The Relationship between Environmental Management Quality and Financial Performance of AIM listed Firms in the UK

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A thesis submitted in partial fulfilment of the requirements of Bournemouth University for the Degree of Doctor of Philosophy

August 2018

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ABSTRACT

Environmental sustainability is an area of increasing concern for society, governments, corporations, and policy makers worldwide. The adoption of sustainable environmental practices contributes significantly to UK's GDP and employment. However, theoretical and empirical arguments on environmental and financial performance relationships have been inconclusive with existing studies mainly focussing on large listed firms. The aim of this study is to examine the relationship between environmental management quality (EMQ) and Financial Performance (FP) of firms listed on Alternative Investment Market (AIM) in the UK. The study has three main objectives. First, to determine the environmental management quality and financial performance of AIM listed firms in the UK that are dominated by SMEs as most of the existing studies in the UK have only focussed on large companies listed on the main stock market. Second, to determine whether firm growth influences the environmental management and financial performance relationship of AIM listed firms which mostly consist of new and growing firms. Third, to determine if financial resources have impact on environmental management quality and financial performance relationships as much evidence suggest that environmental management practices of SMEs are low due to resources constraint.

The thesis is based on a sample of 201 firms listed on Alternative Investment Market (AIM) from 2011 to 2016 with a total of 1206 firm-year observation. The environmental management quality measures were obtained through content analysis of annual and other sustainability reports, with the financial performance measures extracted from Amadeus and Fame Database. The relationship between environmental management quality and financial performance was modelled using OLS panel regression technique, supported by Arrellano Bond (GMM) dynamic panel regression model as a robustness check. The study also discussed the various theoretical (resourced-based view and stakeholder theory) and empirical studies that underpin environmental and financial performance relationships with the aim of understanding how environmental management practices influence financial performance whilst at the same time, identifying the gaps that exist in the prior empirical studies.

The findings of the study suggest that strong opportunities exist for AIM listed firms to improve their internal measure of financial performance (ROA) by improving their environmental management quality. This confirmed the theoretical predictions that sustainable environmental management is a unique resource that increases product differentiation in the marketplace, enhances organisational image to customers, and as a

result increases profitability. The study also revealed that the relationship between environmental management quality and Financial Performance is inverted U-shaped; suggesting that moderate level environmental management quality may generate the optimum financial benefit based on internal measures of performance (ROA). Although based on the sample from all firms listed on AIM, no significant relationship was discovered between environmental management quality and market values. It was however discovered that medium and larger firms that improve their environmental management quality also improved their market values.

Regarding the impact of the firm growth on EMQ and FP relationship, no significant association of growth on EMQ and FP relationship was identified. However, it was discovered that the market punishes organic growth firms that pursue increase environmental management practices, as the moderating impact of firm growth on EMQ and FP relationship was negative. In relation to whether cash resources moderate EMQ and FP relationship, the study revealed that efficient deployment of cash resources for environmental proactive measures impact positively on financial performance. The result of this interaction also indicates that excessive investment of cash resources on environmental management practices would yield negative returns. The study confirms theoretical assertions based on the resourced-based view that resources are essential for environmental and financial performance relationships. In the case of stakeholder theory, the assertion that improved environmental performance is rewarded by stakeholders was only confirmed in medium and larger firms.

Finally, the implications and suggestions for future research were discussed. Whilst it is expected that the establishment of business case will improve environmental management quality of AIM listed firms, it is also recommended that flexible innovative regulations that will encourage AIM listed firms to improve and disclose their environmental practices will be a step in the right direction.

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ACKNOWLEDGEMENT

In all things, give glory to the Lord. I am very grateful to the Almighty God for his grace in abundance and mercies which enabled me to complete this study successfully. This thesis has benefited from the kind and helpful individuals whose immerse contribution cannot be overlooked. I really appreciate every bit of advice and direction which greatly shaped this thesis. God richly bless all of you. Special thanks go to the following individuals who in diverse ways were very instrumental in the work. To my supervisory team at Bournemouth University, Dr Ishmael Tingbani, and Dr Elena Cantarello, I am grateful for your support and the enormous time you spent over the course of this thesis. To Professor Steve Letza Dr Alan Kirkpatrick, and Dr Jens Mohrenweiser, who were at my PhD transfer viva, for your relevant inputs at that stage which has improved the thesis, I am grateful. Also, worth acknowledging are Professor Ven Tauringana and Professor Tim Lloyd. Your timely feedbacks at the early stages of the thesis, as well as at the PhD presentations and workshops are deeply appreciated.

The Doctorial College also needs special mention for the various workshops that ensured that my research skills were enhanced. Let me say thank you to all my PhD colleagues for the warm and receptive atmosphere at our meetings and gatherings. I also wish to acknowledge the cordial and helpful discussion and support of Dr Isaac Boateng and my colleague's Dr Gabriel Ahinful and Joseph Chenchenhene. I sincerely acknowledge the administrative support offered during my studies from the Business School, Faculty of Management that made things relatively easy and straightforward for me.

I would also like to express my gratitude and indebtedness to the authorities and all colleagues at Koforidua Technical University, Ghana for the invaluable contribution and support over the duration of my studies abroad. I am thankful to you for the help and prayers which supported me during the academic research programme.

Last but not the least, the support of my wonderful family cannot be overemphasised. I deeply and sincerely appreciate the love, care, and readiness which my dear lovely wife, Alice Boakye expressed during the long period of academic research. To my lovely and ever wonderful daughters, Nana Ama, Lindsey and Shirly-Ann, thank you very much for being so considerate and appreciative of the fact that I needed to squeeze your much-needed time for my academic work. To Dr Ahinful and wife Nana Dwomoh, I am grateful for your reception at Bournemouth. In addition, I also express my profound gratitude to Mr Mathew Bediako for his invaluable time in editing this thesis. To my brothers and sisters, I am

grateful for your interest and support for my academic development. Finally, I cannot express my appreciation to my parents Mr Akwasi Agyemang and Madam Grace Kwakyewaah for their endless encouragement and support from birth to this day of my adult and academic life. I say well-done!!!

DECLARATION

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

Danquah Jeff Boakye
July 2018

DEDICATION

This Thesis is dedicated to my lovely wife Mercy Alice Boakye who provided me with the needed support throughout the course of this study.

LIST OF ABBREVIATIONS AND ACRONYMS

ACCA	Association of Chartered Certified Accountants
AIM	Alternative Investment Market
AMT	Automatic Monitoring and Targeting
AR	Arrellano Bond
BAT	Best Available Techniques
BEIS	Department for Business, Energy and Industrial Strategy (BEIS)
CCL	Climate Change Levy
CDSB	Carbon Disclosure Standard Board
CEO Rem	CEO Remuneration
CHP	Combined Heat and Power
CHPQA	Combined Heat and Power Quality Assurance
CIFAR	Canadian Institute for Advance Research
CIWEM	Chartered Institute of Water and Environmental Management
COM	Compliance (Environmental Regulations)
CRC	Carbon Reduction Commitment
CSEAR	Centre for Social, Environmental and Accounting Research
CSER	Corporate Social and Environmental Responsibility
CSR	Corporate Social Responsibility
DEFRA	Department of Environment, Food and Rural Agency
EC	European Commission
ECA	Enhanced Capital Allowance
ECHA	European Chemical Agency
EE	Energy Efficiency
EEA	European Economic Area
EMAS	Eco Management Audit System
EMP	Environmental Management Performance
EMQ	Environmental Management Quality
EnTA	Environmental Technology Assessment
EPS	Earnings Per Share
ESOS	Energy Savings Opportunity Scheme
ESOS	Energy Savings Opportunity Scheme

ETPL	Energy Technology Product List
EU ETS	European Union Emission Trading System
EU	European Union
FE	Fixed Effects
GDP	Gross Domestic Products
GHG	Greenhouse Gases
GMM	General Methods of Moments
GRI	Global Reporting Initiative
HVAC	Heating, ventilation and air conditioning
IPPC	International Plant Protection Convention
IRRC	Investor Responsibility Research Centre
ISO	International Standard Organisation
KIS	Korean Innovation Survey
KPI	Key Performance Indicators
LCA	Life Cycle Assessment
LPG	Liquified Petroleum Gas
LSEG	London Stock Exchange Group
MBV	Market-based View
MNC	Multi-National Corporations
MRE	Material and Resource Efficiency
NASDAQ	National Association of Securities Dealers Automated Quotations
NHS	National Health Services
NRBV	Natural Resource-based View
NYSE	New York Stock Exchange
OLS	Ordinary Least Square
ONS	Office for National Statistics
P/E Ratio	Price Earnings Ratio
PRTR	Pollutant Release Transfer Register
RBV	Resource-based View
RE	Random Effect
ROA	Return on Assets
ROCE	Return on Capital Employed

ROE	Return on Equity
ROI	Return on Investment
ROS	Return on Sales
SEA	Strategic Environmental Assessment
SMEs	Small and Medium-sized Enterprises
STAKE	Stakeholder Engagement
TRI	Toxic Release Inventory
UK	United Kingdom
UNGC	United Nations Global Compact
US	United States
WM	Waste Management

CHAPTER ONE

BACKGROUND OF THE STUDY

1.1 Introduction

Environmental sustainability is an area of increasing concern for society, governments, corporations and policy makers worldwide (Gregory-Smith et al. 2017). The adoption of sustainable environmental management practices contribute over £23.6 billion and 357,200 to UK's GDP and employment respectively (Office for National Statistics 2015). Whilst the contribution of sustainable environmental practices in many developed economies such as the UK has been tremendous over the course of previous and current decade, business practitioners and researchers have debated over the potential impact that proactive environmental practices have on businesses (Conlon and Glavas 2012). This debate on the potential impact of proactive environmental practices on business performance has emerged from both theoretical and empirical point of view and the results have been inconclusive. Whilst some arguments support the view that proactive environmental practices can enhance economic value, others have argued that it rather generates an extra cost to the business (Friedman 1970, Porter and Linde 1995).

The proponents of traditional view including Friedman (1962), argue against the idea that sustainable environmental practices generate financial benefits and that environmental legislations, including technological standards, environmental taxes, and emission permits compel firms to allocate resources such as labour and capital for pollution control and from a business point of view, this is considered unproductive. Emphasising on Friedman's (1962) argument, Davis (1973) outlined that many social goals are not self-financing implying that someone else must pay for them. If businesses are pushed into social obligations, it will drive out most marginal firms from various industries (Davis 1973). In a situation where the ownership rights of public goods such as water and air quality are not defined, the cost of pollution that is generated by the firm is incurred by the society (Figge and Hahn 2004, McWilliams et al. 2006). Therefore, a firm that voluntarily internalises these externalities generates an additional cost that is not in line with the profit maximising objective. The negative arguments have also been explained by Ambec et al. (2013) that technological standards, for instance, limit the flexibility of technology or inputs into the production process and taxes as well as emission permits are additional costs to the firm.

Porter and Linde (1995), strong advocate of "win-win" situation, recognised the existence of trade-off that arises from environmental legislation on one side is the benefits society from the strict environmental regulations. On the other side, they indicated that industry's private

costs of strict environmental regulation results in higher prices and reduce competitiveness. However, Porter and Linde (1995) strongly argued that pollution reduction measures may improve productivity with which resources are utilised and that properly designed environmental regulations may trigger innovations which may offset the cost of the investment or compliance and results in a positive relationship between environmental and financial performance. Social goals are now considered priority for the members of the public. Therefore, firms that intend to capture public image to attract more customers and generate other benefits need to show support for social goals such as improved environmental practices (Davis, 1973). Pollution prevention enables significant cost savings to be achieved through efficient input into production process and energy consumption, as well as reuse and recycling (Hart 1997). It is believed that environmental sustainable practices are more likely to be successful if symbiotic (Porter and Kramer 2002). That is, when there is "win-win" partnership between commercial and social entities, reputational gains, assets gain among others, is derived. Based on the revisionists view, it has also been argued that proactive environmental performance creates strategic benefits such as improved operational efficiency, increased recruitment opportunity and retention as well as increased market share (Hart 1997, Russo and Fouts 1997, Darnall and Ytherthus 2005). Similarly, Butler et al. (2011) emphasised that sustainable environmental performance may increase product differentiation in the marketplace thereby enhancing organisational image to customers and as a result increase profitability.

Various empirical studies on the relationship between environmental and financial performance have therefore been undertaken in support of these two lines of arguments (Freedman and Jaggi 1992, Hart and Ahuja 1996, Christmann 2000, Filbeck and Gorman 2004, Trumpp and Guenther 2017). Similarly, to the neoclassical arguments and the revisionist's literatures, these studies have produced contradictory results with some supporting positive relationship arguments and others in favour of the negative relationship position. For instance, whilst Christmann (2000), Carter et al. (2000), Melnyk et al. (2003), Clemens (2006), Montobon et al. (2007), López-Gamero et al. (2009), and Trumpp and Guenther (2017) have documented positive relationship between environmental and financial performance, others including Freedman and Jaggi (1992), Cordeiro and Sarkis (1997), Khanna and Damon (1999) and Wagner (2005) found negative relationship between environmental and financial performance. Aside the fact that these studies support neoclassical and revisionists arguments, it has also been argued that the contradictory results could be attributed to the fact that linear models dominate the results of the existing studies

(Ramanathan, 2016: Trumpp and Guenther, 2017). Therefore, based on non-linear relationship, they argued that the type of the relationship is based on the level of environmental performance.

However, in spite of the important interrelations that exist between environmental and financial performance, little empirical evidence exists on SMEs that dominate the Alternative Investment Market. As emphasised by Trumpp and Guenther (2017), establishing a positive correlation between environmental and financial performance would provide a business case for environmental engagement. This is very important for SMEs which have been confirmed by many studies that environmental pollution originates from SMEs. Environment Agency (2003) estimated that about 60% of UK SMEs are responsible for 60% of commercial waste and 80% pollution accidents. It has been argued that the sheer number of SMEs with a significant number in manufacturing has the potential to exert enormous pressure on the environment (Hillary and Burr 2011). Hillary (1995) also identified that pollution emission from SMEs operating in the manufacturing sector alone is about 70%. Notwithstanding the fact that environmental pollution mostly originates from SMEs, most studies on the relationship between environmental and financial performance have concentrated on large companies listed on the main markets (e.g. Russo and Fouts 1997, Filbeck and Gorman 2004, Earnhart and Lizal 2007, Clark et al. 2015). However, it has been argued that conclusions drawn from large listed companies cannot be representative of SMEs which in most cases have different structures and are not aware of their own environmental impacts (Hillary 2004, Fassin 2008). Sen and Cowley (2013) have also emphasised that social and environmental issues for large firms and SMEs differ in critical ways, and the CSER must encompass these disparities.

This study, therefore, offers new evidence on the relationship between environmental and financial performance by demonstrating that such a relationship among SMEs and large companies listed on the Alternative Investment Market could be non-linear. This perhaps could also explain why extant research has reported mixed findings ranging from a positive, negative, or neutral relationship between environmental and financial performance. To the best of my knowledge, there is no study that has demonstrated that the relationship between environmental and financial performance is non-linear among publicly listed SMEs. The issue of whether firm growth moderates environmental and financial performance relationships have been contradictory. Whereas some argue that the growth of the firm positively influences the environmental and financial performance relationships, others have argued that the relationship is negative. As most of the companies listed on AIM are new

and growing businesses, establishing the effect of firm growth on environmental and financial performance relationship of AIM listed firms will also provide additional evidence to the studies in this area. Also, several studies (e.g. Aiyub et al. 2009, Hillary and Burr 2011) have shown that financial strength influences the ability of firms to pursue an optimal investment policy such as innovative environmental practices which could positively impact on their financial performance. However, this has not been empirically tested, particularly in terms of AIM listed firms. Thus, this study adds to the existing literature by showing evidence of possible effect of cash resource implication on the relationship between environmental and financial performance of AIM listed companies which have not been considered by the existing studies.

1.2 Importance of UK in the Context of the Study

Since 1990s, UK has made a great progress in meeting many environmental challenges whilst at the same time ensuring growth in the economy. Energy UK (2017) reported that as at 2016, the energy sector had significantly reduced GHG emissions by not less than 54% since 1990. Coal power generation had also reduced by 63% between 1990 and 2015 with renewable energy supply now occupying the larger share of the UK energy supply market (Energy UK, 2017). Sulphur dioxide (SO2) nitrogen oxides (NOx) and dust (PM 2.5) which constitute major emissions to air from power generation points have been drastically reduced since 1990 as a result of fuel switch from coal to gas. This remarkable progress has been noted by the OECD (2015) which reiterated that it reflects both reshaping of the UK Economy in the strengthening of the UK environmental policies in the context of the EU.

However, despite the remarkably success that has been achieved by the UK especially in reducing emission from the energy sector, it has been argued that UK could still improve its ranking among OECD and EU countries in priority environmental areas such as diffusing pollution and waste management. OECD (2015) report indicated that the UK is in the middle range of EU and OECD countries as many environmental indicators notably waste management, recycling, and recovery rates are still trailing those of comparable EU counterparts. The report also indicated that landfilling rates in the UK remains considerably high.

