting and perceptions of corporate reputation: An analysis using fortune most admired scores", *Sustainability, Environmental Performance and Disclosures*, Emerald Group Publishing, Bingley, Vol. 4, pp. 83–104.

Brown, E. and Cloke, J. (2009), "Corporate social responsibility in higher education", *ACME: An International E-Journal for Critical Geographics*, Vol. 8 No. 3, pp. 474–483.

Brown, P., Beekes, W. and Verhoeven, P. (2011), "Corporate governance, accounting and finance: A review", *Accounting and Finance*, Vol. 51 No. 1, pp. 96–172.

Bryman, A. (2015), *Social Research Methods*, Oxford University Press, Oxford.

Buhr, N. (1998), "Environmental performance , legislation and annual report disclosure : the case of acid rain and Falconbridge", *Accounting, Auditing & Accountability Journal*, Vol. 11 No. 2, pp. 163–190.

Campbell, D. (2000), “Legitimacy theory or managerial reality construction? Corporate social disclosure in Marks and Spencer Pic corporate reports , 1969-1997”, *Accounting Forum*, Vol. 24 No. 1, pp. 80–100.

Campbell, D. (2003), “Intra- and intersectoral effects in environmental disclosures: evidence for legitimacy theory?”, *Business Strategy and the Environment*, Vol. 12, pp. 357–371.

Campbell, D. (2004), “A longitudinal and cross-sectional analysis of environmental disclosure in UK companies—a research note”, *The British Accounting Review*, Vol. 36 No. 1, pp. 107–117.

Campbell, D. and Abdul Rahman, M.R. (2010), “A longitudinal examination of intellectual capital reporting in Marks & Spencer annual reports, 1978-2008”, *British Accounting Review*, Elsevier Ltd, Vol. 42 No. 1, pp. 56–70.

Campbell, D., Shrives, P. and Bohmbach-Saager, H. (2001), “Voluntary Disclosure of Mission Statements in Corporate Annual Reports: Signaling What and To Whom?”, *Business & Society Review*, Vol. 106 No. 1, pp. 65–87.

Campbell, J.L. and Pedersen, O.K. (2001), “The Rise of Neoliberalism and Institutional Analysis”, *The Rise of Neoliberalism and Institutional Analysis*, Princeton University Press, pp. 1–23.

Carpenter, V.L. and Feroz, E.H. (2001), “Institutional theory and accounting rule choice : an analysis of four US state governments â€™ decisions to adopt generally accepted accounting principles”, Vol. 26.

Caves, R.E. and Porter, M.E. (1977), “From Entry Barriers to Mobility Barriers : Conjectural Decisions and Contrived Deterrence to New Competition”, *The Quarterly Journal of Economics*, Vol. 91 No. 2, pp. 241–262.

Chatterjee, A. (2012), “Assurance of corporate greenhouse gas disclosures in the mining and crude oil production sector : a comparative inter- national Study”, *Journal of the Asia-Pacific Centre for Environmental Accountability*, Vol. 18 No. 2, pp. 75–102.

Chen, X., Ender, P., Mitchell, M. and Wells, C. (2003), *Regression with Stata*, University of California, Loss Angeles, available at: http://www.ats.ucla.edu/stat/stata/webbooks/reg/default.htm.

Chen, M.A. (2012), “The Informal Economy: Definitions, Theories and Policies”, *WIEGO Working Paper*, Vol. 1 No. August, p. 26.

Cho, C.H., Guidry, R.P., Hageman, A.M. and Patten, D.M. (2012), "Do actions speak louder than words? An empirical investigation of corporate environmental reputation", *Accounting, Organizations and Society*, Elsevier Ltd, Vol. 37 No. 1, pp. 14–25.

Chow, C.W. and Wong-Boren, A. (1987), "Voluntary financial disclosure by Mexican corporations", *The Accounting Review*, Vol. 62 No. 3, pp. 533–541.

Christensen, L.J., Peirce, E., Hartman, L.P., Hoffman, W.M. and Carrier, J. (2007), "Ethics, CSR, and Sustainability Education in the Financial Times Top 50 Global Business Schools: Baseline Data and Future Research Directions", *Journal of Business Ethics*, Vol. 73 No. 4, pp. 347–368.

Christensen, P., Thrane, M., Jørgensen, T.H. and Lehmann, M. (2009), "Sustainable development: Assessing the gap between preaching and practice at Aalborg University", *International Journal of Sustainability in Higher Education*, Vol. 10 No. 1, pp. 4–20.

Clarkson, M.B.E. (1995), "A stakeholder framework for analyzing and evaluating corporate social performance", *Academy of Management Review*, Vol. 20 No. 1, pp. 92–117.

Clarkson, P.M., Fang, X.H., Li, Y. and Richardson, G. (2011), "The Relevance Of Environmental Disclosures For Investors and Other Stakeholder Groups : Are Such Disclosures Incrementally Informative?", *Working Paper, University of Queensland, Georgia State University, and University of Toronto, SSRN eLibrary*.

Clarkson, P.M., Li, Y., Richardson, G.D. and Vasvari, F.P. (2008), "Revisiting the relation between environmental performance and environmental disclosure: An empirical analysis", *Accounting, Organizations and Society*, Vol. 33 No. 4–5, pp. 303–327.

Cohen, J. (1960), "A coefficient of agreement for nomial scales", *Educational and Psychological Measurement*, Vol. XX No. 1, pp. 37–46.

Connelly, B.L., Certo, S.T., Ireland, R.D. and Reutzel, C.R. (2011), "Signaling Theory: A Review and Assessment", *Journal of Management*, Vol. 37 No. 1, pp. 39–67.

Cooke, T.E. (1989), "Disclosure in the Corporate Annual Reports of Swedish Companies", *Accounting and Business Research*.

Cooke, T.E. (1992), "The Impact of Size, Stock Market Listing and Industry Type on Disclosure in the Annual Reports of Japanese Listed Corporations", *Accounting and Business Research*, Vol. 22 No. 87, pp. 229–237.

Cooper, S. and Pearce, G. (2011), “Climate change performance measurement, control and accountability in English local authority areas”, *Accounting, Auditing & Accountability Journal*, Vol. 24 No. 8, pp. 1097–1118.

Core, J.E. (2001), “A review of the empirical disclosure literature: Discussion”, *Journal of Accounting and Economics*, Vol. 31 No. 1–3, pp. 441–456.

Cormier, D. and Gordon, I.M. (2001), “An examination of social and environmental reporting strategies”, *Accounting, Auditing & Accountability Journal*, Vol. 14 No. 5, pp. 587–616.

Cormier, D., Ledoux, M.-J. and Magnan, M. (2011), *The Informational Contribution of Social and Environmental Disclosures for Investors*, *Management Decision*, Vol. 49, available at:http://doi.org/10.1108/00251741111163124.

Cortese, A.D. (2003), “The critical role of higher education in creating a sustainable future”, *Planning for Higher Education*, Vol. 31 No. 3, pp. 15–22.

Covaleski, M.A. and Dirsmith, M.W. (1988), “An Institutional Perspective on the Rise, Social Transformation, and Fall of a University Budget Category”, *Administrative Science Quarterly*, Vol. 33 No. 4, pp. 562–587.

Cowen, S.S. and Carolina, N. (1987), “The impact of corporate characteristics on social responsibility disclosure: a typology and frequency-based analysis”, *Accounting, Organizations and Society*, Vol. 12 No. 2, pp. 111–122.

Cox, N.J. (2006), “WINSOR: Stata module to Winsorize a variable."”, *Statistical Software Components*.

Craven, B.M. and Marston, C.L. (1999), “Financial reporting on the Internet by leading UK companies”, *European Accounting Review*, Vol. 8 No. 2, pp. 321–333.

Crichton, M. (1995), *The Lost World*.

Crowther, D. (2000), “Corporate Reporting, Stakeholders and the Internet: Mapping the New Corporate Landscape”, *Urban Studies*, Vol. 37 No. 10, pp. 1837–1848.

D’Aunno, T., Sutton, R.I. and Price, R.H. (1991), “Isomorphism and external support in conflicting institutional environments: a study of drug abuse treatment units.”, *Academy of Management Journal. Academy of Management*, Vol. 34 No. 3, pp. 636–61.

Dahan, G.S. and Senol, I. (2012), "Corporate social responsibility in higher education institutions: Istanbul Bilgi University case", *American International Journal of Contemporary Research*, Vol. 2 No. 3, pp. 95–103.

Dahle, M. and Neumayer, E. (2001), "Overcoming barriers to campus greening", *International Journal of Sustainability in Higher Education*, Vol. 2 No. 2, pp. 139–160.

Daily, C.M., Dalton, D.R. and Cannella, A.A.J. (2003), "Corporate Governance: Decades of Dialogue and Data", *Academy of Management Review*, Vol. 28 No. 3, pp. 371–382.

Dale, A., Newman, L. and Ling, C. (2010), "Facilitating transdisciplinary sustainable development research teams through online collaboration", *International Journal of Sustainability in Higher Education*, Vol. 11 No. 1, pp. 36–48.

Darnall, N., Henriques, I. and Sadorsky, P. (2010), "Adopting Proactive Environmental Strategy: The Influence of Stakeholders and Firm Size", *Journal of Management Studies*, Vol. 47 No. 6, pp. 1072–1094.

Daub, C.H. (2007), "Assessing the quality of sustainability reporting: an alternative methodological approach", *Journal of Cleaner Production*, Vol. 15 No. 1, pp. 75–85.

Davis, J.H., Schoorman, F.D. and Donaldson, L. (1997), "Toward a Stewardship Theory of Management", *The Academy of Management Review*, Vol. 22 No. 1, pp. 20–47.

Deegan, C. (2000), *Financial Accounting Theory*, 3rd ed., McGraw-Hill, Australia.

Deegan, C. (2002), *Introduction: The Legitimising Effect of Social and Environmental Disclosures – a Theoretical Foundation*, *Accounting, Auditing & Accountability Journal*, Vol. 15, available at:http://doi.org/10.1108/09513570210435852.

Deegan, C. (2009), *Financial Accounting Theory*, 3rd ed., McGraw-Hill, Sydney.

Deegan, C. and Gordon, B. (1996), "A Study of the Environmental Disclosure Practices of Australian Corporations", *Accounting and Business Research*, Vol. 26 No. 3, pp. 187–199.

Deegan, C. and Rankin, M. (1996), "Do Australian companies report environmental news objectively? An analysis of environmental Protection Authority", *Accounting, Auditing & Accountability Journal*, Vol. 9 No. 2, pp. 50–67.

Deegan, C. and Rankin, M. (1997), "The materiality of environmental information to users of annual reports", *Accounting, Auditing & Accountability Journal*, Vol. 10 No. 4, pp. 562–583.

Deegan, C., Rankin, M. and Voght, P. (2000), "Firms' Disclosure Reactions to Major Social Incidents: Australian Evidence", *Accounting Forum*, Vol. 24 No. 1, pp. 101–130.

Dellaportas, S. and Hassall, T. (2013), "Experiential learning in accounting education: A prison visit", *British Accounting Review*, Elsevier Ltd, Vol. 45 No. 1, pp. 24–36.

Dhaliwal, D.S., Li, O.Z., Tsang, A. and Yang, Y.G. (2011), "Voluntary nonfinancial disclosure and the cost of equity capital: the initiation of corporate social responsibility reporting", *Accounting Review*, Vol. 86 No. 1, pp. 59–100.

Dillard, J.F., Rigsby, J.T. and Goodman, C. (2004), "The making and remaking of organization context: Duality and the institutionalization process", *Accounting, Auditing & Accountability Journal*, Vol. 17 No. 4, pp. 506–542.

DiMaggio, P.J. and Powell, W.W. (1983), "The iron cage revisited: institutional isomorphism and collective rationality in organizational fields", *American Sociological Review*, Vol. 48 No. 2, pp. 147–160.