Evidence also shows that most environmental pollution in the UK is caused by businesses. Hillary (1994) disclosed that environmental pollution from SMEs operating in the manufacturing sector alone is about 70%. Baker (2004) reiterated that one of the major environmental impacts of big supermarket chain is when a new store is opened. Aside the

size, the opening of the supermarkets in outskirts of town means that more travel journey is required which consequently influences the level of GHG emissions. AEA Technology (2005) disclosed that cars used for food shopping in the UK result in cost of more than £3.5 billion per year from traffic emission, accidents, noise, and congestions. Survey by FOE (2005) revealed the demands by supermarkets on UK farmers in terms of product specification. Packaging is increasing the use of materials and pesticides with detrimental effects on the environment. Efficient management of UK natural environmental is therefore vital as poor environmental management practices has negative social consequences on the UK economy. WHO (2009) for instance, disclosed that outdoor air pollution on respiratory and cardio-vascular system are estimated to cause between 12,000 and 24,000 premature deaths per annum and cost UK £20.5 billion per year. Evidence suggests that when there is availability of green spaces, people are more likely to undertake sustained physical activity which is a very important factor in good physical and psychological wellbeing. In the UK, available statistics indicate that lack of physical activity costs more than £8 billion per annum in addition to £2.5 billion cost related to obesity (Department of Health, Physical Activity 2004). According to Everett et al. (2010) healthy and clean environment is also considered a useful avenue in attracting and retaining investors. This has been highlighted by UKTI (2009) that the natural environment is a key quality of life factor that are considered by entrepreneurs.

In addressing some of these environmental challenges, various environmental reporting requirements have been enacted in the UK. Companies Act 2006, DEFRA (2013) and London Stock Exchange Guidelines are intended to encourage companies to adopt good environmental practices and report on them as well. However, most of these reporting requirements are only mandatory to large companies listed on the main markets although they encourage other companies not within the mandatory reporting requirements to report voluntarily. This study therefore in part assesses whether AIM listed companies, which represent another major market and not mandatory required to report on their environmental performance are voluntary disclosing environmental information and that whether such disclosures have any significance on their financial performance. This is important as proponents of regulations have argued that without legislation, firms lack the incentives to implement and disclose adequate information on their environmental practices (Chithambo 2013). Policies and research that are directed towards efficient use of business resources such as energy, water and materials are considered vital as it is estimated that businesses in UK could save up to £23 billion per annum by taking low cost measures to improve their

environmental practices (Defra 2015). Therefore, this study, which is based in the UK, is likely to provide data and encourage SMEs that dominate the UK economy to invest in good environmental practices that could also impact on their financial performance.

1.3 Motivation and the Need for the Study

The study offers new evidence on the relationship between environmental and financial performance by demonstrating that such a relationship is non-linear among publicly listed SMEs. This study differs from the studies that have exclusively examined the relationship between environmental and financial performance. Lopez-Gamero et al. (2009) analysed a sample of Spanish firms and reported a positive impact of proactive environmental management on firm performance. The authors concluded that resources are relevant for competitive advantage and financial performance. Similar evidence was established by Busch and Hoffman (2011) on a sample of 2500 large American firms using an outcome-based approach. Focusing on a sample of 523 US firms, Cordiero and Sarkis (1997) reported a negative linear contemporaneous relation between environmental management and firm performance. Finally, in a much recent study on a sample of international firms, Trumpp and Guenther (2017) established a non-linear relationship between environmental and financial performance. However, whilst Trumpp and Guenther (2017) study documented a non-linear relationship between environmental and financial performance on a sample of large international manufacturing and service firms, this study, unlike Trumpp and Guenther (2017) focuses on SMEs and provides comparable evidence in a major markets (i.e., AIM in the UK). It establishes how the use of different environmental management performance measures outlined in DEFRA (2013) report affect the financial performance of AIM listed firms.

Second, it has been argued that the growth of a business could influence environmental and financial performance relationships. Darnall and Ytherthus (2005) for instance hypothesised that companies in high growth industries may derive positive impacts from proactive environmental actions as they have more organic rather than bureaucratic management style and more likely to capture additional financial benefits by pursuing environmental measures beyond compliance because of their innovative culture. Russo and Fouts (1997) have emphasised how growth firms are more likely to benefit from increased environmental performance Arguing from theoretical underpinnings of discounted cash flow techniques, they indicated that the level of industry growth moderates the expected probabilities of return as the expected payoff of any investment risk is higher in high growth industries. As most AIM listed firms are SMEs, new and growing, establishing a positive link between growth

on environmental and financial performance is likely to encourage the listed SMEs to adopt more proactive environmental practices to enhance their financial performance. Therefore, this study for the first time provides evidence on whether firm growth has influence on environmental and financial performance relationships of AIM listed firms which mainly consists of SMEs.

Third, the study also provides evidence for the first time, in terms of the relationship between environmental and financial performance by taking into consideration the plausible effect of financial constraints. Although many studies (e.g. Hillary and Burr, 2011: Aiyub et al. 2009) have recognised that cash constraints affect SMEs' ability to implement proactive environmental practices, it has not been tested empirically. Others (e.g. Christmann 2000, López-Gamero et al. 2009) have indicated that availability of resources moderate environmental and financial performance relationships. It is argued that the existence of cash resources can enhance a firm's ability to acquire other resources such as pollution abatement equipment to introduce innovative environmental practices that can impact positively on profitability (Trumpp et al. 2013). Most AIM listed firms are new and evidence suggest that most new firms are usually cash constrained as they lack market reputation to access finance more easily (Berger and Udell 1995, Arslan et al. 2006). Therefore, this study for the first time provides evidence as to whether the availability of cash resource influneces the relationship between the environmental and financial performance of listed AIM listed firms in the UK.

1.3 Aims and Objectives of the Study

The aim of the study is to investigate the impact of environmental management quality on financial performance of companies listed on the Alternative Investment Market in the UK. Whilst the intention is to resolve the research gap in terms of inconclusiveness of existing research on environmental and financial relationship by employing non-linear models, it also focuses on listed SMEs which have not been considered by the existing studies. In addition, it also looks at how cash resource constraint, as well as firm growth, impacts on environmental and financial performance relationships of AIM listed companies. The research objectives and the related research questions are summarised below.

- To determine whether there is a relationship between environmental management quality and financial performance of AIM listed firms in the UK.
- To determine whether the impact of environmental management quality on financial performance is influenced by firm growth.

- To determine whether the impact of environmental management quality on financial performance is influenced by the financial strength of the firm.

Research Questions

- Is there any relationship between environmental management quality and financial performance of AIM listed firms?
- Does firm growth influence the relationship between environmental management quality and financial performance?
- Does financial strength affect environmental management quali and financial performance relationships?

1.5 Summary of Research Methodology

In all 201 companies were selected from 1049 companies listed on the AIM as at February 2016 spread across 26 different industries. Less polluting firms mainly banks, financial services, real estate investment trusts and real estate investment services were excluded (Konar and Cohen 2001). Ntim and Soobaroyen (2013) indicated that such companies should be excluded as they are subject to different disclosure and regulatory requirements. Firms included also consistently disclose their environmental performance. This is in line with disclosure theory that there is a positive link between environmental performance and environmental disclosure as inferior firms are unlikely to disclose their poor environmental practices (Gómez-Bezares et al. 2017). The study adopted two dependent variables to capture corporate financial performance: accounting (internal measure of performance) and market-based measures. This is because each measure has a different dimension on corporate financial performance. Whereas accounting-based measures are widely used because they reflect internal efficiency, market-based measures are also used to capture the market perception about the firm.

In the case of independent variables (environmental performance measures), Defra (2013) report outlined several environmental performance measures including Waste, Greenhouse Gases, Energy, Material and Resource efficiency, as well as stakeholder engagement, and these have been adopted as independent variables for the study. Other variables that could also influence financial performance and have been controlled in the study are size (Cordeiro and Sarkis 1997, López-Gamero et al. 2009, Trumpp and Guenther 2017), industry (Rumelt 1991, Claver et al. 2007) risk tolerance (Cordeiro and Sarkis 1997, Waddock and Graves 1997, Li and Hwang 2011), and liquidity (García-Teruel and Martínez-Solano 2005). Content analysis was used to obtain environmental performance measures as seen in the case of Montabon et al. (2007) and Chithambo (2013). Content analysis is a systematic and

replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Montabon et al. 2007).

The method of analysis used in this study is panel data analysis, which controls for individual heterogeneity (Hsiao 2007). To help select the suitable panel estimation technique, Hausman (1978) test was performed. The Hausman test rejected the null hypothesis that the individual effects are uncorrelated with the regressors and therefore, the study adopts the fixed-effects regression model.

1.6 Main Findings

The findings of the study accomplished the three main objectives of the study. In terms of the first objective, the study revealed that there is a significant relationship between environmental performance and accounting-based measure of performance, ROA. Whilst the positive correlation between environmental management performance and accounting based measure support theoretical assertion by Hart (1997) that environmental practices such as pollution prevention is a unique resource which enables significant cost savings to be achieved, it has also been empirically confirmed in some studies (López-Gamero et al. 2009, Hillary and Burr 2011). However, no significant relationship was identified based on the market-based measure of performance, the Tobin's q. This outcome also suggests that investors may be interested in product driven environmental initiatives which directly impact on cost and profitability rather than embracing themselves with process driven initiatives which could be achieved through the spill over effect from the product driven initiatives (Gilley et al. 2000). The result from the study is very significant as it shows that listed SMEs are better off investing their limited resources on product driven initiatives which directly impact on profitability than process driven initiatives which may not have any significant impact on profitability. The results from different components of environmental performance and financial performance which revealed significant positive relationship between all components of environmental management quality and the ROA also support the view that it is more beneficial for listed SMEs to pursue environmental practices that reflect their internal efficiency rather than those that attempt to persuade the market.

With respect to the second objective, it was discovered that whilst growth positively impacts on the market value of AIM listed companies, there was no moderating impact of Firm Growth on environmental management and financial performance relationships. The result supports the arguments by Waddock and Graves (1997) that resource constraint is likely to weaken a firm's abilities to expand its social and environmental activities. This has been

confirmed by Elsayed and Paton (2009) that during the growth stage when a firm is not well established, the firm is more likely to have difficulties accessing external funding hence will have limited investment in social and environmental practices which is unlikely to impact on their financial performance. Thus, in line with the Resourced-based view, resource-constraint during the period of growth is likely to affect listed SMEs ability to develop unique and specific environmental strategy to gain competitive advantage.

Regarding the third objective, it was found that higher level of cash resource may positively or negatively impact on EMQ and FP relationships depending on how efficiently the cash is utilised. This is supported by the findings of Trumpp et al. (2013) that redesigning of production process and substitution of polluting inputs require financial resources. Basing their argument on slack resource hypothesis, their study confirmed that the availability of financial resources influences environmental performance. This study also confirmed that whilst EMP has significant impact on internal measures of performance for both constraint and unconstraint, there is no significant impact of EMQ on the market-based measure of performance. This confirms the initial findings that EMQ and FP relationship for AIM listed firms are more driven by internal measures of performance.

1.7 Contributions of the Study

The study makes a number of significant contributions to existing research. First, the study is significant to SMEs, unlike the existing studies which concentrated on large listed companies (Hayward et al. 2013, Clark et al. 2015, Muhammad et al. 2015). As argued by Fassin (2008), the way large companies deal with social and environmental issues cannot be simply transposed to SMEs as they are less bureaucratic and in most cases solve problems on a day-to-day basis. SMEs are likely to be motivated if there are concrete data on financial benefits of pursuing environmental proactive activities. However as shown by Hillary and Burr (2011), the low occurrence of SMEs with environmental management practices could be attributed to lack of concrete data on financial benefits of environmental management systems (EMS) for SMEs. This study, therefore, provides evidence specific to the SMEs to address these failures as evidence obtained on the relationship between the environmental and financial performance of large listed companies may not be relevant to SMEs. SMEs also have limited resources to manage the environment and therefore the results obtained from the large listed companies cannot be a representative of SMEs. The result of this study is therefore expected to complement evidence specific to the AIMs listed companies that are dominated by SMEs and to help address the market failure to provide concrete data on SMEs environmental and financial performance relationships.

Second, most studies on environmental and financial performance relationships have employed linear regression models in their analysis. However, it has been argued that the inconclusive results of the studies on environmental and financial performance relationships could be attributed to large use of linear regression models and therefore using more complex models such as moderating/mediating factors and non-linear models such as quadratic models would be more useful (Ramanathan 2016, Trumpp and Guenther 2017). The few studies that have employed non-linear models on the studies on environmental and financial performance relationships have only confirmed such relationships in one or few sectors notably manufacturing and large companies (Nollet et al. 2015, Ramanathan 2016, Trumpp and Guenther 2017). This study, which tests non-linear relationships of environmental and financial performance in small, medium, and large companies, is expected to provide new evidence to the studies on environmental and financial performance relationships.

Third, Russo and Fouts (1997) have argued on how firms are more likely to benefit from increased environmental performance when they are in high growth industries rather than low growth industries. In line with the theoretical underpinnings of discounted cash flow, they indicated that the level of industry growth moderates the expected probabilities of return as the expected payoff of any investment risk is higher in high growth industries. This supports the earlier empirical evidence of Hofer (1975) that low growth industries are likely to consist of mature firms with hierarchical, inflexible and bureaucratic organisational structure and therefore less likely to accommodate efficient proactive environmental management practices. It has also been argued that high growth industries have more organic rather than bureaucratic management style and therefore more likely to capture additional financial benefits by pursuing environmental measures beyond compliance because of their innovative culture (Darnall and Ytherthus, 2005). However, firm growth as well as the growth structure of a firm which could be organic or inorganic, and how it affects environmental and financial performance relationships has not been tested by the existing empirical studies. This study is therefore expected to provide additional evidence on environmental and financial performance relationships studies by showing whether firm growth and growth structure of the firm affects the environmental and financial performance relationships particularly for AIM listed companies where both organic and inorganic growth are dominant.

Fourth, an increase in cash resources directly affects fund available for investment and it is expected that companies with high cash resources are likely to invest in proactive environmental measures. It has also been argued by Gilchrist and Himmelberg (1995) that

the cost of external financing mostly depends on the collateral indicated by the net worth of the business. As firms improve their financial strength, it impacts the net worth as premium on external funding falls and creates an opportunity for businesses to invest through external financing. This idea has also been reinforced by Fazzari et al. (1988) that dependence level of cash flow for investment is higher in cash constraint companies. However, the moderating effect of cash resource on environmental and financial performance relationships has not been considered by the existing studies, particularly in the Alternative Investment Market. This study, therefore, provides new evidence to the studies in this area by showing the effect of cash resource constraint on environmental and financial performance relationships

Fifth, a greater number of empirical studies on the relationship between environmental and financial performance have used perception-based studies (Blackburn 2004, Aiyub et al. 2009, López-Gamero et al. 2009, Hillary and Burr 2011, Hayward et al. 2013). However, many studies have argued against using perception-based studies on environmental and financial performance relationships. Vijfvinkel et al. (2011) emphasised that obtaining sustainable activities based on perception of individuals is subjective as it can be interpreted differently per firm. It is believed that perception studies lack reliability as participants may produce false information and self-reported environmental and financial performance by mangers lack objectivity (Darnall and Ytherthus 2005). This study is however based on published annual reports and audited financial statements in order to provide alternative methodology of studies on SMEs environmental and financial relationships in the UK which have been dominated by perception-based study.

Sixth, the study also makes significant contribution from theoretical point of view. The study was mainly underpinned by the resource-based view and the stakeholder theory. The findings of the study confirmed that resources are relevant in developing sustainable environmental management practices that enhance financial performance. This is based on the arguments from the resource-based view that resources that are unique, valuable and inimitable such as cleaner environment should establish legitimacy with the society, improve competitiveness due to higher patronage of its products and services, and consequently impact on financial performance (Russo and Fouts 1997). However, to develop such unique environmental resources may depend on the availability of other resources. Aiyub et al. (2009) averred that financial constraints could be a major obstacle for SMEs to engage in sustainable environmental practices although not empirically tested. This study has therefore confirmed the resource-based view that efficient utilisation of financial resources on

proactive environmental practices could impact positively on financial performance of a firm.

Seventh, the study further demonstrates that the stakeholder theory may not be relevant for smaller companies. Instead, social capital theory may be more appropriate for smaller companies to maximise the financial benefits of proactive environmental management practices. Although it has been argued by Trumpp and Guenther (2017) that improved environmental performance strengthens the market value as it enhances the firm's relationship with important stakeholders such as investors who may increase their level of investment. Increased investment is expected to create higher demand for shares and consequently influence the market value. Although this has been confirmed by the study in relation to medium and larger firms, that linkage could not be established in the case of smaller firms which recorded negative relationship between EMP and the market value. This finding is in line with theoretical arguments by Hoejmose et al. (2012) that SMEs are heterogeneous community of firms and suggest that the differences in environmental engagements between small, medium and large firms are significant. They reiterated that large firms significantly engage more with environmental initiatives particularly with respect of corporate PR and marketing. Medium firms also largely, promote their environmental practices both internally and externally whilst smaller firms are only embedded with their local community. Therefore, whilst it is likely that medium and larger firms may signal their environmental efforts to investors due to enhanced communication, this may not be the case for smaller firms whose environmental activities may only be recognised by their local community which is unlikely to participate in the stock market. Therefore, it is more appropriate for smaller firms to maximise the benefits of proactive environmental practices through social capital theory which addresses the benefits of networks of SMEs than attempt to enhance their corporate image through stakeholder theory.

1.8 Outline of the Research

The study is divided into eight chapters and structured as follows: Chapter two presents environmental management practices in UK. It gives various statutory, regulatory, institutional, and other environmental frameworks in the UK and how they affect AIMs listed companies. The chapter also emphasises the effect of the various frameworks on small, medium, and large companies.

Chapter three provides the analysis of the theoretical frameworks that explain the reason for the positive and negative relationships between environmental and financial performance.

The theories discussed are the Resource-Based View (RBV) and The Stakeholder Theory. The chapter also establishes the link that exists between the resource-based theory and the stakeholder theory and provides the conceptual framework which links the theories with environmental performance. The summary is provided at the end of the chapter.

The review of the theoretical framework is followed by the analysis of empirical literature in chapter four. The relevance of the chapter is to present empirical review on environmental and financial performance relationships. The discussion of the chapter starts with those studies that argue for positive relationship between environmental and financial performance relationships, followed by studies that support negative relationships, and no relationships. The chapter also discusses how cash resources can impact on environmental and financial performance relationships as well as how firm's growth can affect environmental and financial performance relationships. The control variables, both company specific factors such as size, the level of risk, liquidity and the nature of the industry, as well as governance specific factors including board size, independence of the board and CEO remuneration are also discussed in this chapter. The last section of chapter four summarises the main findings from the existing studies on environmental and financial performance relationships, limitations of the existing studies and finally summary and conclusions of the chapter.

Chapter five provides discussions on the research hypothesis. It shows how both the theoretical underpinnings and empirical studies on environmental and financial performance relationships are translated into testable hypothesis. The chapter is divided into five sections. The first section discusses the testable hypothesis on how the various measures of environmental performance influence financial performance. The second section gives the hypothesis that are developed to determine the likely impact of cash resources on environmental and financial performance relationships whilst the third section dwelt on the effect of firm's growth on environmental and financial performance relationships. The section four also gives the testable hypothesis based on control variables, both company specific factors and governance factors. The last section summarises the chapter.

The methodology of the study is presented in chapter six. It considers both dependent and independent variables as well as the control variables. The research strategy, content analysis, is fully discussed in this chapter. The chapter also discusses the analysis of empirical models used in the study such as panel regression models, fixed effect models and dynamic panel regression model (GMM). Other analytical methods including descriptive statistics and correlations are also discussed in this chapter.

Chapter seven presents the empirical finding of the study. It gives the results of the sixteen-testable hypothesis presented in chapter five. The chapter give empirical results from the findings of the study based on the panel fixed effect models whilst incorporating the results from the non-linear models. The chapter also shows the results from the GMM models, the moderating effect of cash resource on environmental and financial performance relationships, as well as the effect of the firm's growth structure on environmental and financial performance relationships.

The last chapter contains the summary and conclusions of the study. It summarises the results of the study, gives the policy implications, and shows the major contributions and limitations. Finally, it gives the potential insight for future research and areas of potential improvements.

CHAPTER TWO

ENVIRONMENTAL MANAGEMENT PRACTICES IN UK

2.1 Introduction:

Regulations play a critical role in the environmental management behaviour and practices of organisations. It is asserted that regulations are required to correct the market failure in the environment as well as to be a stimulus for economic activities (CIWEM 2017). CIWEM (2017) emphasised that to encourage investment and innovation in sustainable environmental practices, it is important that a well-established environmental management framework that allows organisations to document and assess their impact on the environment and the commitment continually to improve performance be established. In view of this, many international, regional, and national frameworks have been established to encourage corporations to respond actively to the environmental challenges whilst at the same time improving their financial performance. This chapter, therefore, dwells on important international, European Union and UK environmental frameworks, directives, and guidance that assist companies in implementing sustainable environmental practices that may also enhance their financial performance.

The rest of the chapter is organised into six sections. Section one gives the definitions of Environmental Management and how they have evolved over the years. Section two is centred on international policy guidelines that address environmental issues. Section three discusses some of the major European Union's directives that govern operations of organisations in relation to the environment and how these directives are implemented in the UK. Section four provides some other institutional framework and guidelines in UK that also assist organisations in responding to environmental challenges. Sections five deals with UK SMEs and the environment, and finally section six dwells on the Alternative Investment Market in the UK and how companies listed on AIM may respond to environmental challenges faced by their organisations.

2.2 Definitions of Environmental Management

Environmental Management is regarded as compliance of environmental regulations that encompass trade-offs between environmental and economic performance (Walley and Whitehead 1994). Environmental Management involves all efforts that are directed towards minimising the negative impacts of a firm product throughout their life cycle (Klassen and McLaughlin 1996a). However, the definition of environmental management has evolved. Berry and Rondinelli (1998) reiterated the fact that progressive firms are increasingly shifting from the notion of regulatory compliance to one of proactive environmental

management. Three stages have occurred in the development of environmental management practices. The stage one, which was the widespread business practices between the 1960s and 1970s involved dealing with environmental crisis as they occurred and attempts were made to control the resulting damage (Berry and Rondienelli 1998). The stage two, which occurred in the 1980s, was regarded as a reactive mode that involves corporations making efforts to comply with rapidly changing government regulations and minimising the cost of compliance. The stage three, which was considered as the proactive environmental management strategy stage also occurred in the 1990s. This is the stage where organisations recognise the need to anticipate the environmental impact of their business practices and take measures to reduce the negative impacts ahead of regulations (Berry and Rondienelli, 1998). At this stage, corporations incorporate environmental management practices as part of their strategy by taking advantage of business opportunities that come with it. Many firms are now regarding environmental values as part of their corporate culture and management processes. Cutting-edge firms are going beyond pollution preventing and exploring new opportunities for developing green products and services.

In line with proactive environmental practices that emerged in the 1990s is Strategic Environmental Assessment (SEA). Partidário (1996) indicated that SEA is a formalised way of assessing at earliest possible stage environmental impact of decisions made at policy, planning, and programme levels. SEA considers possible alternative ways that are pragmatic and integrate relevant environmental issues including biophysical, economic, social and political consideration into the environmental assessment. Thus, in an attempt to achieve proactive environmental practices, Partidario (1996) indicated that SEA is emerging in the context of national environmental practices in the US and most European Countries. This has been echoed by the Office for National statistics (ONS) UK, that there is growingly demand in the UK and the international society to measure the progress towards environmental sustainability. Linton et al. (2007) emphasised that the definition of environmental sustainability should not only include sustainable practices from production to supply but extend beyond the core of supply chain management to include product design, manufacturing by-products, product use, product life extension, product end-of-life, and recovery processes at end-of-life. Similarly, Office for National Statistics (2015) also provided definition of environmental sustainability as moving towards improving and preventing the environment from further deterioration. In line with current trends towards the environment, environmental management is defined as proactive strategies that involve voluntary eco-efficient practices for reducing energy, waste, material usage, that require

constant changes in routine and operations to minimize the firm's ecological foot print (Buysse and Verbeke 2003, Gómez-Bezares et al. 2017).

Thus, environmental management is a structured approach that firms adopt to ensure that their processes have a minimal, if not any, negative impact on the natural environment (Paulraj and de Jong 2011).The next section discusses some of the international policy guidelines that attempt to help corporations to achieve sustainable environmental practices.

2.3 International Policy Guidelines

2.3.1 Global Reporting Initiative (GRI, 2006)

The GRI framework was developed on the basis that increasing environmental challenges throughout the world requires trusted and credible framework for sustainability reporting that can be employed by any organisation of any size, sector, or location. Transparency about the sustainable practices of organisations is of great interest to many stakeholders and the GRI framework has been developed using multi-stakeholder approach which involves consensus, seeking consultation from large networks of experts from diverse stakeholders. The GRI Reporting framework is designed to serve as generally accepted framework for reporting environmental and other social performance of the organisation. It is also intended to serve a range of organisations from smaller enterprises to larger enterprises as well as organisations with dispersed geographical locations.

The GRI reporting framework is one of the widely-used sustainability reporting frameworks. It has four key elements. These are:

- Sustainability Reporting Guidelines: This principle is considered as the cornerstone of the GRI framework. This principle defines the report content and ensures that quality information is reported. It also gives the standard disclosures which consist of performance indicators, other disclosure items, and guidance on specific technical topics in reporting. Thus, this section covers reporting principles such as materiality, stakeholder inclusiveness, sustainability context, and completeness. This section also includes principle of balance, comparability, accuracy, timeliness, reliability and clarity. The final section of this principle concludes with guidance for the reporting entities on how to define the range of entities given by the report.
- Indicator Protocols: Indicator protocol provides definitions, compilation guidance and other information that assist preparers in ensuring consistency in the interpretation of performance indicators.

- Sector Supplements: This supports the guidelines with interpretations and guidance for applications in specific sectors. It also requires that relevant sector supplements should be used in addition to the guidelines and not in place of the guidelines.
- Technical Protocols: This covers issues that normally face organisations during the reporting process such as setting up the reporting boundary. It gives guidance on reporting issues and designed to be used in conjunction with the guidelines and sector supplements.

In relation to environmental dimension of sustainability, the GRI Framework outlines concise approach on the disclosure of environmental performance that concerns an organisation's impact on living and non-living natural system. The environmental aspects identified by the Global Reporting Initiative (2011) are Materials, Energy, Water, Biodiversity, Emission, Waste, Products and Services, Compliance, Transport and Overall. The detail indicators under each performance measures are given below:

Materials: Materials used by weight or volume, Percentage of material used that are recycle input materials.

Energy: Direct energy consumption by primary energy source, indirect energy consumption by primary energy source, energy saved due to conservation and efficient improvements, initiatives to provide energy efficient or renewable energy-based products, initiatives to reduce indirect energy consumption and the reductions achieved.

Water: Total water withdrawal by source, water source significantly affected by withdrawal of water and percentage of total volume of water recycled and used.

Biodiversity: Location and size of land owned, leased, protected areas and areas of high biodiversity value outside protect areas. It also includes description of significant impact of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside the protected areas. Others are habitats protected or restored, and strategies, current actions and future plans for managing biodiversity.

Greenhouse Gases/Emissions (GHG): This measure involves reporting on total direct and indirect greenhouse gas emission by weight, other relevant indirect greenhouse gas emission by weight, initiations to reduce greenhouse gas emissions and the emissions achieved. Other measures under the GHG include emission of ozone depleting substance by weight and other significant emission by type and weight.

Waste: Measures outlined here include total weight of waste by type and disposal method, total number and volume of significant spills, weight of transported, exported or imported waste deemed hazardous.

Products and Services: This measure involves initiatives to reduce environmental impacts of products and services and the extent of the impact. It also involves percentage of material sold, the packaging material reclaimed by category.

Compliance: Monetary value of significant fines and total number of non-monetary sanctions for non-compliance environmental regulations and laws.

Transport: This includes reporting of significant environmental impacts of transporting products and services, transportation of raw materials and transporting staff.

Overall: Total environmental protection expenditures.

The GRI reporting guidelines is designed to encourage organisations to adopt innovative practices to reduce environmental impact from their operations whilst enhancing their competitiveness and performance. These guidelines are also in line with DEFRA (2013) guidelines which requires similar disclosure. The idea is that organisations reporting their environmental practices would adopt proactive practices that would draw the attention of the stakeholders and establish legitimacy to enhance their competitiveness. This is in line with disclosure theory that there is a positive link between environmental performance and environmental disclosure as inferior firms are unlikely to disclose their lack of environmental performance (Gómez-Bezares et al. 2017). It is believed that disclosure of proactive environmental practices through the GRI guidelines would provide consumers and other relevant stakeholder's environmental information relating to the firm and their products that will enhance their reputation in the marketplace and enhance their competitiveness. Although the GRI requirements are not mandatory for UK companies, particularly SMEs which are the focus of the study, there is still the need for firms that intend to legitimize their position among the society to report on their environmental practices. In a study that analysed the effect of financial disclosure on financial performance in Malaysia, the companies emphasized that disclosure of their contribution in the environment practices was to attract investors and fulfil the demand of stakeholder groups (Nor et al. 2016). Similarly as revealed by Yusoff and Lehman (2009), it is the obligation of the firm itself to inform stakeholders regarding their environmental practices as such actions could help the firm to portray sustainability business to the stakeholder groups.

2.3.2 The United Nations Global Compact (UNGC)

During the World Economic Forum in January 1999, the UN outlined the various environmental challenges faced by each continent and solicited the support of leaders to join the international scheme aimed at bringing businesses together with UN agencies, NGOs and other civil societies to foster alliances in the pursuit of sustainable global economy. The UN Global Impact, therefore, provided initiatives to assist organisations in the development and promotion of value-based management globally. It encouraged innovation, creativity, and good practices among participants in dealing with environmental and other business challenges. The UNGC, like many studies on sustainability, argued for a business case for CSR and environmental sustainability and indicated that businesses with strong social and environmental responsibility are more successful in generating economic value added. Although the UNGC principle focussed on different areas of social responsibility such as human rights, labour and anti-corruption, environmental sustainability is one of the principal areas of the UNGC guidelines. The UNGC environmental principles are given below:

Precautional approach to environmental Challenges: This principle requires that businesses provide support to precautionary approach to environmental challenges which requires that various assessments are undertaken. First, assessment of whether precautionary approach is required, and this involves identifying the potential negative impacts and evaluating the risks. If the assessment identifies credible threat of harm, then the precaution principle requires precautionary action to be undertaken. The precautionary actions include – assessment of alternative options, adopting a transparent, inclusiveness and open decision making. Other precautionary measures are implementing ongoing process of research and monitoring as well as implementing the "the proportionality principle" which ensures the costs of actions to prevent hazards are not disproportionate to the expected benefits.

Promote Greater Environmental Responsibility: The second principle requires that businesses provide support to improve environmental responsibility. The UNGC in arguing for a business case for companies to promote sustainability documented that cleaner and efficient production process increased resource productivity as fewer raw materials are used and thereby lower operational costs. It also indicated that environmentally responsible companies also benefit from tax incentives and permit programmes as they are more advanced than their peers are. Employees and consumers are also becoming more interested in doing businesses with companies that adopt sustainable environmental practices. The UNGC guidelines on sustainability are:

- Developing company vision, strategies and policies to include sustainable development
- Determine sustainable targets and indicators
- Developing production and sustainable consumption programme with established performance targets that takes the organisation beyond compliance
- Extending the sustainability throughout the value chains by liaising with product designers and suppliers to promote environmental sustainability.
- Employ voluntary code of conducts and sectorial international initiatives to achieve sustainable environmental performance
- Systems in place to measure, track, and communicate sustainability progress and reporting against global operating standards. There is also the need to continually assess results and apply strategies for continued improvement.
- Ensure high level of transparency and regular communication and dialogue with stakeholders

Environmentally Friendly Technologies: The last principle contained on the UNGC environmental guidelines urges businesses to promote the development and diffusion of environmentally friendly technologies. Advocating for "win-win" situation between sustainability and performance, they indicated that adopting environmentally friendly technology helps companies to cut their usage of raw materials and increased efficiency. It further reiterated that technology innovation brings new business opportunities and improves the competitive position of the company. The UNGC document provided guidelines at both the factory level and strategic level to promote environmentally friendly technology and promote financial performance as well. At factory level, they recommended changing the production techniques, changing input materials, altering the product design and reusing materials on site. The guidelines offered at the strategic level also include establishing policies on the use of environmentally friendly technologies, providing information to stakeholders on environmental performance and benefits of using environmental friendly technologies. It also involves refocussing research and development towards sustainability, using life cycle assessment (LCA) in the development of new technologies, Adopting Environmental Technology Assessment (EnTA) and liaising with industry partners in ensuring that the best technology is available to other organisations.

Thus, UNGC guidelines on sustainability that is considered suitable for all sizes organisations, both SMEs and larger companies, whilst ensuring measures are put in place by corporations to reduce the environmental impacts of their actions also incorporate innovative practices to ensure positive impact on the bottom line. In line with UNGC

guidelines, many studies have argued that environmental innovations impact positively on costs. Cortez and Cudia (2012) reported that innovations and product design reduce environmental costs of Japanese automobile and electronic firms and impacted positively on their financial performance. This is in line with the arguments that are drawn from the resourced-based view that environmental performance and the associated re-evaluation of production process and adoption of the state of the art technology increases resource productivity which generate competitive advantage and creates opportunity for improved financial performance (Erekson et al. 2008). Thus, similarly to the GRI guidelines although voluntarily, both SMEs and large corporations that adhered to the UNGC guidelines may introduce innovate practices that are likely to enhance the environmental and financial performance relationships.

2.3.3 International Standard Organisation (ISO 14001)

Another important international environmental framework is provided by the International Standard Organisation, specifically referred to as ISO 14001. ISO 14001 is an agreed international standard that lays out the requirement for environmental management system (International Organization for Standardization 2015). It is a Geneva-based International Standards Organisation which incorporates ISO 14000 series as a standardized environmental management system on different dimensions ranging from an organization's system for managing environmental impacts to labelling guidelines to life cycle assessment (Russo 2009)

Environmental management system like ISO 14001 assists organisations to identify, manage, monitor, and control their environment in more holistic way. ISO 14001 requires that organisations consider all relevant environmental issues into their operations including air pollution, water and sewerage issues, waste management, climate change, material and resource efficiency, soil contamination and climate change mitigation. Recent revisions in the ISO standards require key improvements such as incorporating environmental management within the organisation's strategic process, greater inputs, and stronger commitment from the leadership and more proactive initiatives to boost environmental performance. It is also asserted that ISO 14001 is suitable for all organisations irrespective of size, sector, or the type of business organisation. Similarly, to EMAS and other environmental management systems, the main aim of ISO 14001 is the need for continual improvement of the organisation's system and approach to environmental issues.