DiMaggio, P.J. and Powell, W.W. (1991), *The New Institutionalism in Organizational Analysis*, Chicago University Press, Chicago, available at:http://doi.org/10.2307/258726.

Dlouhá, J., Barton, A., Janoušková, S. and Dlouhý, J. (2013), "Social learning indicators in sustainability-oriented regional learning networks", *Journal of Cleaner Production*, Vol. 49, pp. 64–73.

Donaldson, L. (1990), "The Ethereal Hand: Organizational Economics and Management Theory", *Academy of Management Review*, Vol. 15 No. 3, pp. 369–381.

Donaldson, L. (2008), "Ethics Problems and Problems with Ethics : Toward a Pro-Management Theory", *Journal of Business Ethics*, Vol. 78, pp. 299–311.

Donaldson, L. and Davis, J.H. (1991), "Stewardship Theory or Agency Theory: CEO Governance and Shareholder Returns", *Australian Journal of Management*, Vol. 16 No. June 1991, pp. 49–66.

Donaldson, L. and Davis, J.H. (1993), "1. Introduction e published an article (Donaldson and Davis 1991) in an earlier volume of the Australian Journal of Management (", Vol. 18 No. 2.

Donaldson, T. and Preston, L.E.E.E. (1995), “The Stakeholder Theory Of The Corporation: Concepts , Evidence And Implications”, *Academy of Management Review*, Vol. 20 No. 1, pp. 65–91.

Donath, J. (2007), “Signals in social supernets”, *Journal of Computer-Mediated Communication*, Vol. 13 No. 1, pp. 231–251.

Dragomir, V.D. (2012), “The disclosure of industrial greenhouse gas emissions: a critical assessment of corporate sustainability reports”, *Journal of Cleaner Production*, Elsevier Ltd, Vol. 29–30, pp. 222–237.

Durbin, J. (1954), “Errors in Variables”, *Review of the International Statistical Institute*, Vol. 22 No. 1/3, pp. 23–32.

Eccles, R.G., Herz, R.H., Keegan, E.M. and Philips, D.M.H. (2001), *The Value of Reporting Revolution*, Price Waterhouse Coopers, New York.

Eccles, R.G., Newquist, S.C. and Schatz, R. (2007), “Reputation and its risks”, *Harvard Business Review*, Vol. 85 No. 2.

Eddleston, K.A., Kellermanns, F.W. and Zellweger, T.M. (2012), “Exploring the Entrepreneurial Behavior of Family Firms: Does the Stewardship Perspective Explain Differences?”, *Entrepreneurship: Theory and Practice*, Vol. 36 No. 2, pp. 347–367.

Edelman, L.B. (1990), “American Workplace Legal Environments and Organizational Governance: The Expansion of Due Process in the American Workplace”, *American Journal of Sociology*, Vol. 95 No. 6, pp. 1401–1440.

Espinosa, M. and Trombetta, M. (2007), “Disclosure interactions and the cost of equity capital: Evidence from the Spanish continuous market”, *Journal of Business Finance and Accounting*, Vol. 34 No. 9–10, pp. 1371–1392.

Filho, W.L. (2011), “About the role of universities and their contribution to sustainable development”, *Higher Education Policy*, Vol. 24, pp. 427–438.

Fligstein, N. (1985), “The spread of the multidivisional form among large firms, 1919-1979”, *American Sociological Review*, Vol. 50 No. 3, pp. 377–391.

Fogarty, T.J. (1992), “Financial Accounting Standard Setting as an Institutionalized Action Field : Constraints , Opportunities and Dilemmas”, Vol. 0, pp. 331–355.

Fomburn, C. and Shanley, M. (1990), "What's in a Name? Reputation Building and Corporate Strategy", *The Academy of Management Journal*, Vol. 33 No. 2, pp. 233–258.

Forum for the Future. (2007), *Higher Education for Sustainable Development - Final Report of International Action Research Project*, available at: http://www.oecd.org/dataoecd/55/4/45575516.pdf.

Foster, D. and Jonker, J. (2005), "Stakeholder relationships: the dialogue of engagement", *Corporate Governance*, Vol. 5 No. 5, pp. 51–57.

Francis, J., Nanda, D. and Olsson, P. (2008), "Voluntary disclosure, earnings quality, and cost of capital", *Journal of Accounting Research*, Vol. 46 No. 1, pp. 53–99.

Freedman, M. and Jaggi, B. (1988), "An analysis of the association between pollution disclosure and economic performance", *Accounting, Auditing & Accountability Journal*, Vol. 1 No. 2, pp. 43–58.

Freedman, M. and Jaggi, B. (2005), "Global warming, commitment to the Kyoto protocol, and accounting disclosures by the largest global public firms from polluting industries", *The International Journal of Accounting*, Vol. 40 No. 3, pp. 215–232.

Freedman, M. and Stagliano, A.J. (1991), "Differences in social-cost disclosures: A market test of investor reactions", *Accounting, Auditing & Accountability Journal*, Vol. 4 No. 1, pp. 68–83.

Freedman, M. and Stagliano, a. J. (2008), "Environmental disclosures: electric utilities and Phase 2 of the Clean Air Act", *Critical Perspectives on Accounting*, Vol. 19 No. 4, pp. 466–486.

Freedman, M. and Wasley, C. (1990), "The association between environmental performance and environmental disclosure in annual reports and 10ks", *Advances in Environmental Accounting and Management*, Jai Press Inc., Vol. 3, pp. 183–193.

Freeman, R.E. (1984), *Strategic Management: A Stakeholder Approach*, Pitman, Boston.

Freeman, R.E. (1994), "The politics of stakeholder theory: some future directions^", Vol. 4 No. 4, pp. 409–422.

Freeman, R.E., Wicks, A.C. and Parmar, B. (2004), "Stakeholder Theory and 'The Corporate Objective Revisited'", *Organization Science*, Vol. 15 No. 3, pp. 364–369.

Friedman, A.L. and Miles, S. (2002), “Developing stakeholder theory”, *Journal of Management Studies*, Vol. 39 No. 1, pp. 1–21.

Frumkin, P. and Galaskiewicz, J. (2004), “Institutional Isomorphism and Public Sector Organizations”, *Journal of Public Administration Research and Theory*, Vol. 14 No. 3, pp. 283–307.

Galaskiewicz, J. and Wasserman, S. (1989), “Mimetic Processes within an Field: Interorganizational An Empirical Test Stanley Wasserman”, *Administrative Science Quarterly*, Vol. 34 No. 3, pp. 454–479.

Gallego-Álvarez, I., Rodríguez-Domínguez, L. and García-Sánchez, I.-M. (2011), “Study of some explanatory factors in the opportunities arising from climate change”, *Journal of Cleaner Production*, Elsevier Ltd, Vol. 19 No. 9–10, pp. 912–926.

Gamble, G.O., Hsu, K., Kite, D. and Radtke, R.R. (1995), “Environmental Disclosures In Annual Reports and 10Ks: An Examination”, *Accounting Horizons*, Vol. 9 No. 3, pp. 34–54.

Gao, S.S., Heravi, S. and Zezheng, J. (2005), “Determinants of corporate social and environmental reporting in Hong Kong : a research note”, *Accounting Forum*, Vol. 29, pp. 233–242.

García-sánchez, I.M. (2008), “Corporate Social Reporting : Segmentation and Characterization of Spanish Companies”, *Corporate Social Responsibility and Environmental Management*, Vol. 198 No. April 2007, pp. 187–198.

Garriga, E. and Melé, D. (2004), “Corporate Social Responsibility Theories : Mapping the Territory Social Responsibility Corporate Theories : Mapping the Territory”, *Journal of Business Ethics*, Vol. 53 No. 1/2, pp. 51–71.

Ghoshal, S. and Bartlett, C.A. (1990), “The Multinational Corporation as an Interorganizational Network”, *Academy of Management Review*, Vol. 15 No. 4, pp. 603–625.

Gibbins, M., Richardson, A. and Waterhouse, J. (1990), “The management of corporate financial disclosure: opportunism, ritualism, policies, and processes”, *Journal of Accounting Research*, Vol. 28 No. 1, pp. 121–143.

Gibson, K. and Donovan, G.O. (2007), “Corporate Governance and Environmental Reporting : an Australian study”, Vol. 15 No. 5, pp. 944–956.

Gietzmann, M. and Ireland, J. (2005), "Cost of capital, strategic disclosures and accounting choice", *Journal of Business Finance and Accounting*, Vol. 32 No. 3–4, pp. 599–634.

Glennie, M. and Lodhia, S. (2013), "The influence of internal organisational factors on corporate-community partnership agendas: an Australian case study", *Meditari Accountancy Research*, Vol. 21 No. 1, pp. 52–67.

Godemann, J., Herzig, C., Moon, J. and Powell, A. (2011), *Integrating Sustainability into Business Schools – Analysis of 100 UN PRME Sharing Information on Progress (SIP) Reports United Kingdom*, Vol. 44.

Gould, J. and Kolb, W.L. (1964), *A Dictionary Ofthe Social Sciences*.

Gray, R. (2000), "Current Developments and Trends in Social and Environmental Auditing, Reporting and Attestation: A Review and Comment", *International Journal of Auditing*, Vol. 4 No. 3, pp. 247–268.

Gray, R. (2006), "Social, environmental and sustainability reporting and organisational value creation?", *Accounting, Auditing & Accountability Journal*, Vol. 19 No. 6, pp. 793–819.

Gray, R., Bebbington, J. and McPhail, K. (1994), "Teaching ethics in accounting and ethics of accounting teaching: educating for immortality and a possible case for social and environmental accounting education", *Accounting Education*, Vol. 3 No. 1, pp. 51–75.

Gray, R. and Collison, D. (2002), "Can't see the wood for the trees, can't see the trees for the numbers? Accounting education, sustainability and the public interest", *Critical Perspectives on Accounting*, Vol. 13, pp. 797–836.

Gray, R., Javad, M., Power, D.M. and Sinclair, C.D. (2001), "Social and environmental disclosure and corporate characteristics: a research note and extension", *Journal of Business Finance and Accounting*, Vol. 28 No. 3–4, pp. 327–356.

Gray, R., Kouhy, R. and Lavers, S. (1995a), "Corporate social and environmental reporting: a review of the literature and a longitudinal study of UK disclosure", *Accounting, Auditing & Accountability Journal*, Vol. 8 No. 2, pp. 47–77.

Gray, R., Kouhy, R. and Lavers, S. (1995b), "Methodological themes: Constructing a research database of social and environmental reporting by UK companies", *Accounting, Auditing & Accountability Journal*, Vol. 8 No. 2, pp. 78–101.

Gray, R., Owen, D. and Adams, C. (1996), *Accounting & Accountability: Changes and Challenges in Corporate Social and Environmental Reporting*, Prentice Hall.

Gray, R., Owen, D. and Adams, C. (2010), "Some theories for social accounting?: a review essay and a tentative pedagogic categorization of theorizations around social accounting", *Sustainability, Environmental Performance and Disclosures*, Emerald Group Publishing, Bingley, Vol. 4, pp. 1–54.

Gray, R., Owen, D. and Maunders, K. (1987), *Corporate Social Reporting*, Prentice-Hall, Englewood Cliffs, NJ.

Gray, R., Owen, D. and Maunders, K. (1988), "Corporate social reporting: Emerging trends in accountability and the social contract", *Accounting, Auditing & Accountability Journal*, Vol. 1 No. 1, pp. 6–20.

Gray, R., Owen, D.L. and Maunders, K. (1991), "Accountability, corporate social reporting, and the external social audits", *Advances in Public Interest Accounting*, Vol. 4, pp. 1–21.

Green, W. and Li, Q. (2012), "Evidence of an expectation gap for greenhouse gas emissions assurance", *Accounting, Auditing & Accountability Journal*, Vol. 25 No. 1, pp. 146–173.

Greene, W.H. (2012), *Econometric Analysis*, 7th ed., Pearson Education Ltd.