Companies implementing ISO 14001 are expected to achieve "win-win" situation by improving their environmental performance and at the same time improve economic or financial performance. Some of the benefits which have been reported by users of ISO 14001 include demonstration with current and future legal requirements, improved leadership participation and employee engagement; improve company reputation and stakeholder confidence through strategic communication. Others are increased competitive advantage and financial advantage through improved efficiencies and reduced costs as well as encourage superior environmental performance by integrating suppliers into the organisation's business system.

It is argued that the integration of proactive environmental system such as ISO 14001 assist organisation to identify, as well as manage their environmental obligation and risk which may results in significance costs savings and superior financial performance (Paulraj and de Jong 2011). Environmental management system such as ISO is considered essential to environmental management and it has been argued that a firm cannot achieve competitive advantage without certified system such as ISO 14001 (Melnyk et al. 2003). It has been emphasised that ISO 14001 and other environmental certification facilitate systematic, comprehensive and proactive management of processes that could consequently result in sustainable competitive advantage (Hart 1995, Russo 2009). These assertions are supported by many empirical findings. For instance, (Montabon et al. 2000) found on different dimension measures that environmental performance improved as firms moved further through ISO adoption process. This has also been confirmed in more recent studies (Aiyub et al. 2009, Hillary and Burr 2011) where small, medium and large firms improved on different dimension of financial performance after the adoption of ISO 14001. Thus, smaller companies similar to larger firms that adopt ISO 14001 also enhanced their financial performance. This probably explains the increased adoption of ISO 14001 and by January 2006, 103,583 facilities had adopted ISO 14001 and EMAS worldwide (ISO World 2007).

2.4 The EU Environmental Frameworks/Regulations/Policies

Most UK environmental legislation and frameworks are developed based on EU directives and legislations. There are some key EU directives that directly or indirectly affect UK businesses. Various arguments have been made regarding the impact of EU environmental policy on businesses across the EU's single market. It has been argued that common environmental and product standards that apply across the EU's single market creates a more playing field between European businesses and minimise the costs and complexities associated with having to comply with multiple regulations in different member states

(Molho 2016). Some of the major UK environmental legislation driven by EU environmental directives and impact on UK businesses is discussed below:

2.4.1 Waste: The EU Directive 2008/98/EC:

This directive provides basic principle of waste management which requires that waste is managed without harm to human health and the environment. In particular, the legislation emphasised that management of waste should be done without risk to water, air, plants, animals and without causing nuisance through odour or noise. In addition, the management of waste should not affect countryside or places of special interest. The legislation also set out waste management hierarchy with prevention as the top priority, followed by preparing for reuse, recycling, recovery, and disposal as the last resort. The directive has also been reinforced by the introduction of Circular Economy Package in 2015 to ensure that waste and resources are minimised to bring major economic benefits and contribute to growth and innovations of European businesses. Therefore, generation of waste, which is considered as a sign of inefficiency, is reduced through this directive and thus enhances competitiveness and financial performance. In the UK, this directive was implemented through The Waste (England and Wales) Regulations 2011 and in Northern Ireland.

The above directive encourages firms to reduce waste as it is estimated that although cities cover only around 2% of the World's surface, they consume about 75% of world's natural resources and generated about 70% of the global waste (UN-MEA 2006). Waste is considered as a symbol of inefficiency in any modern organisation and an indication of resource misallocation. Generation of waste also depletes natural resources, consumes excess energy and resources, exerts pressure on land, pollutes the environment, and generates additional financial burden of managing the waste (Zaman and Lehmann 2013). Therefore, waste management and prevention, which the above directive is concerned, is expected to promote clean natural environment whilst at the same time helping firms to save costs. These prepositions are supported by the empirical evidence from Zaman and Lehmann (2013) which found that companies that engaged zero waste practices made significant savings due to resource recovery from municipal solid waste.

2.4.2 Ambient Air Quality Directive (2008/50/EC)

This legislation was intended to reduce the concentration of major air pollutants that impact public health such as particular matter (PM_{10} and $PM_{2.5}$) and nitrogen dioxide. In the UK, this was transposed into law under Air Quality standard regulations 2010. The directive is mandatory for member states to produce air quality plans for zones where limit values are exceeded and must take necessary measures to ensure the target is achieved. According to

Air Pollution Information System - APIS (2017) the EU directive sets limit for pollutants such as nitrogen dioxide and sulphur dioxide for the protection of vegetation, it does not need to be applied in major roads and industrial processes. APIS (2017) therefore argued that it provides little protection to the ecosystem. However, in the UK the countryside agencies and the industrial regulatory bodies have agreed to use these as a standard to judge harm for sensitive wild life sites.

Evidence suggests that poor air quality affects performance. This has been validated by Wyon (2004) that poor air quality, aside the health implications, also results in thinking difficulty and affect productivity. The study also found that poor air quality affects the life cycle cost building and the efficient use of energy.

2.4.3 Chemicals: REACH (EC1907/2006)

The REACH directive is intended to protect human and the environment through proper and earlier identification of intrinsic properties of chemical substances. The REACH process involves registration, evaluation, authorisation and restriction of chemicals. It is also intended to enhance innovation and competitiveness of the chemical industries in the EU. The regulation ensures that responsibility of managing risks from chemicals and provision of safety information is placed on the industry. It is mandatory for manufacturers and importers of chemicals to gather information on the properties of their chemical substances to facilitate safe handling and to register information on the Central Database of European Chemical Agency (ECHA) in Helsinki. The Agency manages the database, coordinates the system for detail evaluation of suspicious chemicals, and maintains public database for consumers and professionals to assess hazardous information. The REACH regulation is also applicable to non-EU companies that intend to place their products on the EU market. Thus, the REACH regulations fulfil the information gap by providing industry access to assess hazards and risk of substances. This ensures that risk of substances is monitored, identify and risk management measures are put in place to protect human and environment. The REACH guidelines, which incorporates innovative practices is likely to enhance the competitiveness of the companies with expected positive impact on financial performance.

It has been noted that the role of REACH in shaping the pace of innovation in environmental regulations is very important. Nemet (2009) recognised the importance of the policy instrument in reducing firm costs in the production of eco-innovations. It has been suggested that to enhance the capabilities of firms to develop new skills and knowledge in environmental technologies, regulations should create the enabling environment by

developing new sources of internal and external information. REACH directive fits into this context perfectly as it has enhanced the chemical industry environmental database. This also tends to stimulate internal knowledge source by providing support for R & D activities. These arguments have been supported by the finding of Arfaoui (2017) which found that manufacturers of chemical substances and chemical substance formulators increased the probability of introducing innovative environmental practices compared to firms that engaged in other activities. The study also documented that the correlation co-efficient for the REACH variables was significantly positive. This clearly supports Porter and Linde's (1995) debate that well designed environmental regulations may trigger innovations and increase competitiveness and performance.

However, Arfaoui (2017) indicated that the REACH directive is very demanding and places burden on SMEs which have fewer resources and therefore makes it difficult for them to innovate. This is in line with the resourced-based view as the study confirmed arguments advanced by Aiyub et al. (2009) and Hillary and Burr (2011) that resource constraints prevent SMEs to adopt innovative practices to improve their environmental and financial performance relationships.

2.4.4 Emissions – Greenhouse Gases: EU Directive 2003/87EC (EU ETS)

This regulation established greenhouse emission allowance trading scheme. The directive works on a cap and trading principles by setting up a limit on the total amount of certain greenhouses which organisations are permitted to emit by their installation system. The cap principle allows companies to buy or receive emission allowances and this can be traded with another organisation if it is required. The cap is progressively reduced to ensure that total emission falls. Within the cap, a company must render accounts of its emission after one year and must ensure that it has enough allowances to meet its emissions requirements otherwise, heavy fines are imposed. Companies that can reduce their emissions can save the surplus for future requirements or sell to another company that has exceeded its limit. This directive, therefore, promotes investment in clean, low carbon technologies which do not only impacts on emission reductions, but also saves costs as well and impact positively on the financial performance of the firm. The directive is mandatory for sectors such as energy intensive industries, oil refineries, production of iron, cement, pulp and paper, glass, lime, aluminium, commercial aviation, acid, and bulk organic chemicals. The target gases are carbon dioxide (CO_2) nitrous oxide (N_2O) and perfluorocarbons (PFS). In the UK, the EU ETS is implemented through The Greenhouse Gas Emission Trading Scheme Regulations 2012.

Chaabane et al. (2012) study confirmed how environmental performance could enhance financial performance through the emission allowance-trading scheme. The study through mathematical modelling found that as carbon price increased, the quantity of recycled products also increased. Thus, as the level of the emission is more stringent, carbon emissions are reduced due to replacement with recycle products. However, the study found that when carbon prices are cheaper they help the companies to reduce cost of compliance to regulations as cheaper carbon price are substituted to recycle and emission level increases. Thus, it is important to realise that where environmental regulations impose limits on GHG emissions, it may lead to decrease in recycling activities unless the recycling cost is optimised. The argument that cheaper carbon prices may result in lower environmental practices has been reiterated by Kirat and Ahamada (2011) who found that the excess allocation of emission allowance and the impossibility of reserving the excess on the following periods prevented the achievement of scarcity which was the essence of the carbon coercion. Therefore to enable heavy emitters such as electricity producers to make long-term choices to produce electricity with fewer emissions should be conditioned by the emergence of real carbon price signal (Kirat and Ahamada 2011).

Studies by Oberndorfer (2009) also provided evidence on EU Emission Allowance (EUA) and stock prices by testing whether EUA return volatility and electricity stock volatility are related. The results suggested that whilst increase in EUA price increases positively affects stock returns, decrease in EUA prices negatively affects stock returns from most important electricity firms covered by EU ETs. The result in line with the findings of Chaabane et al. (2012) which suggested that higher EUA prices are likely to improve environmental practices such as recycling and improve financial performance.

2.4.5 Industrial Emissions: Directive 2010/75/EU:

This directive aims at achieving higher level of protection of human health and the environment in general by reducing the harmful effect of industrial pollution through the application of better techniques available. The Industrial Emission Directive is based on several principles including an integrated approach, use of best available techniques (BAT), flexibility, inspection, and public participation. The integrated approach requires holistic view on environmental performance of a plant covering areas such as emissions to air, land, and water, generation of waste, raw materials use, energy efficiency, noise, accident prevention, and site restoration after closure. BAT requires that the best available techniques in relation to environmental performance are adopted by reference to BAT Reference document which is coordinated by the European IPPC Bureau. The industrial emission

directive also allows some flexibility by allowing competent authorities to set lesser strict emission requirements in specific areas where strict application of the BAT principles would result in higher costs than expected environmental benefits due to factors such as geographical location, local environmental conditions, and technical features of the installation.

A system of mandatory inspection of site visit, which should take place every one to three years, is also enshrined in the directive. The directive on industrial emission also ensures it gives the public the right to participate in the decision-making process, provides the public with information on the outcome of their decision, and has access to permit application and results of the monitoring releases. Thus, this directive whilst ensuring adequate measures are put in place by organisations to reduce industrial pollution, the innovative and flexible nature of the directive also ensure cost reduction is eminent as seen in the case of the REACH directive.

2.4.6 Eco Management Audit Scheme (EMAS)

Aside legal regulations and directives that are required to be complied with by businesses operating in the European Economic Areas, there is also environmental management instrument designed by the European Union. The main objective of EMAS is for continuous improvement of environmental performance of businesses and other organisations. It is an environmental management system that allows organisations to measure, evaluate, report, and improve environmental performance. EMAS follows four systematic approaches involving plan, do, act, and check. The “Plan” approach involves having environmental policy which shows the commitment of the organisation to the laws, regulations and other directives regarding environmental issues. Planning also involves setting up environmental objectives and targets. In relation to the “Do” approach, the EMAS guidelines require organisations to put environmental structures in place, allocate responsibilities on environmental issues, organise appropriate training for those with environmental responsibilities and communication with the relevant stakeholders. The third phase given in EMAS guidelines is “Act”. This involves monitoring the targets and other structures in place and measuring performance against the targets or the policies and these must be recorded and audited. The fourth approach “Check” requires management review and measures for continuous improvement.

The EMAS guideline is designed for all organisations operating in all sectors as well as those with worldwide sites. Organisations adopting EMAS are expected to achieve the following outcomes.

- Cost reduction due to efficient use of resources such as energy and water.
- Minimization of risk as operational procedure and legal compliance are continuously monitored and assessed.
- Enhance regulatory compliance as due to greater awareness and knowledge of regulatory requirements.
- May enjoy regulatory relief due to the EMAS process in place
- Improved relationship with both internal and external stakeholders
- Increase competitive advantage as EMAS registration can result in improved market access and increased market share.

Therefore, smaller or larger companies, listed or unlisted that adopt EMAS guidelines are likely to improve and increase competitive advantage and thus improve their financial performance. Evidence from various studies (Iraldo et al. 2009) suggest that a third party guarantee of environmental "excellence" would give a firm advantageous position with respect to their competitors as firms that adopt EMAS commit themselves to improve environmental performance with consequence on financial performance. Iraldo et al. (2009) found that a well-designed environmental management system such as EMA has a positive consequence on environmental and financial performance. This result seemed to support the revisionist ideology that environmental regulations should be mainly considered as industrial policy instrument directed at increasing the competitiveness of the firm. This is based on the premise that a well-designed environmental regulation could compel firms to seek innovations that will turn out to be both financial and socially beneficial (Sinclair-Desgagné 1999).

2.5 Regulatory/Institutional Frameworks and Other Policy Guidelines in the UK

In addition to various environmental frameworks and guidelines that have been provided by international organisations such as the UN and the European Commission, there are also various environmental performance and reporting guidelines that have been developed to complement or as an implementation guideline for the international and the EU frameworks/guidelines. Some of the major environmental performance and reporting guidelines or frameworks that have been developed in the UK are discussed below.

2.5.1 London Stock Exchange Guidance on Environmental Reporting

The London Stock Exchange Group (LSEG) has indicated that companies are changing their exposure to low carbon economy and the sector needs to be understood by the investors and therefore the need for issuers to provide more detail information on green reporting. Versaevel (2016) has argued that companies that disclose comprehensive reports on how they are meeting environmental challenges send a strong signal to the capital markets that appreciate the business opportunities associated with environmental initiatives such as transition to low carbon economy. LSEG (2017) reported that some of the global investors allocate additional capital to companies with higher green revenue exposure and therefore the need for companies to provide better reporting on their green initiatives to attract such investment inflows. LSEG has therefore provided guidelines on how companies can enhance their sustainability reporting which is summarised below.

- Transition to a low carbon economy: This requires companies to identify parts of the business that manufacture goods or render services that enhance the value of the business and deliver environmental solutions at the same time.
- Identifying green revenues: This guideline also requires organisations to provide details of revenues derived from green products and services
- Connect to your own global impact: This requires an integration of reporting green revenue with both wider financial reporting with carbon strategy, emission data and performance reporting.
- Where the future lies: Detail discussion on how investment in innovation and research and development strengthen the transition to a low carbon economy.

Although, DEFRA (2013) report only makes it mandatory for companies listed on the main market of the London Stock Exchange and the European Economic Area to disclose environmental performance, the London Stock Exchange Group (2017) argued that institutional investors are interested in all entities irrespective of their size, listed or unlisted and across all industries. Therefore, the guidance on environmental reporting is relevant for all sizes of companies and sectors and this is important for companies particularly SMEs which are resource constraint to enable them attract investment from green oriented investors to enhance their financial performance.

2.5.2 Department of Environment, Food and Rural Agency (DEFRA)

DEFRA in setting up environmental management principles has outlined many benefits for firms that measure and report on their environmental performance. First, DEFRA (2013) report indicated that measuring and reporting of environmental performance lead to lower

energy and resource costs and at the same time gain better understanding of risk exposure to climate change and strengthen the green credentials of the organisation in the market place. In line with the arguments presented by the LSEG (2017), the DEFRA (2013) report reiterated that organisations of all sizes are expected by the various stakeholders, notably investors and shareholders to measure and report on their environmental performance. Organisation that fail to measure and report their environmental practices risk losing out to competitors that report on their environmental performance. Under the DEFRA (2013) guidelines, the following principles are to be followed by organisations in measuring and reporting environmental performance.

Relevant: The data collected and to be reported should appropriately reflect the organisation's environmental impact. The information provided should also be able to serve the decision-making needs of both internal and external users.

Quantitative: The key performance indicators (KPIs) should be measurable with appropriate targets to reduce a specific impact. This will ensure the effectiveness of environmental policies and management systems can be evaluated and validated. In addition, the quantitative information should be accompanied by a narrative explaining its purpose, impacts, and giving comparators where necessary.

Accuracy: Strive to limit the uncertainties in the reported figures as far as possible. Achieving accuracy in the information provided will enable users to make decisions with reasonable confidence regarding the integrity of the information reported.

Completeness: Define all sources of environmental impact within the reporting boundary and provide reasons for any specific exclusion.

Consistent: Follow consistent methodologies to ensure meaningful comparisons of environmental impact data over time. Appropriate record must also be kept for any changes to the data, organisational boundary, methods, or any other relevant factors.