GRI. (2013), *Global Reporting Initiative- G4 Sustainability Reporting Guidelines*, available at: www.globalreporting.org.

Grossman, S.J. (1981), "The informational role of warranties and private disclosure about product quality", *Journal of Law and Economics*, Vol. 24 No. 3, pp. 461–483.

Grunig, J.E. (1989), "Symmetrical presuppositions as a framework for public relations theory", *Public Relations Theory*, pp. 17–44.

Gujarati, D.N. (2004), *Basic Econometrics*, *New York*, The McGraw-Hill Companies, available at:http://doi.org/10.1126/science.1186874.

Guler, I., Guillen, M.F. and Macpherson, J.M. (2002), "Global Competition, Institutions, and the Diffusion of Organizational Practices: The International Spread of ISO 9000 Ouality Certificates", *Administrative Science Quarterly*, Vol. 47, pp. 207–232.

Guthrie, J. and Abeysekera, I. (2006), "Content analysis of social, environmental reporting: what is new?", *Journal of Human Resource Costing & Accounting*, Vol. 10 No. 2, pp. 114–126.

Guthrie, J. and Mathews, M.R. (1985), "Corporate social accounting in Australasia", *Research in Corporate Social Performance and Policy*, Vol. 7, pp. 251–277.

Guthrie, J. and Parker, L.D. (1990), "Corporate social disclosure practice: A comparative international analysis", *Advances in Public Interest Accounting*, Vol. 3, pp. 159–175.

Hackston, D. and Milne, M.J. (1996), "Some determinants of social and environmental disclosures in New Zealand companies", *Accounting, Auditing & Accountability Journal*, Vol. 9 No. 1, pp. 77–108.

Haigh, M. and Shapiro, M. a. (2012), "Carbon reporting: does it matter?", *Accounting, Auditing & Accountability Journal*, Vol. 25 No. 1, pp. 105–125.

Halliday, T.C., Powell, M.J., Granfors, M.W. and Halliday, C. (1993), "After Minimalism: Transformations of State Bar Associations from Market Dependence to State Reliance, 1918 to 1950", *American Sociological Review*, Vol. 58 No. 4, pp. 515–535.

Halme, M. and Huse, M. (1997), "The influence of corporate governance, industry and country factors on environmental reporting", *Scandinavian Journal of Management*, Vol. 13 No. 2, pp. 137–157.

Hamilton, L.C. (1991), "sed4: Resistant normality check and outlier identification", *Stata Technical Bulletin 3*, pp. 15–18.

Hammond, K. and Miles, S. (2004), "Assessing quality assessment of corporate social reporting: UK perspectives", *Accounting Forum*, Vol. 28 No. 1, pp. 61–79.

Han, S.-K. (1994), "Mimetic isomorphism and its effect on the audit services market", *Social Forces*, Vol. 73 No. 2, pp. 637–663.

Hanafi, R.A. (2006), *An Exploration of Corporate Social and Environmental Disclosure in Egypt and UK: A Comparative Study*, Glasgow Theses Service, available at: http://theses.gla.ac.uk/.

Haniffa, R.M. and Cooke, T.E. (2005), "The impact of culture and governance on corporate social reporting", *Journal of Accounting and Public Policy*, Vol. 24 No. 5, pp. 391–430.

Haniffa, R.M. and Hudaib, M. (2006), "Corporate governance structure and performance of Malaysian listed companies", *Journal of Business Finance and Accounting*, Vol. 33 No. October, pp. 1034–1062.

Hart, S.L. (1995), "A Natural-Resource-Based View of the Firm", *Academy of Management Review*, Vol. 20 No. 4, pp. 986–1014.

Harte, G. and Owen, D. (1991), "Environmental disclosure in annual reports of British companies: A research note", *Accounting, Auditing & Accountability Journal*, Vol. 4 No. 3, pp. 51–61.

Hassan, O.A.., Giorgini, G., Romilly, P. and Power, D.M. (2011), "Voluntary Disclosure and Risk in An Emerging Market", *Journal of Accounting in Emerging Economies*, Vol. 1 No. 1, pp. 33–52.

Hasseldine, J., Salama, A. and Toms, J.S. (2005), "Quantity versus quality: the impact of environmental disclosures on the reputations of UK Plcs", *The British Accounting Review*, Vol. 37 No. 2, pp. 231–248.

Haunschild, P.R. and Miner, A.S. (1997), "Modes of Interorganizational Imitation : The Effects of zational Outcome Salience and Uncertainty", *Administrative Science Quarterly*, Vol. 42 No. 3, pp. 472–500.

Hausman, J.A. (1978), "Specification Tests in Econometrics", *Econometrica*, Vol. 46 No. 6, pp. 1251–1271.

Hazardous Waste Recycling Benefits. (2012), "(2012), Wastes-Hazardous Waste", *Wastes - Hazarduous Waste*, available at: www.epa.

Healy, P.M. and Palepu, K.G. (2001), "Information asymmetry, corporate disclosure, and the capital markets: A review of the empirical disclosure literature", *Journal of Accounting and Economics*, Vol. 31, pp. 405–440.

HEFCE. (2009a), *Consultation on a Carbon Reduction Target and Strategy for Higher Education in England*, *Policy Development Consultation*.

HEFCE. (2009b), *Sustainable Development in Higher Education 2008 Update to Strategic Statement and Action Plan*.

HEFCE. (2009c), *Carbon Reduction Strategy – Outcomes of Consultation*.

HEFCE. (2010), “Carbon reduction target and strategy for higher education in England”, Vol. 1 No. September, pp. 1–31.

HEFCE. (2013), *Higher Education Funding Council of England- Corporate Social Responsibility Report 2012-13*, available at: http://www.hefce.ac.uk/about/howweoperate/corporatesocialresponsibility/.

Hendry, J. (2001), “Missing the target: normative stakeholder theory and the corporate governance debate”, Vol. 11 No. 1, pp. 159–176.

Henriques, I. and Sadorsky, P. (2008), “Voluntary Environmental Programs : A Canadian Perspective”, Vol. 36 No. 1, pp. 143–167.

Herremans, I.M., Akathaporn, P. and McInnes, M. (1993), “An investigation of corporate social responsibility reputation and economic performance”, *Accounting, Organizations and Society*, Vol. 18 No. 7/8, pp. 587–604.

Hill, C.W.L. and Jones, T.M. (1992), “Stakeholder-agency theory”, *Journal of Management Studies*, Vol. 29 No. 2, pp. 131–154.

Hines, R.D. (1989), “Financial accounting knowledge, conceptual framework projects and the social construction of the accounting profession”, *Accounting, Auditing & Accountability Journal*, Vol. 2 No. 2, pp. 72–92.

Ho, L.J. and Taylor, M.E. (2007), “An Empirical Analysis of Triple Bottom-Line Reporting and its Determinants : Evidence from the United States and Japan”, *Journal of International Financial Management and Accounting*, Vol. 18 No. 2, pp. 123–150.

Holland, J. (2005), “A grounded theory of corporate disclosure”, *Accounting and Business Research*, Vol. 35 No. 3, pp. 249–267.

Holm, P. (1995), “The Dynamics of Institutionalization: Transformation Processes in Norwegian Fisheries”, *Administrative Science Quarterly*, Vol. 40, pp. 398–422.

Hooks, J. and van Staden, C.J. (2011), “Evaluating environmental disclosures: The relationship between quality and extent measures”, *British Accounting Review*, Elsevier Ltd, Vol. 43 No. 3, pp. 200–213.

Hrasky, S. (2012), “Carbon footprints and legitimation strategies: symbolism or action?”,

Accounting, Auditing & Accountability Journal, Vol. 25 No. 1, pp. 174–198.

Huang, C.-L. and Kung, F.-H. (2010), "Drivers of Environmental Disclosure and Stakeholder Expectation: Evidence from Taiwan", *Journal of Business Ethics*, Vol. 96 No. 3, pp. 435–451.

Hughes, S.B., Anderson, A. and Golden, S. (2001), "Corporate environmental disclosures: Are they useful in determining environmental performance?", *Journal of Accounting and Public Policy*, Vol. 20 No. 3, pp. 217–240.

Humphrey, C., Lewis, L. and Owen, D. (1996), "Still too distant voices? Conversations and reflections on the social relevance of accounting education", *Critical Perspectives on Accounting*, Vol. 7, pp. 77–99.

Hussainey, K. and Al-Najjar, B. (2011), *Future-Oriented Narrative Reporting: Determinants and Use.*, *Journal of Applied Accounting Research*, Vol. 12, available at:http://doi.org/10.1108/09675421111160691.

Ingram, R.W. (1978), "An investigation of the information content of (certain) social responsibility disclosures", *Journal of Accounting Research*, Vol. 16 No. 2, pp. 270–286.

Ingram, R.W. and Frazier, K.B. (1980), "Environmental performance and corporate disclosure", *Journal of Accounting Research*, Vol. 18 No. 2, pp. 614–623.

Islam, M.A. (2009), *Social and Environmental Reporting Practices of Organisations Operating in , or Sourcing Products from , a Developing Country: Evidence from Bangladesh*, RMIT University, available at: http://researchbank.rmit.edu.au/.

ISO 14064-1. (2012), *Greenhouse Gases- Part 1: Speification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals*, UK, available at: www.bsigroup.com/standards.

Jamali, D. (2007), "A Stakeholder Approach to Corporate Social Responsibility: A Fresh Perspective into Theory and Practice", *Journal of Business Ethics*, Vol. 82 No. 1, pp. 213–231.

Jarque, C.M. and Bera, A.K. (1980), "Efficient tests for normality, homoscedasticity and serial independence of regression residuals", *Economics Letters*, Vol. 6, pp. 255–259.

Jarque, C.M. and Bera, A.K. (1987), "A Test for Normality of Observations and Regression Residuals", *International Statistical Review*, Vol. 55 No. 2, pp. 163–172.

Jensen, M.C. and Meckling, W.H. (1976), "Theory of the Firm: Managerial Behavior, Agency Costs and Owenership Structure", *Journal of Financial Economics*, Vol. 3, pp. 305–360.

Jizi, M.I., Salama, A., Dixon, R. and Stratling, R. (2013), "Corporate Governance and Corporate Social Responsibility Disclosure: Evidence from the US Banking Sector", *Journal of Business Ethics*, pp. 1–15.

Johnston, D.M., Sefcik, S.E. and Soderstrom, N.S. (2008), "The value relevance of greenhouse gas emissions allowances: an exploratory study in the related United States SO2 market", *European Accounting Review*, Vol. 17 No. 4, pp. 747–764.

Jones, T.M. (1980), "Corporate social responsibility revisited, redefined", *California Management Review*, Vol. 22 No. 3, pp. 59–67.

Jones, T.M. (1983), "An integrating framework for research in business and society: A step toward the elusive paradigm?", *Academy of Management Review*, Vol. 8 No. 4, pp. 559–565.

Jones, T.M. (1995), "Instrumental Stakeholder Theory: A Synthesis Of Ethics And Economics", *Academy of Management Review*, Vol. 20 No. 2, pp. 404–437.

Jongbloed, B., Enders, J. and Salerno, C. (2008), "Higher education and its communities: Interconnections, interdependencies and a research agenda", *Higher Education*, Vol. 56 No. 3, pp. 303–324.

Joseph, G. (2007), "Implications of a Stakeholder View on Corporate Reporting".

Kennedy, P. (1998), *A Guide to Econometrics*, Fourth Edi., The MIT Press, Cambridge, Massachusetts.

Klein, B. and Leffler, K.B. (1981), "The Role of Market Forces in Assuring Contractual Performance", *Journal of Political Economy*, Vol. 89 No. 4, pp. 615–641.

Kolk, A.N.S. (1999), "Evaluating corporate environmental reporting", *Business Strategy and the Environment*, Vol. 8, pp. 225–237.