Comparable: Accepted KPIs should be used by organisations to report on their environmental performance rather than organisations inventing their own versions of measurement standards. Using standard KPI is necessary for benchmarking with similar organisations and will assist user in judging the environmental performance of the organisation against it peers.

Transparent: This is important in ensuring that credible report is produced. All relevant issues in the report should be addressed in factual and coherent manner and appropriate records should be kept for any assumptions, calculations, and methodologies used.

In addition to the principle of measuring and reporting, the DEFRA (2013) guidance also provides five key steps which need to be followed when considering the environmental impact KPIs that need to be reported on. The steps are determining the boundaries of the organisation, determining the period for the data collection, determining the key environmental impact of the organisation, measuring, and reporting of the environmental impact. Identifying the relevant performance applicable to the organisation is very important for the organisation to produce relevant report. The key performance indicators identified by DEFRA (2013) as applicable to both smaller and larger companies are Greenhouse gases, Water, Waste, Material and Resource Efficiency, Biodiversity/Ecosystem services, as well as Emission to air, land and water. DEFRA (2013) report recognised that all the measures identified may not be relevant for every organisation. An organisation that can identify the relevant performance measures and design appropriate measures to reduce the environmental impact is also expected to reduce costs by saving on resources, establish strong legitimacy with the various stakeholders as well as strengthen its relationships in the market place and result in improved financial performance.

The DEFRA (2013) guidance, which is designed to assist companies in complying with the greenhouse gas (GHG) reporting, makes it mandatory from 1 October 2013 for all UK listed companies to report on their greenhouse emission as part of their annual reports. Although the requirement is applicable to only UK companies quoted on the main market of London Stock Exchange, European Economic Area and those whose shares are traded on New York Exchange or NASDAQ, the guidance encourages all other companies to voluntary report on their greenhouse gas emissions.

Tauringana and Chithambo (2015) suggested that the efficacy of voluntary guidance in influencing disclosure behaviour is relevant as proponents of regulation argue that without it, organisations are unlikely to disclose adequate environmental information voluntarily. However, the research conducted by Tauringana and Chithambo (2015) which sampled 215 companies from the London Stock Exchange suggested that the publication of Department for Environment Food and Rural Affairs (2009) guidance which was only mandatory for large listed companies has significant effect on the level of environmental performance disclosure notably greenhouse gases both before and after the publication. Although the

DEFRA (2013) report is only mandatory for large listed companies, smaller companies that reported voluntarily are also expected to enhance their reputation and competitiveness. Thus, SMEs are also likely to disclose their environmental performance to build reputation with the stakeholders and enhance their competitive edge. This suggestions have been earlier buttressed by Yusoff and Lehman (2009) that the onus is on the firm itself to inform stakeholders of their environmental engagements as such actions could assist them to portray sustainability business to stakeholders which can enhance their competitiveness and performance.

2.5.3 The Companies Act 2006

In line with DEFRA (2013) guidelines, this act requires listed companies to report on greenhouse gas emissions for which they are accountable. Section 417 (5) requires that as part of the business review, listed companies must provide information on environmental practices including the impact of the company's operation on the environment. It is mandatory for quoted companies, as defined by the Companies Act 2006 (Legislation.Gov.Uk 2006), to report on environmental matters in the annual report by using key performance indicators (KPI's) where necessary to understand the company's business. Two types of regulations that apply to two distinct companies are identified here. Companies Act 2006 (2013 amendment) requires that listed companies with less than 500 employees must continue to comply with the existing requirements (Regulation 2013) where companies with equity shares listed on the main market of the London Stock Exchange, regulated by the EEA, NYSE or NASDAQ must report on their GHG emission as part of their annual report. However, Regulation 2016 (Companies, Partnerships and Groups) applies to all UK traded companies with over 500 employees and including banking companies and authorised insurance companies (CDSB 2016).

The environmental and other non-financial information must be included as part of the strategic report. It requires that where it is a strategic report of the group, the environmental and other non-financial information must be a consolidated statement that relates to the transactions of the group. The Carbon Disclosure Standard Board (CDSB, 2016) argued that such reporting requirements are necessary to help companies to understand and identify sustainability risk and increase consumer and investor trust which may impact positively on the bottom-line. Other arguments in support of the reporting requirements are to ensure that companies can manage change towards sustainable global economy by incorporating long-term profitability with environmental protection. CDSB (2016) also advocated that such a reporting requirement is a step in the right direction for a roadmap to resource Europe, as

access to environmental and other non-financial information will help to attain the milestone that ensures that by 2020, there will be market and policy incentives to reward business investment in efficiency.

Public organisations such as government departments, non-ministerial departments, and other public bodies are also required to report as minimum, certain GHG emissions as part of their sustainability performance in the annual reports. It is also a requirement for Local Authorities in England to report GHG emissions from their own operations and estates. However, empirical research conducted by Williamson and Lynch-Wood (2008) downplays the effectiveness of Companies Act 2006 in helping to address social and environmental issues in the UK. Based on a sample of 79 listed companies, they found that in comparison with the Operating and Financial Review (OFR) which was enshrined in Companies Act 1985, the new reporting requirements are not supported by statutory guidelines. In addition, the study found that the auditing requirements in the CA06 are less robust than the OFR which was repealed. Besides, similar to the OFR which targeted only shareholders, the target audience of the CA 06 was shareholders and therefore unlikely to address the environmental concerns of other stakeholders. The findings from Williamson and Lynch-Wood (2008) confirms the earlier findings of Wiseman (1982) which evaluated the quality and accuracy of environmental disclosures contained in the annual reports of 26 largest US companies in the steel and paper industries. The study reported that the environmental disclosures were not complete and were not related to the company's actual performance.

Besides, CA06 is also directed towards large listed companies similarly to the DEFRA (2013) guidance although evidence exists that most environmental pollutions are caused by SMEs (Hillary 2004). However, it is expected to establish legitimacy, both SMEs and larger companies may respond to stakeholders by disclosing their environmental information. This reinforces the arguments that based on legitimacy perspective, companies may use social and environmental disclosures to rationalise their existence as well as address any legitimacy gap (Guthrie and Parker 1989, Wilmshurst and Frost 2000).

2.5.4 The Association of Chartered Certified Accountants (ACCA) – Environmental Reporting and Accounting

Environmental reporting involves the production of numerical and narrative statement on an organisation's environmental impact or foot print of the financial period under review (ACCA 2018). ACCA (2018) indicated that organisations could account for their environmental impact using environmental reporting. They identified environmental

consequence of an organisation as inputs and outputs. Whereas inputs relate to environmental resources such as water, energy, materials, land use, output is about the efficiency of internal processes and impact on outputs such as tonnes of products recycled, or tonnes of waste or pollution reduced. Measurement of environmental impact can be direct or indirect. A direct environmental accounting measures only those environmental consequences that are only within the reporting entity. However, indirect environmental accounting also incorporates reporting on the environmental consequence of backward and forward supply chains.

The ACCA supports the environmental reporting principle of Global Reporting Initiative (GRI) which encourages organisation to identify and report on their environmental practices that impact on living and non-living organisms. The ACCA outlined that environmental report should contain the organisation's profile, environmental policy statements, targets, achievements, compliance, management systems, procedures and system for independent verification. The ACCA also identified many benefits for environmental reporting by companies. First, it identified that environmental reporting may be used to gain or maintain legitimacy. They explained that environmental reporting could be used to address the concerns after environmental incident which had threatened its licence to operate. Second, environmental reporting also provides assurance to shareholders and other stakeholders on the management environmental risk including the sources of environmental risks and the ways they are being mitigated or managed. Third, the ACCA (2018) report also argued that environmental reporting is a key measure of encouraging internal efficiency of operations. This stem from the fact that environmental reporting requires establishing a range of technical measures that generate knowledge that have potential to save costs, improve operational efficiency and impact positively on profit.

One of the major roles played by ACCA in sustainability reporting is the provision of assurance services. ACCA applied AA1000AS (Accountability 2008) to provide assurance on sustainability reporting. The AA1000AS (2008) is international standards that provides the requirements for performing sustainability assurance. The aim of the AA1000 accountability principle is to help organisations understand, manage and improve sustainability performance and be accountable to stakeholders (AccoutAbility 2008). Empirical evidence from O'Dwyer and Owen (2005) suggested that AA1000 is the methodology with the most stakeholder focussed and that assurors using AA1000 tend to provide higher level of assurance. Thus, it is expected that organisations that use such

assurance methodology is likely to obtain social legitimacy from stakeholders and enhance their reputation and consequently impact on their financial performance.

2.6 Environmental Taxes, Reliefs and Schemes for UK Businesses

In the UK, various types of environmental taxes are in place for different types of businesses and sizes as a way of encouraging businesses to operate in environmentally responsible manner and to operate efficiently. Some of the key taxes and reliefs are outlined below:

2.6.1 Climate Change Levy (CCL)

Climate change levy is applicable to businesses that operate in industrial, commercial, agricultural, and public services sectors. Two types of levies are used, either the main rates or carbon support rates. The main rate is applied on electricity, gas, and solid fuels. Exemptions are available for the main rates if they meet certain conditions: The conditions are, first, the electricity, gas or the solid fuel are not used in the UK. Second, second, the firm is registered under CHP quality assurance (CHPQA) programme and third, the electricity is derived from renewable sources before 1 August 2015 and are used for electricity generating station producing at least 2MW. Finally, they should not use as a source of fuel or used in certain forms of transport (Gov.uk 2018). Reduced rates are also paid by energy intensive businesses that have climate change agreement with the Environmental Agency. In the case of Carbon price support rates, they are paid by businesses that operate electricity generating stations and combined heat and power (CHP) stations. The carbon price support rate is used to encourage businesses to use low carbon technology for producing electricity. They are applied on gas, LPG, coal and other fossil fuels.

The Climate Change Levy (CCL) announced by the Chancellor in October 1999 budget was considered as a key instrument in the Government package of measures to address Kyoto targets and to minimise CO2 emission in the UK. The levy which was expected to raise £1 billion in the first year of implementation was not expected to bring additional tax burden to the employer as it was compensated by a cut in employer's national insurance by 0.3%. Part of the revenue from the CCL (£33m) was to provide incentives to SMEs to invest in energy efficiency practices whereas £17m was for the development of renewable energy sources (Varma 2003). Study by Varma (2003) on the effect of the climate change levy on UK businesses recognised that although there were bound to be winners and losers, the most obvious ancillary benefit was the impetus provided to renewable energy as there was 13% increase in the use of renewable sources of energy following the introduction of the levy. Therefore, companies shifting to renewable energy aside avoiding the payment of climate change levy also enjoyed lower electricity tariffs thereby increasing their competitiveness

with expected positive consequence on financial performance as well. The provisions of financial incentives to encourage SMEs to invest in proactive environmental practices would ensure that SMEs are not constraint due to lack of resources to engage in innovative environmental practices that can enhance their performance.

2.6.2 CRC (Carbon Reduction Commitment) Energy Efficiency Scheme

This scheme is intended for large non-energy intensive organisations such as supermarkets, hotels, water companies, banks, local authorities and central government departments. Organisations that fall under those categories must register the business under CRC Energy Efficiency Scheme. Organisations registered under the scheme are required to monitor and report CO2 emissions from the use of gas and electricity. Under the scheme, they are also required to purchase enough allowances to meet annual emissions and surrender them at the end of the year.

In line with the Porter and Linde (1995) argument that well-designed environmental regulation can improve performance, the NHS which was one of the affected organisations encouraged the various trusts to prepare for its implementation as CRC can be turned on to an organisation's advantage (NHS Sustainable Development Unit 2010). To provide motivations for companies to perform well under the CRC regulations, the performance of organisations was expected to be ranked in the form of a league table (Brill 2011). Whilst this is expected to generate reputational benefits for good companies that will be seen as environmentally responsible, it is also likely to create severe negative reputation for companies with poor performance with negative consequences on their financial performance.

2.6.3 Capital Allowances on Energy-Efficient Items – Enhanced Capital Allowance (ECA) Scheme

The ECA scheme is applicable to companies that invest in energy-saving plant or machinery. The scheme allows 100% first year allowance to be claimed against taxable profits in a single tax year (Gov.uk 2018). Thus, through the ECA, companies can offset the cost of the plant and machinery that fall into ECA category against the business profits in the financial year in which the assets were purchased. This can improve both cash flow position and profitability by making funds available for further investment which could have been used to pay corporation tax.

The categories of assets or plant and machinery that qualify for the ECA scheme are contained in the ETL (or Energy Technology Product List, ETPL). The ETL is a database of

energy efficient plant and machinery managed by the Department for Business, Energy and Industrial Strategy (BEIS) on behalf of the UK government. BEIS reviews annually, technologies and products that qualify for inclusion in the Energy Technology Product List. The main products currently included in the ETPL are listed below.

- Air to air energy recovery
- Automatic monitoring and targeting (AMT) equipment
- Boiler equipment
- Combined heat and power (CHP)
- Compressed air equipment
- Heat pumps
- Heating, ventilation and air conditioning (HVAC) equipment
- High speed hand air dryers
- Lighting
- Motors and drives
- Pipework insulation
- Refrigeration equipment
- Solar thermal systems
- Uninterruptible power supplies
- Warm air and radiant heaters
- Waste heat to electricity conversion equipment

Thus, companies that invest in such energy saving machineries and equipment can obtain reliefs through corporation tax and this has direct impact on the bottom line.

2.6.4 Landfill Tax

In addition to normal landfill fees, businesses are also required to pay additional tax if they dispose-off waste using landfill sites. Businesses using landfills must register within 30 days of setting up to obtain operational permits. The tax to be paid is calculated based on weight and there are two types of rates. Lower rate currently £2.65 per tonne is paid on "inactive waste" such as soil and rocks and the standard rate for other waste is £84.40 per tonne. Companies that can cut waste to landfills are therefore saving costs and improving on their profits.

However, available empirical evidence suggests that not much have been achieved about using landfill tax to encourage sustainable environmental practices. Although it is expected that the landfill tax would contribute towards transition away from landfilling of waste

towards more sustainable practices such as re-use, recycling and waste minimisation, it has not been effective (Martin and Scott 2003). In particular, Martin and Scott (2003) evaluated the effectiveness of the UK landfill tax and found that the tax is least effective in changing the behaviour of domestic waste producers and SMEs. It was discovered that whilst some progress has been achieved in terms of recycling, there was no evidence of progress in the case of reuse. Similar studies conducted in Denmark found that a 225% rise in landfill tax in 1990 led to only 15% reduction in waste deliveries (Sedee et al. 2000).

2.7 SMEs Business and the Environment in the UK

SMEs play significant role in the UK and account for about 51.8% of the UK annual turnover and provide 67% of the UK's private sector jobs and contribute more than 50% of UK GDP (Dey and Ghosh 2013). They also put the number of SMEs in the UK to about 4.5 million and the number of employees to approximately 13.8 million. Aside the job creation and contribution towards GDP, they encourage innovation and skills and play significant role in the supply chain of larger organisations (Aiyub et al. 2009). However, despite SMEs contribution toward the UK economy, their environmental impact is still unknown (Hillary, 2000) although other studies have estimated the cumulative effect of pollution from SMEs as around 70% (Aiyub et al. 2009). Environmental Agency (2003) also indicated that 60% of commercial waste and 80% of pollution accidents emanates from SMEs. Hillary (2004) emphasised that the high degree of heterogeneity among small and medium enterprises make it difficult to estimate the environmental impact and strategies of the SME sector.

Notwithstanding the fact that most environmental pollution results from SME activities, there is poor awareness and acceptance of proactive environmental management practices by SMEs. Spence et al. (2012) also indicated that although there is some awareness and good environmental practices among SMEs, they are very difficult to influence. The lack of acceptance by SMEs to embrace proactive environmental practices has also been attributed to many other factors. Tilley (1999) documented that SMEs perceive themselves as having little or no impact on the environment. Hillary (1995) survey identified 58% of SMEs felt they have little or no significant impact on the environment. Although Rowe and Hollingsworth (1996) put the above figure to about 55%, they reiterated that most SMEs have intentions to pursue good environmental practices but they are not materialised into reality owing to many challenges that they face. It has been argued that most environmental systems have been designed for larger businesses. However, Tilley (1999) and Rowe and Hollingsworth (1996) averred that environmental solutions design for larger companies cannot be transposed to SMEs which have different structures and, in most cases, solve

problem on ad hoc basis. SMEs needs to be studied in their own right as they are different from large organisations in many respect including resource availability, strategies, drivers, managerial values, and the level of stakeholder involvement (Sáez-Martínez et al. 2016). Hillary and Burr (2011) also reiterated that the low level of SMEs engagement could be explained by the lack of concrete date on the financial benefits of proactive environmental practices.

Another major challenge face by UK SMEs in addressing environmental issues is financial constraint. Aiyub et al. (2009) identified that SMEs face financial pressure and as result tend to concentrate on project with short payback period. This implies that SMEs are unlikely to invest in sustainable environmental practices which they consider to be beneficial only in the long-term. This has been complemented by Revell et al. (2010) study which pointed out that two-thirds of SMEs considered increased in cost as a major challenge in addressing environmental issues. Lack of time is also considered as a major barrier by SMEs to pursue good environmental practices. Revell et al. (2010) identified lack of staff as a major hindrance. In their study, which focussed on both construction and restaurant industry in the UK, restaurant owners considered that benefits from environmental practices such as waste separation does not worth the time of the investment. Similarly, builders also question the justification for reusing and recycling materials in terms of labour and storage required. Blackburn (2004) also identified lack of information as major impediments in the implementation of sustainable environmental practices by SMEs. In that regard, they pointed out low eco-literacy, lack of understanding of environmental laws, and best practices as major setbacks in an attempt to meet environmental challenges by SMEs. Some SMEs also have difficulties in interpreting environmental regulations that affect their businesses. Revell et al. (2010) also concluded that owner-mangers lack understanding of the required knowledge and skills required for sustainable environmental practices and have sceptical attitude in seeking external support.