Kolk, A.N.S., Levy, D. and Pinkse, J. (2008), "Corporate Responses in an Emerging Climate Regime : The Institutionalization and Commensuration of Carbon Disclosure", *European Accounting Review*, Vol. 17 No. 4, pp. 719–745.

Kothari, C.R. (2004), *Research Methodology: Methods and Techniques*, *New Age International*, New Age International (P) Ltd., Publishers Published by New Age International (P) Ltd., available at:http://doi.org/http://196.29.172.66:8080/jspui/bitstream/123456789/2574/1/Research%20Methodology.pdf.

Kraatz, M.S. (1998), "Learning by association? International networks and adaptation to environmental change", *Academy of Management Journal*, Vol. 41 No. 6, pp. 621–643.

Krippendorf, K. (1980), *Content Analysis: An Introduction to Its Methodology*, edited by Kline, F.G., Sage Publication, Inc., California.

Laan, S. Van Der. (2009), "The Role of Theory in Explaining Motivation for Corporate Social Disclosures : Voluntary Disclosures vs 'Solicited' Disclosures", *Australasian Accounting, Business and Finance Journal*, Vol. 3 No. 4, pp. 15–30.

Lajili, K. and Zéghal, D. (2006), "Market performance impacts of human capital disclosures", *Journal of Accounting and Public Policy*, Vol. 25 No. 2, pp. 171–194.

Landgraf, E. and Riahi-belkaoui, A. (2003), "Corporate Disclosure Quality and Corporate Reputation", *Review of Accounting and Finance*, Vol. 2 No. 1, pp. 86–95.

Lane, P.J.., Cannella, A.A.J. and Lubatkin, M.H.. (1998), "Agency Problems as Antecedents to Unrelated Mergers and Diversification: Amihud and Lev Reconsidered", *Strategic Management Journal*, Vol. 19 No. 6, pp. 555–578.

Lang, M.H. and Lundholm, R.J. (2000), "Voluntary Disclosure and Equity Offerings: Reducing Information Asymmetry or Hyping the Stock?", *Contemporary Accounting Research*, Vol. 17 No. 4, pp. 623–662.

Lee, P.M. and O'Neill, H.M. (2003), "Ownership Structures and R & D Investments of U . S . and Japanese Firms : Agency and Stewardship Perspectives", *Academy of Management Journal*, Vol. 46 No. 2, pp. 212–225.

Lehmann, M., Christensen, P., Thrane, M. and Jørgensen, T.H. (2009), "University engagement and regional sustainability initiatives: some Danish experiences", *Journal of Cleaner Production*, Vol. 17 No. 12, pp. 1067–1074.

Levitt, B. and Nass, C. (1989), "The Lid on the Garbage Can: Institutional Constraints on Decision Making in the Technical Core of College-Text Publishers", *Administrative Science Quarterly*,

Vol. 34, pp. 190–207.

Levy, D. and Scully, M. (2007), "The Institutional Entrepreneur as Modern Prince: The Strategic Face of Power in Contested Fields", *Organization Studies*, Vol. 28 No. 7, pp. 971–991.

Lewis, L., Humphrey, C. and Owen, D. (1992), "Accounting and the social: A pedagogic perspective", *The British Accounting Review*, Vol. 24 No. 3, pp. 219–233.

Lim, S., Matolcsy, Z. and Chow, D. (2007), "The Association between Board Composition and Different Types of Voluntary Disclosure", *European Accounting Review*, Vol. 16 No. 3, pp. 555–583.

Liu, X. and Anbumozhi, V. (2009), "Determinant factors of corporate environmental information disclosure : an empirical study of Chinese listed companies", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 17 No. 6, pp. 593–600.

Lockhart, J.A. and Mathews, M.R. (2000), "Teaching environmental accounting: a four-part framework", *Advances in Accounting Education: Teaching and Curriculum Innovations*, Vol. 3, pp. 57–84.

Lodhia, S. and Martin, N. (2012), "Stakeholder responses to the National Greenhouse and Energy Reporting Act: An agenda setting perspective", *Accounting, Auditing & Accountability Journal*, Vol. 25 No. 1, pp. 126–145.

Lozano, R. (2006), "Incorporation and institutionalization of SD into universities: breaking through barriers to change", *Journal of Cleaner Production*, Vol. 14 No. 9–11, pp. 787–796.

Maddala, G.S. (1992), *Introduction to Econometrics*, 2nd ed., Macmillan Publishing Company.

Magness, V. (2006), "Strategic posture, financial performance and environmental disclosure: An empirical test of legitimacy theory", *Accounting, Auditing & Accountability Journal*, Vol. 19 No. 4, pp. 540–563.

Magness, V. (2010), "ENVIRONMENTAL DISCLOSURE IN THE MINING INDUSTRY: A SIGNALING PARADOX?", *Sustainability, Environmental Performance and Disclosures*, Emerald Group Publishing, Bingley, Vol. 4 No. 2010, pp. 55–81.

Marston, C. and Polei, A. (2004), "Corporate reporting on the Internet by German companies", *International Journal of Accounting Information Systems*, Vol. 5 No. 3, pp. 285–311.

Marston, C.L. and Shrives, P.J. (1991), "The use of disclosure indices in accounting research: A review article", *The British Accounting Review*, Vol. 23 No. 3, pp. 195–210.

Mastrandonas, A. and Strife, P.T. (1992), "Corporate Environmental Communications- Lessons from Investors", *Columbia Journal of World Business*, Vol. 27 No. 3/4, pp. 234–240.

Mathews, M.R. (1984), "A suggested classification for social accounting research", *Journal of Accounting and Public Policy*, Vol. 3, pp. 199–221.

Mathews, M.R. (1997), "Twenty-five years of social and environmental accounting research: Is there a silver jubilee to celebrate?", *Accounting, Auditing & Accountability Journal*, Vol. 10 No. 4, pp. 481–531.

Mazhar, M.U., Bull, R., Lemon, M. and Mallaburn, P. (2014), "The current state of strategic carbon management within the UK higher education sector: Leading the way forward?", in Butt, L. and Avery, G.C. (Eds.), *Proceedings of the9th International Symposium on Sustainable Leadership*, Salzburg, pp. 148–160.

Mcdonald, J.F., Moffitt, R.A., The, S., May, N., Mcdonald, J.F. and Moffitt, R.A. (1980), "The Uses of Tobit Analysis", *Review of Economics and Statistics*, Vol. 62 No. 2, pp. 318–321.

McNicholas, P. and Windsor, C. (2011), "Can the financialised atmosphere be effectively regulated and accounted for?", *Accounting, Auditing & Accountability Journal*, Vol. 24 No. 8, pp. 1071–1096.

Mendenhall, W. and Sincich, T.L. (1989), *Business Statistics: Regression Analysis 2nd Course Statistics*, 3rd ed., Macmillan, USA.

Meyer, J., Scott, W.R. and Strang, D. (1987), "Centralization, Fragmen- District Complexity", *Administrative Science Quarterly*, Vol. 32 No. 2, pp. 186–201.

Meyer, J.W. and Rowan, B. (1977), "Institutionalized organizations: Formal structure as myth and ceremony", *American Journal of Sociology*, Vol. 83 No. 2, pp. 340–363.

Miles, M.P. and Covin, J.G. (2000), "Environmental marketing: A source of reputational competitive and financial advantage", *Journal of Business Ethics*, Vol. 23, pp. 299–311.

Miller, G.S. (2002), "Earnings Performance and Discretionary Disclosure", *Journal of Accounting Research*, Vol. 40 No. 1, pp. 173–204.

Milne, M.J. and Adler, R.W. (1999), "Exploring the reliability of social and environmental disclosures content analysis", *Accounting, Auditing & Accountability Journal*, Vol. 12 No. 2, pp. 237–256.

Milne, M.J. and Chan, C.C.C. (1999), "Narrative corporate social disclosures: how much of a difference do they make to investment decision-making?", *British Accounting Review*, Vol. 31, pp. 439–457.

Milne, M.J. and Patten, D.M. (2002), "Securing organizational legitimacy: An experimental decision case examining the impact of environmental disclosures", *Accounting, Auditing & Accountability Journal*, Vol. 15 No. 3, pp. 372–405.

Mio, C. (2010), "Corporate Social Reporting in Italian Multi-utility Companies: An Empirical Analysis", *Corporate Social Responsibility and Environmental Management*, Vol. 17 No. August 2009, pp. 247–271.

Mitchell, R.K., Agle, B.R. and Wood, D.J. (1997), "TOWARD A THEORY OF STAKEHOLDER IDENTIFICATION AND SALIENCE : DEFINING THE PRINCIPLE OF WHO AND WHAT REALLY COUNTS", *Academy of Management Review*, Vol. 22 No. 4, pp. 853–886.

Mizruchi, M.S. and Fein, L.C. (1999), "The Social Construction of Organizational Knowledge : A Study of the Uses of Coercive , Mimetic , and Normative Isomorphism", *Administrative Science Quarterly*, Vol. 44, pp. 653–683.

Moneva, J.M. and Llena, F. (2000), "Environmental disclosures in the annual reports of large companies in Spain", *The European Accounting Review*, Vol. 9 No. 1, pp. 7–29.

Monteiro, S.M. da S. and Aibar-Guzman, B. (2010), "Determinants of Environmental Disclosure in the Annual Reports of Large Companies Operating in Portugal", *Corporate Social Responsibility and Environmental Management*, Vol. 17, pp. 185–204.

Morgeson, F.P., Aguinis, H., Waldman, D. a. and Siegel, D.S. (2013), "Extending corporate social responsibility research to the human resource management and organizational behavior domains: A look to the future", *Personnel Psychology*, Vol. 66 No. 4, pp. 805–824.

Morris, R.D. (1987), "Signalling, agency theory and accounting policy choice", *Accounting and Business Research*, Vol. 18 No. 69, pp. 47–56.

Nakamura, A. and Nakamura, M. (1981), "On the Relationships Among Several Specification Error Tests Presented by Durbin, Wu, and Hausman", *Econometrica*, Vol. 49 No. 6, pp. 1583–1588.

Naser, K. and Nuseibeh, R. (2003), "Quality of financial reporting: Evidence from the listed Saudi nonfinancial companies", *International Journal of Accounting*, Vol. 38 No. 1, pp. 41–69.

Nejati, M., Shafaei, A., Salamzadeh, Y. and Daraei, M. (2011), "Corporate social responsibility and universities : A study of top 10 world universities' websites", *African Journal of Business Management*, Vol. 5 No. 2, pp. 440–447.

Nelson, R.R. and Winter, S.G. (1982), *An Evolutionary Theory of Economic Change*, *Cambridge MA Belknap*, Vol. 93, available at:http://doi.org/10.2307/2232409.

Ness, K.E. and Mirza, A.M. (1991), "Corporate social disclosure: a note on a test of agency theory", *British Accounting Review*, Vol. 23, pp. 211–217.

Neter, J., Wasserman, W. and Kutner, M.H. (1983), *Applied Linear Regression Models*, Homewood, Illinois, USA.

Neu, D., Pedwell, K. and Warsame, H. (1998), "Managing public impressions: Environmental disclosures in annual reports", *Accounting, Organizations and Society*, Vol. 23 No. 3, pp. 265–282.

O'Donovan, G. (2002), "Environmental disclosures in the annual report: Extending the applicability and predictive power of legitimacy theory", *Accounting, Auditing & Accountability Journal*, Vol. 15 No. 3, pp. 344–371.

Okcabol, F. and Tinker, T. (1993), "Dismantling Financial Disclosure Regulations: Testing the Stigler-Benston Hypothesis", *Accounting, Auditing & Accountability Journal*, Vol. 6 No. 1, pp. 10–38.

Oliver, C. (1988), "The Collective Strategy Framework : An Applica- tion to Competing Pre- dictions of Isomorphism", Vol. 33, pp. 543–561.

Oliver, C. (1991), "Strategic responses to institutional processes", *Academy of Management Review*, Vol. 16 No. 1, pp. 145–179.