In addition, regulation is also considered as impediments to SMEs in meeting up their environmental responsibilities. In the UK, most of the environmental directives/regulations are voluntary especially when it comes to SMEs. For instance, both Companies Act 2006 and DEFRA, (2013) guidelines on GHG disclosure are only mandatory for large listed companies (Legislation.Gov.Uk 2006, DEFRA 2013). However, it has been argued that voluntary approaches to environmental compliance are not effective. Taylor et al. (2003) argued that voluntary regulations are effective only when external demand to comply exist. Similarly, Parker et al. (2009) also emphasised voluntary regulation will not be effective in

situations when the environmental challenges of complying with regulations outweigh the benefits.

However, despite the numerous challenges identified as hindering the effective implementation of sustainable environmental practices, there is an increasing trend in sustainability movement in recognition of SMEs' environmental impact and not just large listed companies and multinationals in an attempt to create more sustainable world (Spence et al. 2012). This has been reiterated by Hillary (2004) that the lack of knowledge regarding the impact of the sector and the increasing recognition of the importance of the sector as an avenue to create healthy economy has energise the growing interest in the sector. Hillary (2004) also documented that the EU places important emphasis on companies engaging SMEs in environmental improvements as a vital avenue for sustainable development. Most environmental and social impact of multinational corporations occurs through supply chains which involve SMEs (Spence et al. 2012). This has been reiterated by Aiyub et al. (2009) that in the UK, the automobile companies and the supermarket giants such as Tesco and Sainsbury are leading the way to encourage their suppliers mostly SMEs to pursue sustainable environmental practices. It has also been argued that issues of environmental concerns are important to SMEs as they have stronger links with important stakeholder groups such as employees and local communities and have sense of direct responsibility to those that are closely tied to their businesses (Uhlaner et al. 2004). SMEs environmental concerns and awareness are also reflected in informal environmental management systems which involve combination of environmental activities such as waste reduction, energy saving and water conservation (McKeiver and Gadenne 2005) without necessary employing formal environmental management system such as ISO 14001 and EMAS.

Various arguments have been advanced on the motivation for SMEs to pursue sustainable environmental practices. Dey and Ghosh (2013) suggested firm image and market opportunities as the key motivational factors for SMEs to implement good environmental practices. González-Benito and González-Benito (2008) proposed that market orientation is a possible predictor of environmental sustainability. This has also been highlighted by Jansson et al. (2017) that if customer demand sustainable environmental practices, then market oriented companies due to their sensitivity to customers, will respond. They emphasised that customer and stakeholder pressure are likely to trigger SMEs to develop sustainable environmental measures. Commitment to sustainable environmental practices is seen as a function of customer focus and higher patronage for the products and services by customers will improve operating and financial performance.

In similar vein, Dey and Ghosh (2013) also suggested customer pressure as important motivational force that urges SMEs into environmental sustainable practices. Customers are now more environmental conscious likely to penalise companies that ignore their environmental responsibilities particularly in the case of those engaging in high polluting industries such as the chemical industry. Sáez-Martínez et al. (2016) stated that environmental oriented behaviour and green managerial practices could be improved if customers indicated the greater willingness to pay for products and services that are produced in green conscious manner. If such behaviour is exhibited by customers, then SMEs are more likely to pursue sustainable environmental measures beyond compliance and improve their financial performance due to high patronage from the customers.

Legislation is also seen as a key motivation for SMEs to engage in improved environmental practices. Compliance with environmental legislation such as carbon emission, pollution prevention, waste management and standards for packaging and recycling is regarded as important driver for SMEs in pursuing improve environmental practices (Sáez-Martínez et al. 2016). They argue that compliance with regulations helps to avoid excessive fines which impact negatively on the cash flow and profit of SMEs that are already constraint by cash resources. Regulations can also be effectively used by the government to encourage SMEs to adopt sustainable environmental practices by offering tax incentives. In the UK, the use of 100% capital allowances for companies that purchase environmental user-friendly machineries and low emission cars is expected to encourage SMEs in the implementation of proactive environmental practices. Triguero et al. (2013) averred that SMEs tend to respond to external pressure on environmental responsibility and this is a very important driver that cannot be ignored. Therefore, where a well-designed environmental regulation is in place, it encourages organisations to adopt innovative practices that improve their operational efficiency and improve profitability as well (Porter and Linde 1995).

Aiyub et al. (2009) summed up the benefits and motivations of sustainable practices as both internal and external. They cited internal benefits as including improved documentation, training, and awareness. Other important internal factors indicated was financial, which may be achieved through cost savings on energy, materials, and waste reductions. External benefits included attracting new customers, marketing advantages, lesser insurance premiums, increased competitiveness, compliance to environmental regulation, as well as improving public image. Where SMEs, for instance, adopt formal environmental management scheme such as ISO 14001, it sends a strong signal to important stakeholders that have strong influence on the company. For instance, whilst environmental conscious

customers may patronise the firm's products and services thereby improving its competitiveness, environmental conscious investors may also inject more financial resources into the company to undertake more investment activities and thus enhance the financial performance of the company as well.

Thus, although SMEs face many barriers in addressing environmental challenges, recently, there has been increasing recognition on the impact of SMEs activities on the environment and the need to motivate them to address these challenges to create a healthy economy.

2.8 The Alternative Investment Market (AIM)

The Alternative Investment Market (AIM) was launched by the London Stock Exchange in 1995 to enable smaller companies gain listing on a recognised stock market. The AIM is intended for smaller companies throughout the world that are keen to acquire the needed capital for expansion. Since its inception in 1995, more than 2500 companies have joined AIM and created a unique market for entrepreneurial companies (Mallin and Ow-Yong 2008). One unique feature of AIM is simplified regulatory environment designed to meet the needs of SMEs. In addition, to the simplified regulatory environment, BDO (2016) has cited many other benefits for companies that obtained listing on the Alternative Investment Market. These benefits include easy access to capital, creating market for shares, offer companies the opportunity to make acquisitions using quoted shares as purchase considerations and increased public profile of the company. Other benefits enumerated by BDO (2016) included the fact that listing on AIM makes employee share scheme more attractive, obtain various tax benefits, less stringent regulations on acquisition and disposals, and enjoy more flexibility in terms of regulation than those listed on the main markets. AIM since its inception in 1995 has consistently raised capital to support the expansion programmes of the companies with total market capitalisation reaching £70.0m as at December 2015 for 1044 listed companies.

Although companies listed on the Alternative Investment Market are required to adhere to both European and UK environmental frameworks and directives depending on the type of industry they belong to, most of the UK environmental reporting guidelines are not mandatory for AIMs listed companies. For instance, Companies Act 2006 (2013 amendment) only makes it mandatory for companies listed on the main market of the London Stock Exchange and those regulated by the EEA, NYSE and NASDAQ to report on their GHG emission as part of their annual report. Regulation 2016 of the Companies Act 2006 is also only applicable to UK listed companies with over 500 employees. In line with

companies Act 2006, DEFRA (2013) reporting guidelines also makes it mandatory for companies quoted on the main market of London Stock Exchange and European Economic Area to report on their GHG emissions as part of the annual report although it encourages other companies to report as well. Similarly, the introduction of Energy Savings Opportunity Scheme (ESOS) by the UK government is only mandatory for large companies with over 250 employees to conduct energy audit from 5 December 2015. This implies that SMEs listed on AIM are not required to conduct mandatory energy audit.

However, notwithstanding the fact that companies listed on AIM are exempted from most mandatory environmental reporting requirements, there are various opportunities for AIMs listed companies to report on environmental performance or pursue other proactive measures of sustainable environmental practices. Sandor et al. (2015) have argued that the emerging class of environmental assets including right to emit regional and global pollutants, renewable energy credits, and water quality and quantity rights allow businesses to pursue new opportunities whilst at the same time achieving their environmental goals. In evaluating companies' environmental performance, disclosure of environmental risk and response to environmental risk and opportunities are vital for stakeholder's assessment. Therefore, similar to companies listed on the main markets, listed SMEs that disclose environmental performance reduce environmental concerns of stakeholders and establish good reputations with them (Brouwers et al. 2014). As indicated by Versaevel (2016), companies that disclose comprehensive reports on the extent of their environmental engagement send a strong signal to the capital markets and investors that appreciate proactive environmental initiatives may invest in such companies.

2.9 Applicability of Environmental Regulations/Directives to SMEs

Although some of the environmental regulations are specifically designed or mandatory for large organisations (e.g. Defra 2013), SMEs are still voluntarily required to comply. The GRI (2006) report which is one of the widely used sustainability reporting framework emphasised that the framework can be employed by any organisation of any size, sector or location. Besides, most of the environmental performance measures identified in the GRI report such as Materials, Energy, Water, Emission, Waste, Compliance are also contained in the Defra (2013) report which have been emphasised as being suitable for both SMEs and larger firms on management and reporting of their environmental practices.

The UNGC guidelines which also highlight on how corporations can reduce their environmental impact by incorporating innovative practices and enhancing their financial performance also indicated that it is applicable to both SMEs and larger firms. In relation to

ISO and EMAS, some of the world most renowned environmental management systems which focus on how organisations can identify, manage their environmental obligations and risks and the expected impact on costs have also been identified as appropriate for both SMEs and larger firms. Two major empirical studies on the relationship between environmental and financial performance in the UK by Aiyub et. (2009) and Hillary and Burr that employed ISO 14001 and EMAS as environmental performance measure reported that both SMEs and larger firms improved their financial performance after the introduction of ISO and EMAS.

Besides, most of the European Environmental Directive such as REACH (EC 1907/2006) are industry-based irrespective of whether they are SMEs or larger firms. For instance, the REACH regulation stipulated that it is mandatory for manufacturers and importers of chemical substances to gather information on the properties of their chemical substances to facilitate safe handling and to register the information on the central database of European Chemical Agency (ECHA) in Helsinki. Therefore, both SMEs and larger firms that deal in manufacturing and importation of chemicals are expected to comply irrespective of their size.

In addition, although it might not be mandatory for SMEs to comply with some of these regulations, they also face stakeholder pressure to comply. As reported by Yussoff and Lehman (2009), it is the obligation of the firm itself to inform stakeholders of their environmental practices. Therefore, the absence of mandatory regulations, SMEs similar to larger firms, in order to portray sustainability business and to establish legitimacy with the stakeholders may be compelled to comply with some of these the regulations voluntarily.

2.10 Summary

The chapter has shown the importance of frameworks and directives in shaping the environmental practices of organisations. Although the UK has its own environmental management frameworks and directives, most of the directives have been developed in line with international and European Union policy guidelines. Prominent among these international policy guidelines are Global Reporting Initiatives, United Nation Global Compact, and International Standard Organisation (ISO 14001). These international policy guidelines have been established to encourage organisations to adopt good environmental practices to improve their environmental engagement whilst at the same time remaining competitive. Aside international policy guidelines, EU environmental directives also influence UK businesses directly or indirectly and hence UK environmental frameworks are developed in line with the EU directives. Some of the major EU directives affecting UK

businesses include Waste – EU Directive 2008/98, Ambient Air Quality 2008/50/EC, Chemicals (REACH) – EC 1907/2006, Greenhouse Gases – EU 2003/87EC, Industrial Emission Directive – 2010/75/EU and Eco Management Audit Scheme (EMAS). How these directives are implemented in the UK and its effect on UK businesses have been discussed. Added to the international policy guidelines and the EU directives, the chapter has also discussed specific UK reporting guidelines. Notably, the London Stock Exchange Reporting Guidelines, the ACCA Reporting Guidelines and Companies Act 2006 Reporting Guidelines have not been excluded from discussion in this chapter. Other important topics covered here include Environmental Taxes, Reliefs and Schemes for UK businesses. SMEs business and the environment in UK which captures the challenges face by SMEs in an attempt to manage its environment, as well as the benefits of sustainable environmental practices of SMEs have also been included in the discussions in this chapter. Lastly, the Alternative Investment Market, which is the research focus, has been captured by showing how listed SMEs are exempted from some of the major environmental reporting requirements in the UK and how they may also benefit from voluntary environmental reporting. The chapter also highlights on how SMEs are expected to comply with these regulations although they may not be mandatory required to comply. Thus, the chapter sums up major frameworks and directives both local and international that guide UK companies in adopting sustainable environmental practices that could also enhance their financial performance.

CHAPTER THREE

THEORETICAL FRAMEWORK

3.1 Introduction

The chapter presents the underlying theoretical arguments to support the relationship between Environmental Management and Financial Performance. In order to achieve this, two theories, Resource-based View (RBV) and the Stakeholder Theory have been adopted. The rationale for adopting the RBV is based on the proposition that firms with more financial and other resources are more likely to engage in proactive environmental management practices than less resource endowed firms will. Although it has been argued that SMEs lack the resources to implement environmental sustainable policies and such initiatives may reduce profitability, others have provided counter arguments that SMEs possess unique resources such as internally generated funds, simple capital structure, and entrepreneurial orientation of management which enable them to achieve competitive advantage by adopting green management practices. Woo et al. (2014) has also shown that listing status of SMEs is another complementary asset which they can use to improve their environmental performance.

In terms of stakeholder theory, it has been argued that SMEs that are listed should disclose their environmental performance to reduce environmental concerns of stakeholders. Such a disclosure can increase the transparency of firms' environmental practices and establish good reputation for the firms among internal and external stakeholders with ultimate impact on both profitability and market value. Therefore, in line with these arguments, the Resource-based View and the Stakeholder Theory have been adopted for this study. This is consistent with many other studies on environmental and financial relationships which have also argued that unique deployment of resources and effective stakeholder engagement enhances environmental and financial performance relationships. (Aragón-Correa et al. 2008, Woo et al. 2014, Trumpp and Guenther 2017).

The rest of the chapter is structured as follows. Section 3.2 addresses how the RBV enhances the EMP and FP relationships as well as the criticisms of the RBV. This is followed by the discussions of Stakeholder theory and its criticism in section 3.3. Section 3.4 discusses how the RBV and the stakeholder theory are linked to each other. Section 3.5 presents the conceptual framework whilst 3.6 summarises the chapter.

3.2 The Resource-Based View (RBV)

The resource-based view (RBV) developed by authors such as Wernerfelt (1984a), Rumelt (1984), and Barney (1991) assumes that resources of a firm are divergently distributed and the distribution is also long lasting. Wernerfelt (1984b) defined resources as tangible and intangible assets of a firm such as brand name, in house knowledge of technology, employment of skilled labour, trade contacts, machinery, production efficiency etc. and are tied semi permanently to the firm. Firm resources have also been given by Mac an Bhaird (2010) as both tangible and intangible namely physical capital, human capital, as well as organisational capital.

These proponents of RBV used the word "idiosyncratic" to indicate the distinctive nature of resources which should also be immobile as a source of sustained competitive advantage. Mac an Bhaird (2010) indicated that the RBV contrasts the ideas of industrial organisation economics which concentrates on a firm's reaction to external rivals but the RBV looks at the "black box" of the management of a firm's internal resources. Mac an Baird (2010) believed that the proper combination of both the tangible and intangible could be used by a firm to gain sustainable competitive advantage. Barney et al. (2001) emphasised that differences in firms' performance emanate from the heterogeneity of a firm's resources. It has also been argued that RBV helps to explain competitive advantage results from valuable organisational capabilities including continuous innovation and stakeholder integration linked with proactive integration of environmental issues with strategy (Hart 1997). This theoretical argument by Hart (1997) is in line with revisionists' argument that proactive environmental practices may improve productivity with which resources are utilised and impact positively on financial performance (Porter and Linde, 1995). The revisionists' ideologies have received many empirical supports (e.g. Carter et. 2000, Clemens 2006, Lopez-Gamero et al. 2009). Recent research by US Department of Energy (2015) also found that buildings with LEED and energy star certification have higher rental values, higher occupancy rates, lower utility bills, increased sales prices as well as lower construction premiums.

In the research work of Hart (1995), a natural resource-based view of a firm, he posited that to be able to create and sustain competitive advantage, the firm's capabilities and competences should be supported by resources that cannot be easily imitated. He summed up the characteristics of firm resources that can sustain competitive advantage as valuable, non-substitutability, rare and specific to a firm and must be difficult to replicate. Valuable resources have distinctive capabilities in contributing to the firm's value that are difficult to

be accomplished through other means. Barney (1991) indicated that rare resources must be specific to a firm and should not be widely available to the industry. It should be aligned to a specific firm and therefore difficult to transfer from one firm to another. Hart (1995) contended that the most important characteristics of the resources for sustained competitive advantage is that it must be difficult to replicate. Resources that are difficult to replicate are tacit, complex, skilled based and people intensive, invisible and are achieved upon learning by doing, developed through experience and refined through practice (Hart 1995). Incorporating the natural environment to the resource-based view, Hart (1995) argued that considering the scale of ecological problems over the last 40 years, the exclusion of natural environment from RBV made the theory incomplete hence need to insert environment into the resourced-based view.

Hart (1995) suggested three ways in which the natural environment could be used to create sustainable competitive advantage as pollution prevention, product stewardship and sustainable development. He advocated that pollution prevention minimises emissions and waste, results in continuous improvement and lower costs. In terms of product stewardship Hart (1995) averred that it minimises the life cycle cost of the products, enhances stakeholder integration and prevent competition whereas sustainable development may involve pursuing environmental strategy that sever the negative links between the environment and economic activity such as reduction in the consumption of materials and energy. This argument has been confirmed in the findings of Hart and Ahuja (1994) that Minnesota Mining and Manufacturing redesigned its manufacturing process and reduces harmful by-products and save the company over $500 million. The finding is also in line with Porter and Linde (1995) "win win" hypothesis that a well-designed environmental regulation may trigger innovations and positively impact on financial performance.

Identifying how unique resources can impact on the environmental and financial performance relationships, Russo and Fouts (1997) have documented that resources that are unique, valuable and inimitable should meet the societal demands and therefore resources that address cleaner environment will establish legitimacy with the society, which will improve their competitiveness due to higher patronage of their products and improve profitability. Establishing more link on how resources influence environmental and financial performance relationships, Russo and Fouts (1997) reiterated that environmental policy that depends on pollution abatement through short-term end-of-pipe approach normally fail to achieve regulatory compliance and improve profitability. However, when firms go beyond

compliance mode to focus on pollution prevention by employing efficient methods that concentrate on resource reduction and process innovation it affects the firm's ability to generate profit. This line of argument has also been supported by Lopez-Gamero et al. (2009). They emphasised that environmental performance encourages the development of new resources. They argued that firms that can develop innovative technology that involves low manufacturing emission with respect to other competitors may be able to obtain first-mover advantages after improving their green image in emerging green product market and enhance profitability as well.

Journeault (2016) has also cited many instances in which the resource-based view may be used to enhance the relationship between environmental and financial performance. First, he cited that eco-learning involves the development of eco-insights, knowledge, and the relationship of past ecological initiatives, current and future actions. Eco-learning helps the firm to develop environmental information faster than competitors and by developing unique interaction and activities over long period, eco-learning becomes difficult to imitate and thus create sustainable competitive advantage. Also, arguing from the point of view of Porter and Linde (1995), Journeault (2016), emphasised the importance of continuous environmental innovation as a critical factor, is required in addressing both environmental and competitive issue. The REACH regulations which are directed towards chemical manufacturers and importers provide a database for that enable the chemical handlers to introduce innovative practices which ultimately enhance their performance. Thus, innovations resulting from redesign of production processes results in competitive advantage through corporate renewal which is the motivating factor for developing invisible resources which allows the firm to be ahead of its rivals.

Earnhart and Lizal (2007) also showed how resources could impact positively on environmental and financial performance relationships. Their study emphasised that firms that can invest in riskier environmental management programmes that alter or install new production process to prevent rather than treat pollution may be effectively reducing pollution and at the same time lowering costs. In line with the arguments put forward by Filbeck and Gorman (2004), they reiterated that investment in pollution reduction measures through prevention or end-of-pipe treatment allows the firms to establish competitive edge through marketing of green products.

Ramanathan (2016) has also shown how RBV supports the environmental and financial performance relationships. The study indicated that environmental and financial

performance require deployment and utilisation of a firm's resources and economic performance is expected since both require the use of vital resources necessary for competition. Whilst recognising that the strategic resources that could be deployed to enhance environmental and financial performance relationships include physical assets, technology, organisational culture and other intangible assets, in line with Hart (1995), Ramanathan (2016) emphasised how proper stakeholder management can also enhance environmental and financial performance relationships. The positive correlation between environmental and financial performance could be attributed to deployment of important resource like proper stakeholder management. Good environmental practices make the firm attractive to important stakeholders notably quality employees and management and this could impact positively on operational efficiency and reduce costs.

In terms of deployment of resources to enhance environmental and financial performance relationships, Christmann (2000) identified complementary assets required to achieve competitive advantage by implementing best practices of environmental management. As shown by Hart (1995), it is difficult to separate processed-best focused environmental management practices such as pollution prevention and innovation from other productive activities. This implies that resources and capabilities that are developed and applied in other production processes may also be used to successfully implement processed-best focused environmental practices and generate the needed cost saving expected from the implementation of such practices. Such process-focused strategies ensure that environmental strategies are place in the broader context of a firm's business strategies and make use of complementary assets created through these strategies for environmental gains that have the potential to create competitive advantage and improve the bottom line.

In terms of how firm resources may also influence environmental and financial relationship during the period of growth, Elsayed and Paton (2009) presented a very interesting argument. They indicated that during the initial stage of growth, firms are in good position to build competitive advantage, as they are more likely to have state of the art assets that are unlikely to breach environmental regulations and use of energy efficient assets. Also, arguing from the position of Sharma (2000), and Winn and Angell (2000) they reiterated that serious problems that are encountered in dealing with environmental issues such as newer technology and resistance of employees are unlikely to present themselves during the initial stage of growth.

However, despite the compelling argument that firms at initial growth stage have incentives to invest in environmental sustainability practices and improve their competitiveness, the ability of the firm to deploy resources for environmental activities will depend on the availability of resources. Elsayed and Paton (2009) argued that such a constraint is more likely during the initial growth stage of the firm when they are not well established and access to external funding is difficult. Waddock and Graves (1997) documented that availability of resources will influence or discourage the firm's ability to investment in sustainable environmental practices and that financial slack result in better environmental performance with ultimate effect on improved profitability.

In the view of Smith et al. (1985) when firms are in the rapid growth stage, managerial decisions are more directed towards short-term performance and therefore slack resources are more directed towards expansion opportunities instead of environmental activities. This follows that SMEs listed on AIM where most of the companies are at rapid stage of growth, although have opportunities to develop competitive advantage and improve their financial performance by investing in environmental capital, with difficulty in access to external funding, they more likely to invest any slack funds in expansion projects than environmental sustainable activities. However, the ability of the firm to convert financial slack into improved environmental and financial performance is more likely when the firm is at the maturity stage (Elsayed and Paton 2009). They argued that firms that are in the maturity stage have excess cash, limited investment opportunities and face less competition. Thus, such firms at the maturity stage would be persuaded to invest the excess cash in environmental activities and improve their legitimacy with the stakeholders further to enhance their competitiveness. It was also argued that matured firms were more likely to invest slack resources on environmental activities as a defence against rapid growing firms. Whilst such initiative is likely to enhance the competitive position of matured firms with consequence for improved financial performance, high growth firms are unlikely to have the needed resources to invest in this area which may reduce their competitiveness with adverse consequence on profitability.

The above arguments have been emphasised by Bansal (2005) and Hillary (2000) that resource constraint prevents SMEs from implementing sustainable environmental practices to improve their financial performance. The absence of sufficient resources to employ the necessary capabilities for sustainable environmental practices puts SMEs in difficult position than larger firms when engaging in proactive environmental practices and reaping the potential financial benefits (Aragón-Correa et al. 2008). Thus, SMEs lack cash and other

resources to undertake pollution prevention strategies such as process innovation, which can positively influence profitability. Christmann (2000) for instance emphasised that competencies for process innovation and implementation are complementary assets that moderate the relationship between best practices and cost advantage. Leonidou et al. (2016) although establish a positive relationship between the environmental and financial performance of SMEs, their study emphasised that the link between the two becomes stronger when the firm possesses adequate resources and capabilities and thereby confirming the results of other studies such as Rosso and Fouts (1997).

However, disputing that fact that the resourced-based view may not be relevant for smaller companies' due to financial and other resource constraints, Aragón-Correa et al. (2008) have indicated that SMEs possess unique characteristics which enable them to develop and deploy certain organisational capabilities which may influence the environmental and financial performance relationships. They cited SMEs unique characteristics such as shorter lines of communication, closer interaction within the SMEs, the presence of the founder's vision and entrepreneurial orientation as unique resources which could be exploited by SMEs to influence the environmental and financial performance relationships.

In the analysis of how complementary assets moderate the relationship between environmental and financial performance, Christmann (2000) indicated that firms do not have to develop these complementary assets in pursuance of their environmental strategies but rather they are developed during other general productive activities and can be leveraged into the firm's environmental strategy. This implies that SMEs can also leverage the existing resources that are developed in the normal production process to create a unique and specific environmental strategy to gain competitive advantage without necessary requiring huge investment specifically to develop environmental resources. This reinforces GRI, UNGC and Defra guidelines which has been emphasised as suitable for both small and medium-sized firms.

Despite supporting arguments by many empirical studies that firm resources moderate the positive relationship between environmental and financial performance, the RBV faces some criticisms. Collins (1994) indicated that RBV arguments entail endless regress. As explained by Collins (1994) as second-order capability (developing structures to innovate products) is considered valuable than first order capability (product innovation), RBV is based on the ideas that the firm will strive second order capability and this can be extended in perpetuity leading firms to look for an endless search for higher-order capabilities. However,

Kraaijenbrink et al. (2010) have argued against this criticism by pointing out that infinite regress is only those who consider management as a positive quest for certainty. If management or economics is viewed as practical engagement and open endless, then the argument of infinite regress is baseless.

Another argument put forward by critics of RBV is that sustained competitive advantage (SCA) is not achievable. Fiol (1991) study which supported SCA rejected it in Fiol's (2001) study arguing that the ways organisation use resources and skills must be constantly changed and this results in continuous and temporal change. He indicated that every SCA must eventually compete away. Kraaijenbrink et al. (2010) also disputed this line of criticism and argued that whilst they accept that SCA cannot last forever, they indicated that SCA is achievable as RBV argument is based on actual results and not ex-ante sources of SCA of asymmetric information about the future value of existing resources. Barney and Mackey (2005) have also argued that the theory is difficult to test empirically due to the problems of measuring intangible resources. Thus, existing studies have used secondary data based on proxy variables such as R&D intensity, advertising intensity and human capital leverage but it has been argued that such research potentially leaves out the research question (Rouse and Daellenbach 2002). Barney et al. (2001) also reiterated that such research that uses secondary data and proxy variables are less fruitful in explaining the managerial process of how resources are considered as valuable. Other authors have also argued that the RBV theory only concentrates on internal capabilities and ignores the influence of the external market on the firm. However, the influence of external factor on the firm is a key factor as changes in external forces can distort the internal capabilities and competencies of the firm and put the firm at a competitive disadvantage.

3.3 Stakeholder Theory

When corporations shift from creation of shareholder value as a sole objective to the creation of shared value, then stakeholder theory begins (Ghelli, 2013). A stakeholder is any group or individual who can affect or is affected by the attainment of the organisational objectives (Freeman 1984). The stakeholder theory is used as a basis to analyse those groups who can affect or is affected by the organisation (Moir 2001). Stakeholder theory can, therefore, be argued as a combination of both management theory and ethical theory as it attempts to combine both the motive of profit maximisation with stakeholder benefits and expectations. Reverte (2009) indicated that under the managerial branch of the stakeholder theory, corporate disclosure is a management tool controlling the information needs of powerful stakeholders such as employees, shareholders, investors and public authorities.

Reverte (2009) explained that managers use the information to influence the most powerful stakeholders to solicit their support which is important for the organisation to survive. Freeman (1984) also averred that under the stakeholder theory, firms are caught between explicit and implicit contracts and are required to honour both contracts. He argued that as companies honour these contracts, they build up reputations which are very important in terms of negotiating terms of trade with the various stakeholders. Whereas explicit contract defines the terms of relationship between a firm and its stakeholder's, implicit contracts are self-enforcing because they have no legal standing (Mwangi and Oyenje 2013). Implicit contracts become self-enforcing when the present value of company's gain of keeping positive reputation is greater than the loss if the implied contract is disregarded by the firm. The existence of implicit contract under the stakeholder theory also implies that although SMEs may not be mandatory required to comply with environmental legislation, they may do so voluntarily as in most cases the value gain by way of positive reputation may exceeds the cost of complying with regulations voluntarily.

The stakeholders are categorised into two: the primary and the secondary stakeholders. In neo-classical theory, Clarkson (1995) defined primary stakeholders as those groups without whose continuing participation the corporation cannot survive as a going concern. The primary Stakeholders include shareholders, investors, employees, customers, and suppliers. Secondary stakeholders, on the other hand, are those who influence or are influenced by the corporation and are not essential for its survival (Clarkson 1995). Secondary stakeholders include the government, Social Pressure Group, Media, Competitors, and the Environment. In view of Freeman (1984), it is not sufficient for managers to focus exclusively on the primary stakeholders particularly shareholders. Stakeholder's theory, therefore, implies that it can be beneficial for a firm to engage in certain CSER activities that non-financial stakeholders perceive to be important, without these, the group would withdraw their support for the firm. The Stakeholder theory, therefore, extends the concept of ownership of the firm beyond the legal and economic boundaries (Schneider 2002).

The stakeholder theory could be viewed from two perspectives being normative and instrumental. In the case of normative, the firm establishes relationships with various stakeholders with no stakeholder having preeminent. Therefore, in line with institutional theory, stakeholder pressure may compel organisations to pursue environmental sustainability without regard to the costs and benefits. The instrumental stakeholder theory, on the other hand, attempts to connect stakeholder theory to wealth creation. Goodpaster (1991), building on the work of Freeman (1984), grouped stakeholder theory into strategic,

multi-fiduciary, and synthesis. The strategic, taking the instrumental approach considers stakeholders as a means to generating profit to shareholders. Stakeholders are therefore given consideration depending on the extent to which they can positively or negatively influence profits. The instrumental stakeholder theory is in line with neoclassical economics' arguments that an organisation has no business in pursuing voluntary sustainable practices unless it can contribute to profit. Therefore, whilst normative stakeholder approach is likely to influence environmental and financial performance negatively, instrumental stakeholder approach, which is more, aligned to wealth creation, has the tendency to influence positively, environmental and financial performance relationships. Thus, neoclassical economist such as Friedman (1970) argument that the social responsibility of a business is to increase profits is directly related to the instrumental stakeholder theory.

Trumpp and Guenther (2017) arguing from stakeholder theory indicated that a positive influence on environmental and financial performance is delineated by stakeholder theory as environmental measures beyond compliance improve a firm's fulfilment of stakeholder's expectation. In line with Jones' (1995) point of view, they indicated that when firm practices reduce environmental impacts and are observed by stakeholders, it enhances the firm's reputation. Firms with good environmental reputation may not only attract environmental conscious consumers, but listed firms may also benefit from green investors and drive share prices and market value of the firm. Brouwers et al. (2014) have also confirmed that firms can enhance their financial performance by meeting stakeholder's needs through the implementation of sustainable environmental practices. They argued that whilst regulations only offer a benchmark through which environmental performance are measured, the disclosure of proactive environmental practices reinforces positive stakeholder effect of environmental sustainability practices.

Versaevel (2016) revealed that companies that disclose comprehensive reports on how they are meeting environmental challenges send a strong signal to the capital markets that appreciate the business opportunities associated with environmental initiatives such as transition to low carbon economy. Improved business opportunities due to proactive environmental initiatives also result in improved financial performance. LSEG (2017) emphasised that some of the global investors allocate additional capital to companies with higher green revenue exposure and therefore the need for companies to provide better reporting on their green initiatives to attract such investment inflows. Higher investment inflow due to green initiatives means more profitable investments opportunities could be pursued. This sentiment has also been echoed by the business press which indicated that

about 25% of Fortune 500 companies have set up committees to oversee their companies' initiatives toward the natural environment (Walls et al. 2012). Lacy et al. (2010) also reiterated that between 2004 and 2008, the number of investor proposals in relation to the natural environment doubled. Therefore, initiatives by organisation to improve the managerial know how in environmental sustainability and investors directing investments to sustainable corporation are likely to impact significantly on the bottom-line.

In similar arguments, Carter et al. (2000) also emphasised how good environmental practices may be attractive to stakeholders with ultimate consequence on stock market performance. They argued that a firm's social responsibility including environmental performance has a positive link with stock market performance. Their theoretical argument is on the basis that socially responsible and good environmental practices can enhance a firm's relationship with important stakeholders such bankers, government agencies and investors. As presented by Mcguire et al. (1988), improved relationship with such vital stakeholders may result in economic benefits such as increased investment level into the firm which may drive share prices up and improve market value of the firm. McGuire et al. (1988) asserted that improved environmental practices may reduce finance costs as lenders tend to associate lower financial risk with better environmental performance. They also emphasised how better environmental performance reduces stakeholder pressure and ensures regulatory compliance by explaining that higher level of environmental performance directly leads to reduced regulatory scrutiny, lesser sanctions, and lower community pressure which helps in reducing operational costs.

Endrikat et al. (2014) has also argued from the instrumental stakeholder perspective and explained the positive impact of environmental performance on financial performance. They indicated that as corporations exhibit responsible behaviour toward the natural environment, they meet stakeholder's expectation. Instrumental stakeholder theory provided that fulfilling the expectation of key stakeholders contribute to improved financial performance. They postulated that through proper stakeholder management, firms may gain many sources of competitive advantage including enhanced reputation, and loyal relationship with customers and suppliers. For instance, firms that achieved superior environmental performance can also improve their sales, as consumers may show less reluctance in paying premium price for environmental responsible products with consequence on the bottom line. In line with McGuire et al. (1988), they indicated that better environmental practices enhance relationship with investors and thus may reduce market risk and result in lower financial cost. Similarly, Carter et al. (2000) also indicated that revenue could be positively impacted

when consumers prefer environmentally friendly products which may result in increased market share and establish competitive edge over less environmentally conscious competitors. They also maintained that liaising with important stakeholders such as the supply chain partners could enhance the environmental and financial performance relationships. They proposed that purchasing managers could urge members of the upstream supply chain to provide the purchasing firm with materials and components identified through the design for disassembly and life cycle analysis. Whilst such a partnership may enhance environmental practices, it also impacts positively on costs as waste is reduced.