Owen, D., Gray, R. and Maunders, K. (1987), "Researching the information content of social responsibility disclosure: A comment", *British Accounting Review*, Vol. 19, pp. 169–175.

Palmer, D.A., Jennings, P.D. and Zhou, X. (1993), "Late Adoption of the Multidivisional Form by Large U.S. Corporations: Institutional, Political, and Economic Accounts", *Administrative Science Quarterly*, Vol. 38, pp. 100–131.

Paradis, L.F. and Cummings, S.B. (1986), "The Evolution of Hospice in America toward Organizational Homogeneity", *Journal of Health and Social Behavior*, Vol. 27 No. 4, pp. 370–386.

Parker, L.D. (2005), "Social and environmental accountability research: A view from the commentary box", *Accounting, Auditing & Accountability Journal*, Vol. 18 No. 6, pp. 842–860.

Parsa, S. and Kouhy, R. (2008), "Social Reporting by Companies Listed on the Alternative Investment Market", *Journal of Business Ethics*, Vol. 79 No. 3, pp. 345–360.

Patten, D.M. (1991), "Exposure, legitimacy, and social disclosure", *Journal of Accounting and Public Policy*, Vol. 10 No. 4, pp. 297–308.

Patten, D.M. (1995), "Variability in social disclosure: A legitimacy-based analysis", *Advances in Public Interest Accounting*, Vol. 6, pp. 273–285.

Pellegrino, C. and Lodhia, S. (2012), "Climate change accounting and the Australian mining industry: exploring the links between corporate disclosure and the generation of legitimacy", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 36, pp. 68–82.

People and Planet. (2013), "People and Planet University League", available at: http://peopleandplanet.org/university-league.

Perreault, W.D. and Leigh, L.E. (1989), "Reliability of Nominal Data Based on Qualitative Judgments", *Journal of Marketing Research*, Vol. 26 No. 2, p. 135.

Pfeffer, J. and Salancik, G.R. (1978), *The External Control of Organizations- A Resource Dependence Perspective Copyright*, edited by Greenman, J. and Beach, R.E., Harper & Row, Publishers, Inc., New York.

Porter, M.E. and Kramer, M.R. (2006), "Strategy and society: The link between competitive advantage and corporate social responsibility", *Harvard Business Review*, No. December, pp. 1–15.

Prado-Lorenzo, J.-M., Rodriguez-Dominguez, L., Gallego-Álvarez, I. and Garcia-Sánchez, I.-M. (2009), "Factors influencing the disclosure of greenhouse gas emissions in companies world-wide", *Management Decision*, Vol. 47 No. 7, pp. 1133–1157.

Prencipe, A. (2004), "Proprietary costs and determinants of voluntary segment disclosure: Evidence

from Italian listed companies", *European Accounting Review*, Vol. 13 No. 2, pp. 319–340.

Qian, W. (2012), "Carbon efficiency in Australian NGER reporting companies: what does the integration tell us?", *Journal of the Asia-Pacific Centre for Environmental Accountability*, Vol. 18 No. 3, pp. 159–180.

Rankin, M., Windsor, C. and Wahyuni, D. (2011), "An investigation of voluntary corporate greenhouse gas emissions reporting in a market governance system: Australian evidence", *Accounting, Auditing & Accountability Journal*, Vol. 24 No. 8, pp. 1037–1070.

Razali, N.M. and Wah, Y.B. (2011), "Power comparisons of Shapiro-Wilk, Kolmogorov-Smirnov, Lilliefors and Anderson-Darling tests", *Journal of Statistical Modeling and Analytics*, Vol. 2 No. 1, pp. 21–33.

Reverte, C. (2009), "Determinants of Corporate Social Responsibility Disclosure Ratings by Spanish Listed Firms", *Journal of Business Ethics*, Vol. 88 No. 2, pp. 351–366.

Riahi-belkaoui, A. (1999), "Productivity , Profitability , and Firm Value", *Journal of International Financial Management and Accounting*, Vol. 10 No. 3, pp. 188–201.

Rizk, R. (2006), *Corporate Social and Environmental Disclosure Practices: An International Comparison of UK, Indian and Egyptian Corporations*, *Durham E-Thesis*, Durham University, available at: http://etheses.dur.ac.uk/1807/1/1807.pdf.

Rizk, R., Dixon, R. and Woodhead, A. (2008), "Corporate social and environmental reporting: a survey of disclosure practices in Egypt", *Social Responsibility Journal*, Vol. 4 No. 3, pp. 306–323.

Roberts, C.B. (1991), "Environmental disclosures: A note on reporting practices in mainland europe", *Accounting, Auditing & Accountability Journal*, Vol. 4 No. 3, pp. 62–71.

Roberts, M.R. and Whited, T.M. (2013), "Endogeneity in Empirical Corporate Finance", *Handbook of the Economics of Finance*, No. PA, pp. 493–572.

Roberts, P.W. and Dowling, G.R. (2002), "Corporate reputation and sustained superior financial performance", *Strategic Management Journal*, Vol. 23 No. 12, pp. 1077–1093.

Roberts, R.W. (1992), "Determinants of corporate social responsibility disclosure: An application of stakeholder theory", *Accounting, Organizations and Society*, Vol. 17 No. 6, pp. 595–612.

Robertson, D.C. and Nicholson, N. (1996), "Expressions of corporate social responsibility in U.K. firms", *Journal of Business Ethics*, Vol. 15 No. 10, pp. 1095–1106.

Rollins, T.P. and Bremser, W.G. (1997), "The SEC's enforcement actions against auditors: An auditor reputation and institutional theory perspective", *Critical Perspectives on Accounting*, Vol. 8, pp. 191–206.

Rondinelli, D. a and Berry, M. a. (2000), "Environmental citizenship in multinational corporations: social responsibility and sustainable development", *European Management Journal*, Vol. 18 No. 1, pp. 70–84.

Rosenzweig, P.M. and Singh, J. V. (1991), "Organizational environments and the multinational enterprise", *Academy of Management Review*, Vol. 16 No. 2, pp. 340–362.

Ross, S. a. (1977), "The Determination of Financial Structure: The Incentive Signalling Approach", *Bell Journal of Economics*, Vol. 8 No. 1, pp. 23–40.

Rourke, L., Anderson, T., Garrison, D.R. and Archer, W. (2000), "Methodological Issues in the Content Analysis of Computer Conference Transcripts", *International Journal of Artificial Intelligence in Education*, Vol. 11, pp. 8–22.

Rowley, T.J. (1997), "Moving beyond dyadic ties: A network theory of stakeholder influences", *Academy of Management Review*, Vol. 22 No. 4, pp. 887–910.

Roy, A. and Ghosh, S.K. (2011), "The Bilateral Association Between Discretionary Environmental Disclosure Quality and Economic Performance : An Asian Perspective".

Saha, A.K. and Akter, S. (2012), "Relationship between environmental reporting in corporate annual reports and corporate profitability in Bangladesh", *Independent Business Review*, Vol. 5 No. 2, pp. 91–111.

Saha, A.K. and Akter, S. (2013), "Corporate governance and voluntary disclosure practices of financial and non-financial sector companies in Bangladesh", *Journal of Applied Management Accounting Research*, Vol. 11 No. 2, pp. 45–62.

Salama, A. (2003), *The Relationship between Environmental Disclosure, Environmental Reputation and Firm Financial Performance: UK Evidence*, Nottingham University.

Samuels, J.M. (1990), "Accounting for development: an alternative approach", *Research in Third*

World Accounting, Vol. 1, pp. 67–86.

Saunders, M., Lewis, P. and Thornhill, A. (2008), *Research Methods for Business Students*, *Research Methods for Business Students*, available at:http://doi.org/10.1007/s13398-014-0173-7.2.

Schaltegger, S., Gibassier, D. and Zvezdov, D. (2013), "Is environmental management accounting a discipline? A bibliometric literature review"", *Meditari Accountancy Research*, Vol. 21 No. 1, pp. 4–31.

Schleicher, T. (2012), "When is good news really good news ?", *Accounting and Business Research*, Vol. 42 No. 5, pp. 547–573.

Schleicher, T. and Walker, M. (2010), "Bias in the tone of forward-looking narratives", *Accounting and Business Research*, Vol. 40 No. 4, pp. 371–390.

Scott, W.A. (1955), "Reliability of content analysis: The case of nominal scaling", *Public Opinion Quarterly*, Vol. 19 No. 3, pp. 321–325.

Scott, W.R. (1987), "The Adolescence of Institutional Theory", *Administrative Science Quarterly*, Vol. 32 No. 4, pp. 493–511.

Scott, W.R. (2003), *Financial Accounting Theory*, 3rd ed., Prentice Hall, Toronto.

Scott, W.R. and Meyer, J.W. (1991), "The Rise of training-Programs in Firms and Agencies-An Institutional Perspectives", *Journal Organizational Behavior*, Vol. 13, pp. 297–326.

Selznick, P. (1967), *Leadership in Administration: A Sociological Interpretation*, University of California Press.

Shapiro, S.S. and Wilk, M.B. (1965), "An Analysis of Variance Test for Normality (Complete Samples)", *Biometrika*, Vol. 52 No. 3/4, pp. 591–611.

Shrum, W. and Wuthnow, R. (1988), "Reputational Status of Organizations in Technical Systems", *American Journal of Sociology*, Vol. 93 No. 4, pp. 882–912.

Singh, D.R. and Ahuja, J.M. (1983), "Corporate social repoorting in India", *International Journal of Accounting Education and Research*, Vol. 18 No. 2, pp. 151–170.

Skinner, D.J. (1994), "Why Firms Voluntarily Disclose Bad News", *Journal of Accounting Research*, Vol. 32 No. 1, pp. 38–61.

Slyke, D.M. Van. (2007), "Agents or Stewards: Using Theory to Understand the Government-Nonprofit Social Service Contracting Relationship", *Journal of Public Administration Research and Theory*, Vol. 17 No. 2, pp. 157–187.

Smith, A.D. (2007), "Making the case for the competitive advantage of corporate social responsibility", *Business Strategy Series*, Vol. 8 No. 3, pp. 186–195.

Smith, J. van der L., Adhikari, A. and Tondkar, R.H. (2005), "Exploring differences in social disclosures internationally: A stakeholder perspective", *Journal of Accounting and Public Policy*, Vol. 24 No. 2, pp. 123–151.

Smith, M. and Taffler, R.J. (2000), "The chairman's statement - A content analysis of discretionary narrative disclosures", *Accounting, Auditing & Accountability Journal*, Vol. 5 No. 3, pp. 624–647.

Smith, P.C. (1988), "The ethical dimensions of gadamer's hermeneutical theory", *Research in Phenomenology*, Vol. 18 No. 1, pp. 75–91.

Snider, J., Hill, R.P. and Martin, D. (2003), "Corporate Social Responsibility in the 21st Century: A View from the World's Most Successful Firms", *Journal of Business Ethics*, Vol. 48, pp. 175–187.

Solomon, J.F., Solomon, A., Norton, S.D. and Joseph, N.L. (2011), "Private climate change reporting: an emerging discourse of risk and opportunity?", *Accounting, Auditing & Accountability Journal*, Vol. 24 No. 8, pp. 1119–1148.

Spence, M. (1973), "Job Market Signaling", *The Quarterly Journal of Economics*, Vol. 87 No. 3, pp. 355–374.

Stanny, E. and Ely, K. (2008), "Corporate environmental disclosures about the effects of climate change", *Corporate Social Responsibility and Environmental Management*, Vol. 15, pp. 338–348.

Starr, P. (1982), *The Social Transformation of American Medicine*, USA.

Sullivan, R. and Gouldson, A. (2012), "Does voluntary carbon reporting meet investors' needs?", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 36 No. January, pp. 60–67.

Sun, N., Salama, A., Hussainey, K. and Habbash, M. (2010), "Corporate environmental disclosure,

corporate governance and earnings management", *Managerial Auditing Journal*, Vol. 25 No. 7, pp. 679–700.

Swanson, R.A. and Chermack, T.J. (2013), "Theory Building in Applied Disciplines", p. 215.

Tabachnick, B.G. and Fidell, L.S. (1996), *Using Multivariate Statistics*, HarperCollins College Publishers, New York.

Tilt, C.A. (1994), "The Influence of External Pressure Groups on Corporate Social Disclosure: Some Empirical Evidence", *Accounting, Auditing & Accountability Journal*, Vol. 7 No. 4, pp. 47–72.

Tinker, A.M., Merino, B.D. and Neimark, M.D. (1982), "The normative origins of positive theories: Ideology and accounting thought", *Accounting, Organizations and Society*, Vol. 7 No. 2, pp. 167–200.

Tinker, T., Lehman, C. and Neimark, M. (1991), "Falling down the hole in the middle of the road: political quietism in corporate social reporting", *Accounting, Auditing & Accountability Journal*, Vol. 4 No. 2, pp. 28–54.

Tobin, B.Y.J. (1958), "Estimation of relationships for limited dependent variables", *Econometrica*, Vol. 26 No. 1, pp. 24–36.

Tolbert, P.S. and Zucker, L.G. (1983), "Institutional Sources of change in the formal structure of organizations: the diffusion of civil service reform, 1880-1935", *Administrative Science Quarterly*, Vol. 28, pp. 22–39.

Toms, J.S. (2002), "Firm resources, quality signals and the determinants of corporate environmental reputation: Some UK evidence", *British Accounting Review*, Vol. 34 No. 3, pp. 257–282.

Torres, D.L. (1988), "Professionalism, variation, and organisational survival*", *American Sociological Review*, Vol. 53 No. 3, pp. 380–394.

Trotman, K.T. and Bradley, G.W. (1981), "Associations between social responsibility disclosure and characteristics of companies", *Accounting, Organizations and Society*, Vol. 6 No. 4, pp. 355–362.

Tukey, J.W. (1962), "The Future of Data Analysis", *The Annals of Mathematical Statistics*, Vol. 33 No. 1, pp. 1–67.

Tuttle, B. and Dillard, J. (2007), “Beyond Competition : Institutional”, *Accounting Horizons*, Vol. 21 No. 4, pp. 387–409.

UK Corporate Governance Code. (2012), “The UK Corporate Governance Code”, Financial Reporting Council, London, available at: www.frc.org.uk.

Ullman, A.A. (1976), “The corporate environmental accounting system: a management tool for fighting environmental degradation”, *Accounting, Organizations and Society*, Vol. 1 No. 1, pp. 71–79.

Ullman, A.A. (1985), “Data in search of a theory : a critical examatination of the relationships among social performance disclosure , and economic performance of u. s. firms”, *The Academy of Management Review*, Vol. 10 No. 3, pp. 540–557.

Unerman, J. (2000), “Methodological issues reflections on quantification in corporate social reporting content analysis”, *Accounting, Auditing & Accountability Journal*, Vol. 13 No. 5, pp. 667–680.

UNESCO. (2004), *Education for Sustainable Development*, *Education for Sustainable Development Information Brief*, UNESCO, Paris, available at: www.unesco.org/education/desd.

Urdong, L. (1968), *The Random House Dictionary of the English Language*, New York: Random House.

de Villiers, C., Chen, S., Jin, C. and Zhu, Y. (2014), “Carbon sequestered in the trees on a university campus: a case study”, *Sustainability Accounting, Management and Policy Journal*, Vol. 5 No. 2, pp. 149–171.

de Villiers, C., Naiker, V. and van Staden, C.J. (2011), “The Effect of Board Characteristics on Firm Environmental Performance”, *Journal of Management*, Vol. 37 No. 6, pp. 1636–1663.

Waddock, S.A. and Graves, S.B. (1997), “The corporate social performance- financial performance link”, *Strategic Management Journal*, Vol. 18 No. 4, pp. 303–319.

Walden, W.D. and Schwartz, B.N. (1997), “Environmental disclosures and public policy pressure”, *Journal of Accounting and Public Policy*, Vol. 16 No. 2, pp. 125–154.

Wallace, T.D. and Silver, J.L. (1988), *Econometrics: An Introduction*, edited by Addison-Wesley.

Watson, A., Shrives, P. and Marston, C. (2002), "Voluntary Disclosure of Accounting Ratios in the UK", *The British Accounting Review*, Vol. 34 No. 4, pp. 289–313.

Watts, R.L. and Zimmerman, J.L. (1978), "Towards a positive theory of the determination of accounting standards", *The Accounting Review*, Vol. 53 No. 1, pp. 112–134.

Weber, R.P. (1988), *Basic Content Analysis*, edited by Sullivan, J.L. and Niemi, R.G.*Sage University Paper Series on Quantitative Applications in the Social Sciences*, Sage Publication, Inc., London.

White, H. (1980), "A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity", *Econometrica*, Vol. 48 No. 4, pp. 817–838.

Williams, S.M. (1999), "Voluntary environmental and social accounting disclosure practices in the Asia-Pacific region: an international empirical test of political economy theory", *The International Journal of Accounting*, Vol. 34 No. 2, pp. 209–238.

Williams, S.M. and Pei, C.-A.H.W. (1999), "Corporate social disclosures by listed companies on their web sites: an international comparison", *The International Journal of Accounting*, Vol. 34 No. 3, pp. 389–419.

Wilmshurst, T.D. and Frost, G.R. (2000), "Corporate environmental reporting: A test of legitimacy theory", *Accounting, Auditing & Accountability Journal*, Vol. 13 No. 1, pp. 10–26.

Wiseman, J. (1982), "An evaluation of environmental disclosures made in corporate annual reports", *Accounting, Organizations and Society*, Vol. 7 No. 1, pp. 53–63.

Wiseman, R.M., Cuevas-Rodriguez, G. and Gomez-Mejia, L.R. (2012), "Towards a social theory of agency", *Journal of Management Studies*, Vol. 49 No. 1, pp. 202–222.

Wittneben, B.B.F. and Kiyar, D. (2009), "Climate change basics for managers", *Management Decision*, Vol. 47 No. 7, pp. 1122–1132.

Woods, M. (2003), "The global reporting initiative", *CPA Journal*, Vol. 73 No. 6, pp. 60–65.

Wooldridge, J.M. (2003), *Introductory Econometrics: A Modern Approach*, Vol. 2nd, available at:http://doi.org/10.1198/jasa.2006.s154.

Wright, T. (2010), "University presidents' conceptualizations of sustainability in higher education",

International Journal of Sustainability in Higher Education, Vol. 11 No. 1, pp. 61–73.

Wu, D.-M. (1973), "Alternative Tests of Independence between Stochastic Regressors and Disturbances", *Econometrica*, Vol. 41 No. 4, pp. 733–750.

Wu, Y.-C.J., Huang, S., Kuo, L. and Wu, W.-H. (2010), "Management Education for Sustainability: A Web-Based Content Analysis.", *Academy of Management Learning & Education*, Vol. 9 No. 3, pp. 520–531.

Yekini, C.O. (2012), *Corporate Community Involvement Disclosure: An Evaluation of the Motivation & Reality*, De Monfort University, available at: http://hdl.handle.net/2086/6910.

Yekini, C.O. and Jallow, K. (2012), "Corporate community involvement disclosures in annual report: A measure of corporate community development or a signal of CSR observance?", *Sustainability Accounting, Management and Policy Journal*, Vol. 3, pp. 7–32.

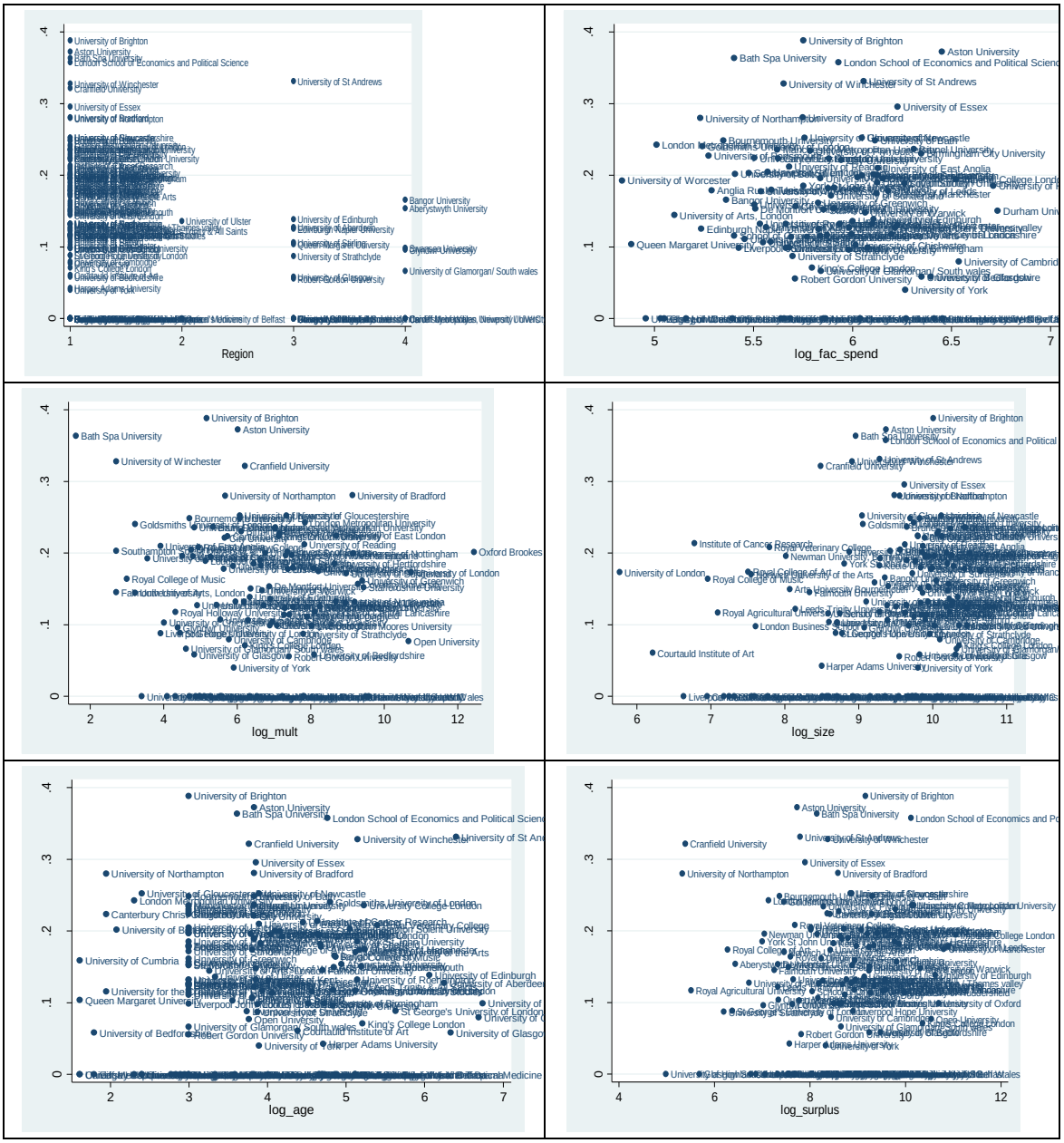
Zeghal, D. and Ahmed, S.A. (1990), "Comparison of social responsibility information disclosure media used by Candadian firms", *Accounting, Auditing & Accountability Journal*, Vol. 3 No. 1, pp. 38–53.

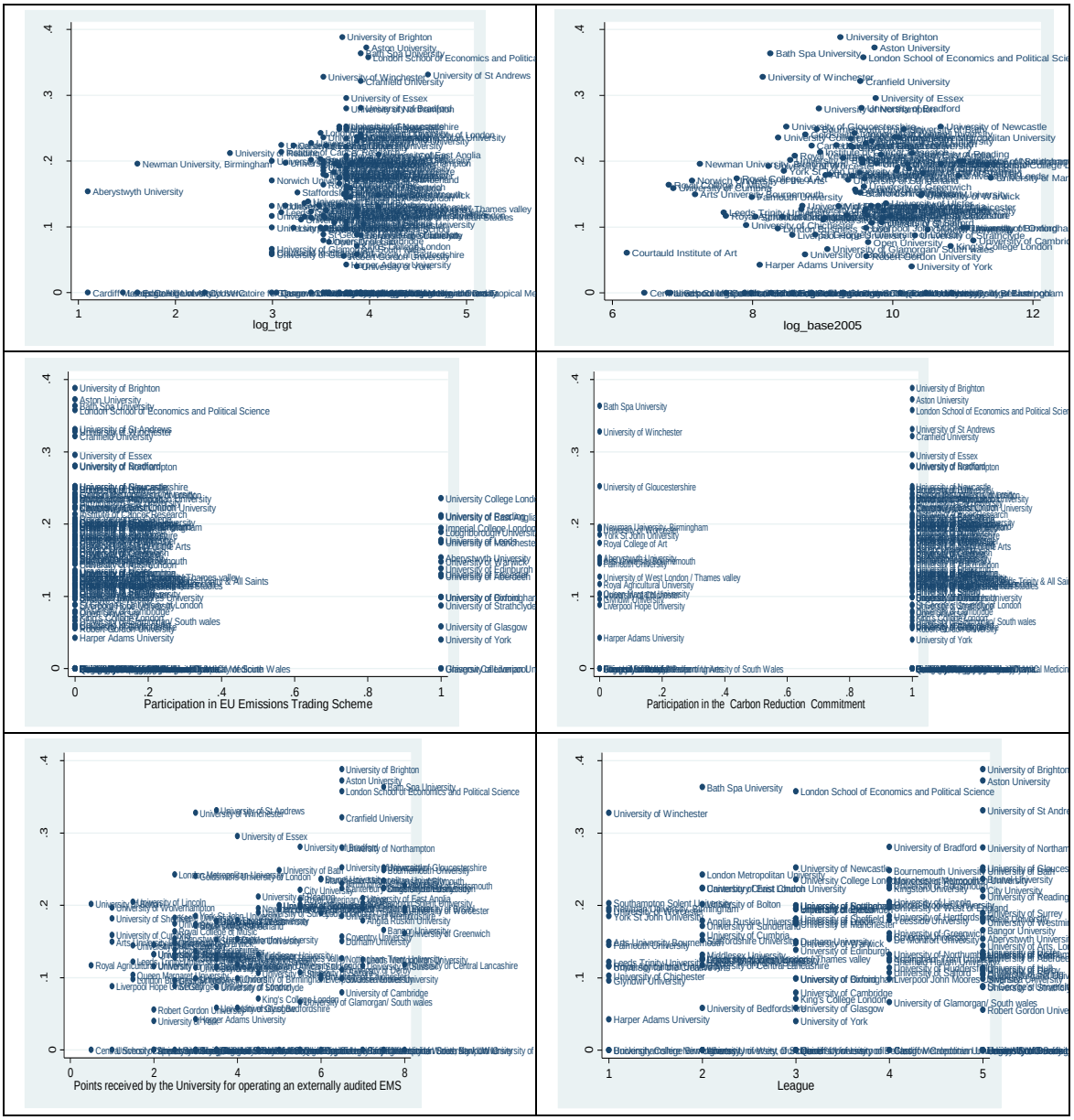
Zhang, N., Williams, I.D., Kemp, S. and Smith, N.F. (2011), "Greening academia: developing sustainable waste management at Higher Education Institutions.", *Waste Management (New York, N.Y.)*, Elsevier Ltd, Vol. 31 No. 7, pp. 1606–16.

Zilahy, G. and Huisingh, D. (2009), "The roles of academia in regional sustainability initiatives", *Journal of Cleaner Production*, Elsevier Ltd, Vol. 17 No. 12, pp. 1057–1066.

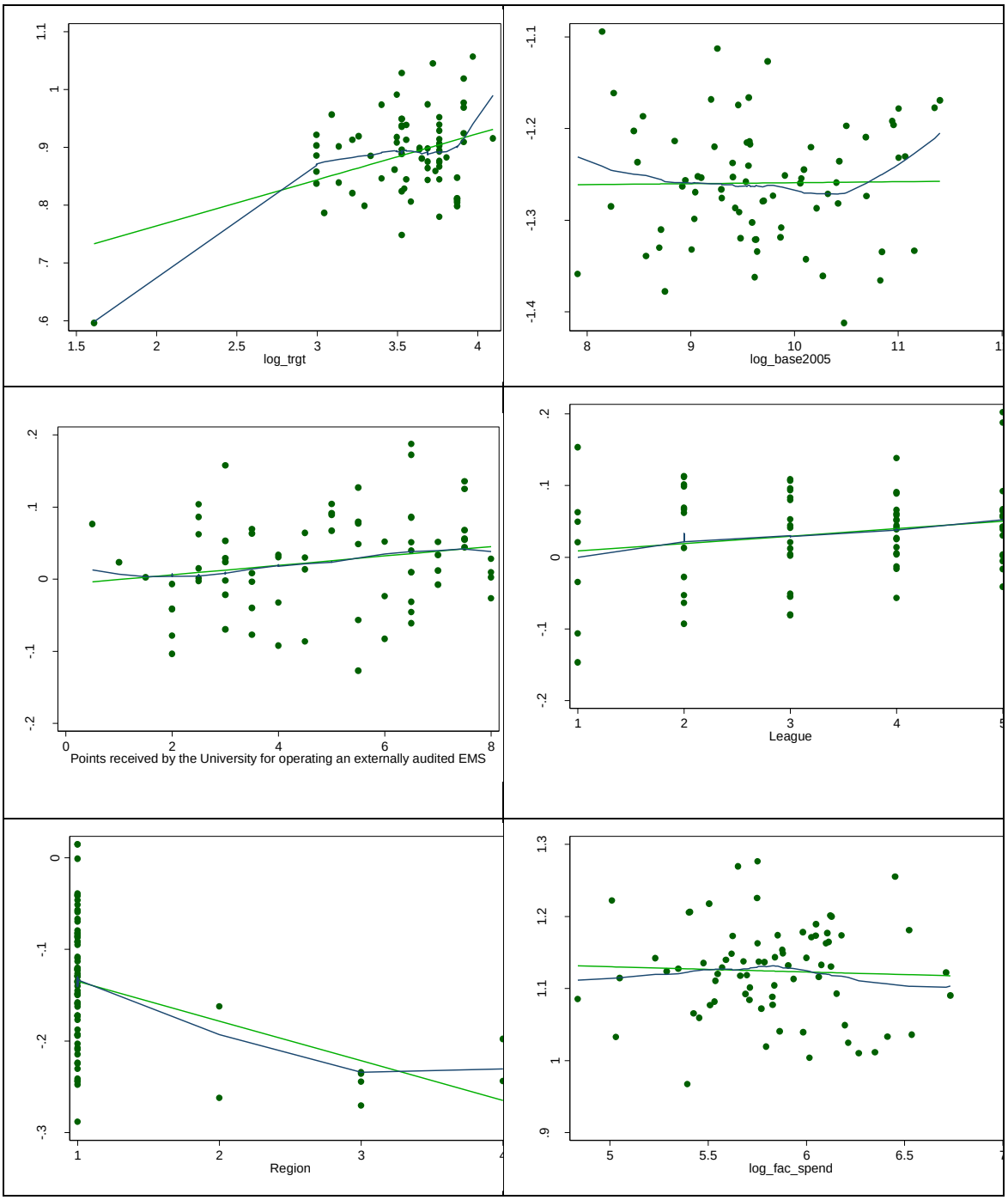
APPENDICES

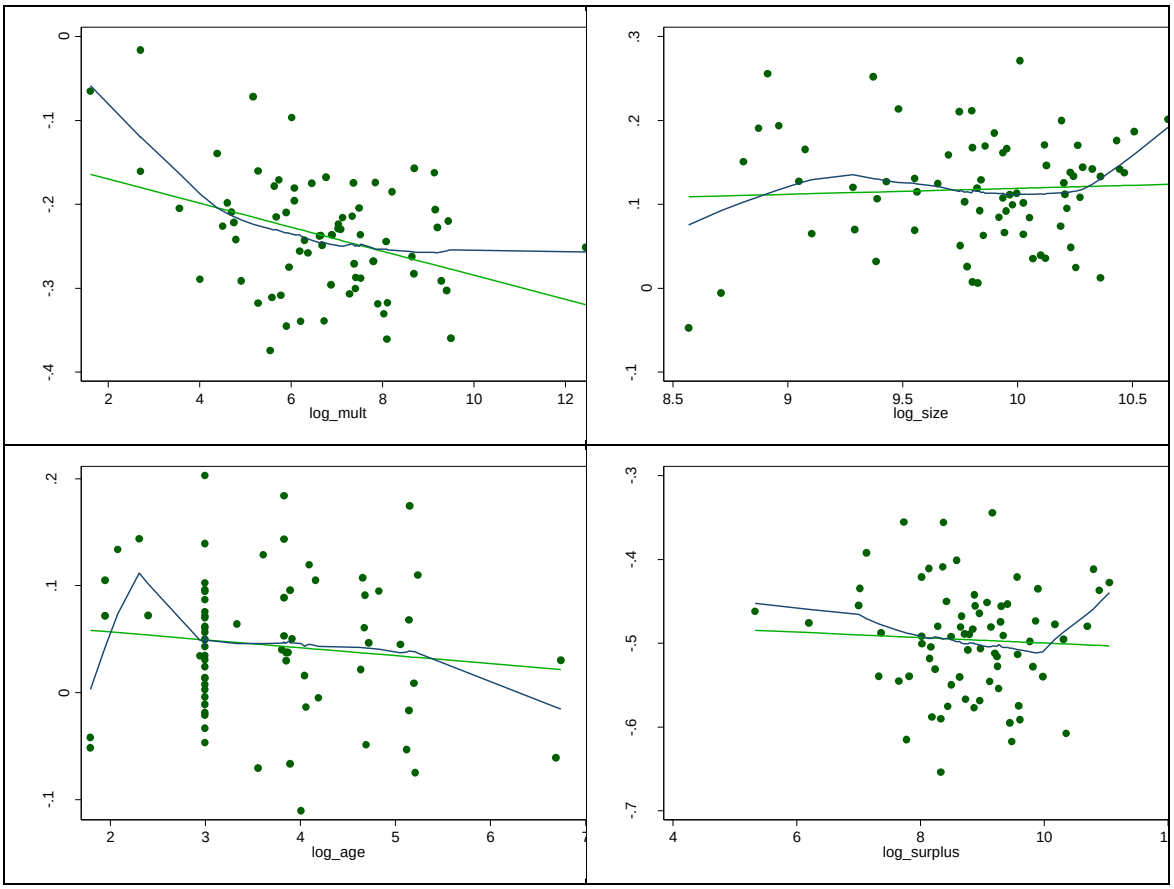
Appendix A. Two-Way Scatter graphs




log_trgt
log_base2005
Participation in EU Emissions Trading Scheme
Participation in the Carbon Reduction Commitment
Points received by the University for operating an externally audited EMS
League

Appendix B. Augmented Component-Plus-Residual Plot




0
-.1
-.2
-.3
-.4
2
4
6
8
10
12
log_mult
.3
.2
.1
0
-.1
8.5
9
9.5
10
10.5
log_size
.2
.1
0
-.1
2
3
4
5
6
log_age
-.3
-.4
-.5
-.6
-.7
4
6
8
10
log_surplus

Appendix C. Diagnostic Tests for Negative Binomial Regression

Panel C1: Check for Over Dispersion

variable	mean	variance	N
cedi_count~t	11.41667	148.0629	144

Panel C2: Check for Negative Binomial Model Fit

Negative binomial regression — Number of obs = 73
LR chi2(2) = 46.68
Dispersion = mean — Prob > chi2 = 0.0000
Log likelihood = -243.34345 — Pseudo R2 = 0.0875

cedi_count_quant	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
_hat	1.155112	.49735	2.32	0.020	.1803243	2.129901
_hatsq	-.036303	.1118674	-0.32	0.746	-.2555592	.1829532
_cons	-.1453946	.5676195	-0.26	0.798	-1.257908	.9671191
/lnalpha	-1.043868	.221721			-1.478434	-.6093033
alpha	.35209	.0780658			.2279945	.5437296

Likelihood-ratio test of alpha=0: chibar2(01) = 171.22 Prob>=chibar2 = 0.000

Appendix D. Normality Tests of Residuals

Panel A. Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	joint adj chi2(2)	joint Prob>chi2
resid	73	0.9353	0.8906	0.03	0.9873

Panel B. Shapiro-Wilk W test for normal data

Variable	Obs	W	V	z	Prob>z
resid	73	0.99077	0.588	-1.158	0.87664

Appendix E. Test for Heteroskedasticity

Panel E1. Breusch-Pagan Heteroskedasity Test (Chapter Two)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of cedi_quant

         chi2(1)      =    20.15
         Prob > chi2  =   0.0000
```

Breusch-Pagan Test for Heteroskedasticity (Chapter Three)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of cedi_qual_01

         chi2(1)      =     0.10
         Prob > chi2  =   0.7485
```

Breusch-Pagan for Heteroskedasticity Test (Chapter Four)

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: sqrt_cedi_quant cedi_qual_01 log_emit_2012 audit log_fac_spend
                    sust log_size log_age

         chi2(8)      =     6.98
         Prob > chi2  =   0.5384
```

Panel E2. White Test for Heteroskedasticity (Chapter Two)

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(72)     =    73.00
         Prob > chi2  =   0.4449

Cameron & Trivedi's decomposition of IM-test
```

Source	chi2	df	p
Heteroskedasticity	73.00	72	0.4449
Skewness	17.10	13	0.1946
Kurtosis	2.35	1	0.1254
Total	92.45	86	0.2978

White Test for Heteroskedasticity (Chapter Three)

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(64)      =     68.81
         Prob > chi2   =    0.3181
```

White Test for Heteroskedasticity (Chapter Four)

```
White's test for Ho: homoskedasticity
         against Ha: unrestricted heteroskedasticity

         chi2(35)      =     31.48
         Prob > chi2   =    0.6386
```

Appendix F. Durbin-Wu-Hausman Test of Endogeneity

```
Tests of endogeneity
Ho: variables are exogenous

Durbin (score) chi2(1)          =  6.8e-06  (p = 0.9979)
Wu-Hausman F(1,59)              =  5.5e-06  (p = 0.9981)
```

Appendix G. Results of Content Analysis

Name of Higher Education Institution	CEDI Quality	CEDI Volume
University of Oxford	No disclosure	0.98%
University of Highlands and Islands	No disclosure	0.00%
University of West of Scotland	No disclosure	0.00%
Birkbeck College	No disclosure	0.00%
Institute of Education	No disclosure	0.00%
Buckinghamshire New University	No disclosure	0.00%
Queen's University of Belfast	No disclosure	0.00%
University of Dundee	No disclosure	0.00%
London South Bank University	No disclosure	0.00%
Cardiff Metropolitan University / UWIC	No disclosure	0.00%
Glasgow Caledonian University	No disclosure	0.00%
Heriot-Watt University	No disclosure	0.00%
Edge Hill University	No disclosure	0.00%
Guildhall School of Music and Drama	No disclosure	0.00%
Glasgow School of Art	No disclosure	0.00%
University Campus Suffolk	No disclosure	0.00%
Abertay University, Dundee	No disclosure	0.00%

London School of Hygiene and Tropical Medicine	No disclosure	0.00%
Cardiff University	No disclosure	0.00%
University of Liverpool	No disclosure	0.00%
University of Buckinghamshire	No disclosure	0.00%
Conservatoire for Dance and Drama	No disclosure	0.00%
Leeds College of Art	No disclosure	0.00%
University College Birmingham	No disclosure	0.00%
University of Wales, Newport/ University of South Wales	No disclosure	0.00%
Regent's University London	No disclosure	0.00%
Central School of Speech and Drama	No disclosure	0.00%
Liverpool Institute for Performing Arts	No disclosure	0.00%
Glyndwr University	Less than moderate disclosure	0.92%
University of Arts, London	Less than moderate disclosure	2.08%
Robert Gordon University	Less than moderate disclosure	0.31%
St George's University of London	Less than moderate disclosure	0.78%
University for the Creative Arts	Less than moderate disclosure	1.33%
University of Sussex	Less than moderate disclosure	1.35%
University of Glamorgan/ South wales	Less than moderate disclosure	0.44%
University of Hull	Less than moderate disclosure	1.30%
Edinburgh Napier University	Less than moderate disclosure	1.57%
Staffordshire University	Less than moderate disclosure	2.31%
King's College London	Less than moderate disclosure	0.50%
University of York	Less than moderate disclosure	0.16%
University of Glasgow	Less than moderate disclosure	0.34%
Liverpool Hope University	Less than moderate disclosure	0.77%
University of Birmingham	Less than moderate disclosure	0.98%
University of Salford	Less than moderate disclosure	1.15%
Nottingham Trent University	Less than moderate disclosure	1.60%

University of Sunderland	Less than moderate disclosure	2.94%
University of Aberdeen	Less than moderate disclosure	1.62%
Falmouth University	Less than moderate disclosure	2.11%
University of Stirling	Less than moderate disclosure	1.13%
Coventry University	Less than moderate disclosure	2.45%
Norwich University of the Arts	Less than moderate disclosure	2.90%
Harper Adams University	Less than moderate disclosure	0.18%
Queen Margaret University	Less than moderate disclosure	1.07%
Courtauld Institute of Art	Less than moderate disclosure	0.37%
York St John University	Less than moderate disclosure	3.43%
University of Cambridge	Less than moderate disclosure	0.63%
Aberystwyth University	Less than moderate disclosure	2.36%
University of Strathclyde	Less than moderate disclosure	0.76%
University of Northumbria	Less than moderate disclosure	1.75%
Liverpool John Moores University	Less than moderate disclosure	0.97%
University of Bedfordshire	Less than moderate disclosure	0.34%
Swansea University	Less than moderate disclosure	0.97%
Open University	Moderate disclosure	0.59%
Leeds Trinity University / Leeds Trinity & All Saints	Moderate disclosure	1.49%
University of Leicester	Moderate disclosure	1.70%
London Business School	Moderate disclosure	0.95%
Institute of Cancer Research	Moderate disclosure	4.57%
University of Bristol	Moderate disclosure	3.83%
Newman University, Birmingham	Moderate disclosure	3.83%
University of Roehampton	Moderate disclosure	1.75%
University of Sheffield	Moderate disclosure	3.30%
University of Manchester	Moderate disclosure	3.05%
School of Oriental and African Studies	Moderate disclosure	1.33%
City University	Moderate disclosure	4.90%
University of Bolton	Moderate disclosure	4.07%

Royal College of Art	Moderate disclosure	3.02%
Teesside University	More than moderate disclosure	3.23%
Leeds Metropolitan University	More than moderate disclosure	1.56%
University of Westminster	More than moderate disclosure	3.15%
Imperial College London	More than moderate disclosure	3.79%
University of Reading	More than moderate disclosure	4.49%
Oxford Brookes University	More than moderate disclosure	4.06%
Middlesex University	More than moderate disclosure	1.73%
De Montfort University	More than moderate disclosure	2.35%
Birmingham City University	More than moderate disclosure	5.31%
University of Derby	More than moderate disclosure	1.23%
Canterbury Christ Church University	More than moderate disclosure	5.00%
University of West of England	More than moderate disclosure	3.89%
University of East London	More than moderate disclosure	5.03%
Goldsmiths University of London	More than moderate disclosure	5.78%
London Metropolitan University	More than moderate disclosure	5.88%
Bournemouth University	More than moderate disclosure	6.18%
Bath Spa University	More than moderate disclosure	13.23%
University of West London / Thames valley	More than moderate disclosure	1.61%
University of Kent	More than moderate disclosure	1.74%
University of Gloucestershire	More than moderate disclosure	6.37%
University of Hertfordshire	More than moderate disclosure	3.43%
University of Worcester	More than moderate disclosure	3.71%
University of London	More than moderate disclosure	3.00%

Arts University Bournemouth	More than moderate disclosure	2.24%
Bangor University	More than moderate disclosure	2.75%
Durham University	More than moderate disclosure	2.26%
University of Bath	More than moderate disclosure	6.18%
University of Central Lancashire	More than moderate disclosure	1.38%
University of Surrey	More than moderate disclosure	3.61%
Kingston University	More than moderate disclosure	5.00%
Royal Veterinary College	More than moderate disclosure	4.33%
University of Ulster	More than moderate disclosure	1.85%
Keele University	More than moderate disclosure	3.34%
University of Southampton	More than moderate disclosure	4.01%
University of Portsmouth	More than moderate disclosure	5.16%
Southampton Solent University	High disclosure	4.12%
University College London	High disclosure	5.56%
University of Lincoln	High disclosure	4.20%
University of Plymouth	High disclosure	5.48%
University of Bradford	High disclosure	7.88%
University of Nottingham	High disclosure	3.98%
Anglia Ruskin University	High disclosure	3.20%
Aston University	High disclosure	13.89%
University of Brighton	High disclosure	15.09%
Cranfield University	High disclosure	10.33%
University of Leeds	High disclosure	3.16%
University of Warwick	High disclosure	2.19%
Royal College of Music	High disclosure	2.69%
University of Exeter	High disclosure	3.81%
London School of Economics and Political Science	High disclosure	12.79%
University of Newcastle	High disclosure	6.37%
Royal Agricultural University	High disclosure	1.36%
University of Edinburgh	High disclosure	1.92%
University of Northampton	High disclosure	7.83%
University of Chichester	High disclosure	1.06%
University of St Andrews	High disclosure	10.97%
University of Cumbria	High disclosure	2.53%
Sheffield Hallam University	High disclosure	1.52%

University of Wolverhampton	High disclosure	3.87%
University of Essex	High disclosure	8.75%
University of Greenwich	High disclosure	2.60%
University of Winchester	High disclosure	10.75%
Loughborough University	High disclosure	3.57%
Royal Holloway University of London	High disclosure	1.38%
University of Huddersfield	High disclosure	1.30%
Manchester Metropolitan University	High disclosure	5.56%
University of East Anglia	High disclosure	4.40%
Brunel University	High disclosure	5.60%
St Mary's University College, Twickenham	Annual Report not found	
Dublin City University	Annual Report not found	
University of Wales, Lampeter	Annual Report not found	
Royal Conservatoire of Scotland	Annual Report not found	
Swansea Metropoliton University/University of Wales, Swasea Campus	Annual Report not found	
Bishop Grosseteste University	Annual Report not found	
Trinity College Carmarthen/ University of Wales, Carmarthen Campus	Annual Report not found	
Royal Academy of Music	Annual Report not found	
University of Lancaster	Annual Report not found	
Ravensbourne	Annual Report not found	
Rose Bruford College	Annual Report not found	
Writtle College	Annual Report not found	
Royal Northern College of Music	Annual Report not found	
ifs School of Finance	Annual Report not found	
St Mary's University College, Belfast	Annual Report not found	
Heythrop College	Annual Report not found	
University of St Mark and St John, Plymouth	Annual Report not found	
Stranmillis University College	Annual Report not found	
Scotland Rural College	Annual Report not found	
University of Wales Trinity Saint David / Trinity University College	Annual Report not found	
University of Chester	Annual Report not found	
Royal Welsh College of Music and Drama	Annual Report not found	
Queen Mary University of London	Annual Report not found	
Trinity Laban Conservatoire of Music and Dance	Annual Report not found	