Meeting the economic and legal responsibilities of shareholders may be anchored through corporate social and environmental responsibilities (Fassanya and Onakoya 2013). As indicated by Freeman (1984), an organisation's commitment to operate in economically and environmentally responsible manner whilst acknowledging the interest of its stakeholders, in the end, will enhance financial performance. The contention is that businesses that pursue better sustainable environmental practices improve their brand image, are trusted by the stakeholders, achieve higher efficiency, and enhance reputation which may result in improved performance ((Fasanya and Onokoya, 2013). Freeman (1984) postulated that companies usually generate externalities that affect both internal and external stakeholders. The externalities cause the stakeholders to exert pressure on companies to reduce negative environmental impacts and increase positive ones. Responding to stakeholder pressure helps the organisation to establish legitimacy with the stakeholders which enhances the firm's reputation and helps to gain competitive advantage with consequence on improved financial performance.

Buysse and Verbeke (2003) identified how negative externalities may undermine the firm's relationship with its stakeholders and negatively impact on financial performance. Supporting the ideas of Hamilton (1995) they contended that if a firm's poor environmental practices make news such as liable for environmental damages, shareholder will suffer financial losses. In support, Henriques and Sadorsky (1996) also indicated that firms with poor environmental practices are perceived as riskier by financial institutions and may refuse financial assistance to the company, or demand higher risk premium. This is very important to SMEs, which because of their perceived riskiness by many financial institutions, already attract higher risk premium so the knowledge of poor environmental practices by stakeholders; notably financial institution, will worsen the situation. Again, Buysse and Verbeke (2003) reiterated that the emergence of green consumerism means that whereas certain consumers are willing to pay a premium price for environmentally friendly products,

another consumer group may also exert negative pressure by boycotting the products of the companies with poor environmental practices. It is also asserted that companies with a reputation for poor environmental practices may find it difficult to recruit and retain high-quality employees who are interested in companies that pursue proactive environmental practices (Buysse and Verbeke, 2003) and this may consequently affect their financial performance.

It is also worthy to note that stakeholder pressure in terms of environmental engagement has not only been beneficial to large companies but smaller companies as well. Arguing from a stakeholder point of view, Borga et al. (2009) indicated that several potential benefits push SMEs towards voluntary sustainable engagement. Some of the key facts identified as pushing SMEs towards sustainability include improving the relationship with financiers, public, employees, and stakeholders in general. Others include reputational enhancement, obtaining contracts from multinationals, as well as building trust with stakeholders to gain competitive advantage. They argued that such benefits obtained by SMEs through sustainable environmental engagement strengthen the SMEs relationship with the stakeholders and put them in an advantageous position that enhances their financial performance.

Spence et al. (2003) however, indicated that SMEs are more embedded in the local environment and suggested that studies into SMEs environmental management would be better addressed through the concept of social capital rather than stakeholder theory. This has been reiterated by Welford and Frost (2006) that many SMEs prefer to build a relationship with fewer, rather than more factories as it is difficult to comply with increasing and contradictory environmental demands of larger stakeholders which may negatively affect their performance.

Despite the immense usefulness of stakeholder theory, especially, in explaining the reason why companies pursue proactive environmental management practices, it has been criticised on many grounds. Kakabadse et al. (2005) indicated that activities of a company affect everyone directly or indirectly and that if a company is responsible to all stakeholders, then from the managerial point of view, the stakeholder theory becomes useless as it is simply too wide-ranging. Stakeholder theory has also been criticised that it seems to ignore the institutional requirements of a modern organisation (Brayden 2006). Under the normative stakeholder view, all stakeholders are given prominence with no preference to a stakeholder group but Brayden (2006) argued that this perspective implies that companies as legal

entities to maximise market value is lost and therefore this perspective reduce corporation to a social entity which can easily change its goals to the demands of crying shareholders. Brayden (2006) also disagreed with the instrumental view which sees firms as always value maximising and has sufficient information to determine the costs and benefits of negotiating with secondary stakeholders. He reiterated that the corporation and stakeholders are unidimensional actors and there is no room for firms that might intend to forgo profit in the interest of collective good.

It is also argued that one of the key setbacks of stakeholder is the accountability to multiple groups. Accountable to multiple stakeholders creates a situation in which any decision by management can be justified by reference to a stakeholder group. Chithambo (2013) in his criticism of stakeholder theory also indicated that the stakeholder theory does not consider the full effect of other environmental factors on the firm; instead, it assumes that the firm environment is only its stakeholders. The stakeholder theory, therefore, ignores the impact of the environment on the business and presents a firm as being in control of its environment. Despite the above criticisms of stakeholder's theory, it has been widely used in analysing the relationship between environmental and financial performance in many studies (Buysse and Verbeke 2003, Trumpp and Guenther 2017) and hence its adoption in this study.

3.4 Linkage between the Resource-based View and the Stakeholder Theory

Various scholars (Hart and Dowell 2011, Endrikat et al. 2014) have indicated the complementary nature of the RBV and the stakeholder theory and maintain that they should not be regarded as competing frameworks. First, they argue that a firm's ability to properly manage and integrate stakeholders can be regarded as organisational capability that can be exploited by the firm to increase its competitive position. This argument has also been emphasised by Ramanathan (2016) that deployment of unique resources that can enhance environmental and financial relationship include proper integration and management of stakeholder relationship. It is also argued that successfully stakeholder management allows firms to capitalise on tangible and intangible resources (Russo and Minto 2012). A firm with enhanced reputation from effective stakeholder integration may be able to attract new customers, investors and other important stakeholders and contribute to the intangible value or resources of the firm. In addition, it is also asserted that stakeholders can provide incentives and encourage the firm to exploit more opportunities that are profitable. Along this line, Endrikat et al. (2014) explained that proper stakeholder integration may encourage firms to pursue waste reduction measures and energy conservatism which may contribute to development of valuable organisational capabilities.

Aside the arguments presented by Endrikat et al. (2014) on the interrelationship between RBV and the stakeholder theory, Sarkis et al. (2010) have also made assertions on how the RBV and the stakeholder theory are linked together in support of the positive association between environmental and financial performance. They explained that where stakeholder pressure compels companies to adopt proactive environmental practices, there are varying responses that may be attributed to lack of resources as proposed by the NRBV. Undisputedly, resources are required for companies to establish legitimacy with stakeholders by pursuing better environmental practices with consequence on profitability due to the enhance reputation and increased market share that may result from improved stakeholder relationship. Hence, combination of the resource-based theory and stakeholder theory provides strong theoretical basis for positive association between environmental and financial performance relationships.

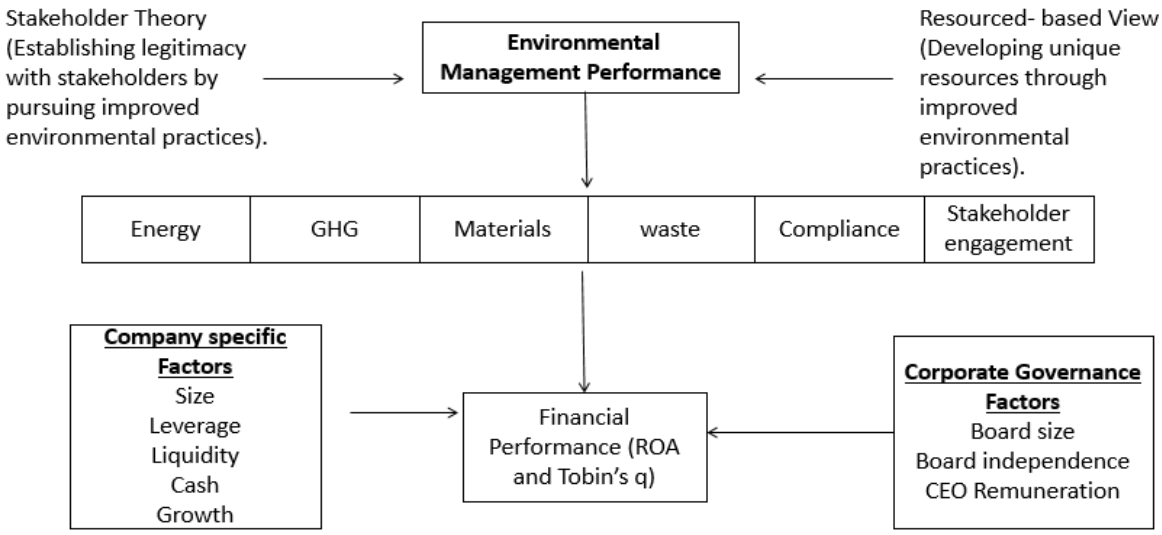
3.5 Conceptual Framework

The conceptual framework developed in fig 1 assumes that firms can establish legitimacy with stakeholders by improving their environmental performance measures such as efficient energy practices, waste control, resource efficiency such as recycling, control of pollution (GHG) and engaging stakeholders on environmental practices. Taking the instrumental stakeholder approach, which is in line with the neoclassical approach it is expected that firms, would link sustainable environmental practices with wealth creation. As emphasised by Jones (1995) when firm's practices reduce environmental impacts observed by stakeholders, it enhances the firm's reputation which may not only attract environmental conscious consumers but also investors, with consequence on both profit and the market value. Similarly, based on the Resource-based View Russo and Fouts (1997) indicated that organisation could use unique resources that meet societal or stakeholder demands such as cleaner environment to improve their competitiveness and consequently improve their financial performance. Therefore, to develop unique environmental resources to establish competitive advantage and meet stakeholder pressure, firms adopt improved environmental practices which also have positive consequences on financial performance.

The framework also shows that aside, the environmental variables, other variables may also moderate environmental and financial performance relationship or influence financial performance. These variables grouped under company specific factors and corporate governance factors have been controlled to capture the full impact of proactive environmental management performance and financial performance of AIM listed companies. The framework is also aligned to Carroll (1991) CSER pyramid. As most of the companies listed on AIM are new with marginal or no profit, it is expected that social and environmental activities of such firms are likely to

fulfil economic responsibility, and attention could be paid to legal and other higher level in the pyramid once the responsibility to make profit is firmly established.

Figure 1: The Conceptual Model of the Study



(Conceptional framework for the study developed by the author)

3.6 Summary of the Chapter

Recent years have seen much improvement on environmental practices by firms due to the priority given to environmental sustainability. However, whether such practices impact on financial performance or simply a matter of image has been subjected to various debates from both theoretical and empirical viewpoint. Similarly, various regulations and guidance from international, regional and local that regulate both larger and smaller firms have been

developed to guide corporations in pursuing and reporting their environmental practices. Some of the major international guidelines have been issued by the Global Reporting Initiatives (GRI), UN Global Compact (UNGC) and International Standards Organisation (ISO). In addition to the international regulations, many European and local regulations have also emerged to help correct market failure to take responsibilities for their environmental actions and at the same time encourage investment in innovation of environmental sustainability that may also enhance financial performance.

Leonidou et al. (2016) also emphasised the instrumental role of regulations and environmental public concern in harnessing environmental practices within smaller firms. In support of regulations, various theoretical arguments have also emerged providing basis on how sustainable environmental practices may impact on financial performance. Prominent of these are the resource-based view and stakeholder-based view. The resource-based view has been adopted for the study as it is argued that a firm with cash and other resources would be able to pursue more environmental proactive measures than resources constraint firms (Aiyub et al. 2009). Aragon-Correa et al. (2008) have also shown that although smaller companies may lack resources to pursue environmental proactive measures, they still possess unique resources that have influence on environmental and financial performance relationships and therefore the resource-based view is very useful for studies that involve SMEs. Also, stakeholder theory has been used in this study as listed SMEs similarly to large listed companies face more pressure from external stakeholders particularly investors on ways of enhancing value and thus may pursue proactive green initiatives to attract green oriented consumers, employees and green investors and this may enhance their competitiveness and improve profitability. Endrikat et al. (2014) have also documented that the RBV and the stakeholder theory, notably the instrumental stakeholder theory, should not be considered as competing frameworks but rather complementary theories that provide a strong theoretical basis to support the positive association between environmental and financial performance relationships. Therefore, the use of resource-based view and stakeholder theory to address environmental and financial performance relationships of listed SMEs in the UK is in line with many studies on environmental and financial performance relationships (Aragon-Correa et al. 2008, Endrikat et al. 2014, Trumpp and Guenther 2017) that have also employed RBV and the stakeholder theory.

Some studies that have employed resource-based view such as Russo Fouts (1997), Christmann (2000), Melynk et al. (2003), Sroufe et al. (2003) and Lopez-Gamero et al. (2009) have emphasised that resources are relevant for competitive advantage and that

resources are required for positive mediation between environmental and financial performance. Montobon et al. (2007) empirical findings which was also developed on the basis of resource-based view and stakeholder theory reiterated that the anticipation of more efficient utilisation of resources improved corporate image as firm become more environmental proactive. Based on stakeholder theory Moneva and Ortas (2010) which discovered positive relationship between environmental quality and financial performance explained that corporate environmental practices improved internal efficiency and corporate financial performance in the next periods. Similarly, Molina-Arozin (2017) which confirmed positive relationship between environmental and financial performance revealed that proactive environmental practices allow cost savings in relation to water and energy and arguing from stakeholder point of view indicated that the implementation of sustainable environmental practices permit differentiation in the hotel industry as reduction in pollution increase the demand by environmental sensitive tourists.

Thus, whilst the issue of environmental sustainability has been given prominence in recent years due to the impact of environmental pollution on society, various regulatory frameworks, international and local guidance, theoretical as well as empirical findings have provided strong support for "win win" situation between proactive environmental practices and financial performance.

CHAPTER FOUR
EMPIRICAL LITERATURE REVIEW

4.1 Introduction

Although many organisations have taken more environmental proactive measures in response to global outcry of environmental pollution and ozone layer depletion, the performance effects of corporate environmental performance are still uncertain. Environmental proactive initiatives are expected to provide "win-win" result by reducing pollution to the environment and at the same time provide opportunities for organisations to build long-term strategies, reduce exposure to environmental liabilities, increase efficiency, enhance shareholder relations and improve profitability (Gilley et al. 2000). However, the costs of providing such environmental proactive initiatives may also overshadow the expected benefits and negatively affect performance. Although many studies have tested the effects of proactive environmental initiatives on financial performance, they are mostly concentrated on large listed companies. Therefore, the purpose of the study is to establish environmental and financial performance relationships of AIM listed firms which mainly consists of small and medium-sized enterprises (SMEs) which the existing studies have not focussed. Thorough review of the existing empirical studies on the topic is therefore imperative to summarise the current knowledge on the topic, identify sources that have been used by the existing literature, methodologies applied and more importantly identify the gaps in the existing studies so that the research could be placed at the appropriate context.

The review of the empirical literature has been generically discussed and the rest of the chapter is structured as follows: Section 4.2 discusses studies on environmental and financial performance relationships by arguing from studies that support positive relationship between environmental and financial performance. Studies that support negative and no relationship between environmental and financial performance are presented in section 4.2. Section 4.3 analyses the effect of cash resources on environmental and financial performance relationships whereas 4.4 also discusses how the growth of a firm affects the environmental and financial performance relationships. Section 4.5 covers control variables or other confounding factors that may also influence financial performance aside environmental performance. This captures governance as well as company specific factors. Section 4.6 is for the summary of existing studies on environmental and financial performance relationships, whilst 4.7 designated for limitations of empirical literatures on environmental and financial performance as well as the expected contributions from the study. Finally, section 4.8 summarises the chapter.

4.2 Environmental and Financial Performance Relationships

4.2.1 Studies that Support Positive Relationships

Various arguments have been developed on how proactive environmental practices may impact positively on financial performance. Most of these arguments are based on the idea that proactive environmental measures provide cost-based competitive advantage which influences financial performance. Porter (1980) explained that one best way for organisations to achieve competitive advantage is pursuing a low-cost strategy, and where environmental performance has significant impact on costs, it should result in increase in profitability realised through internal accounting-based performance measures such as ROA. It is argued that improved measures of environmental practices reduce regulatory and compliance costs, lower emission charge and community pressure is also minimised. In the view of Hart (1995), pollution prevention and product stewardship can result in competitive advantage through "first mover" strategy in emerging green oriented products.

In Hart (1997), it is argued that whereas pollution prevention enables significant cost savings to be achieved in terms of pollution control, environmental and financial performance relationship is also largely enhanced through efficient input and energy consumption including reuse and recycling. Positive advocates for environmental and financial performance relationships argue that when organisations extend their environmental practices beyond compliance level by concentrating on product redesign and application of environmental friendly technologies, positive impact on financial performance is likely to be derived. They reiterated that such proactive approach which requires organisational learning, proper stakeholder integration, and continuous improvement within the framework of the resourced-based view is expected to result in positive relationship between EMP and FP (Aragón-Correa and Sharma 2003, Clarkson et al. 2011). Thus, the intangible resources developed from new capabilities is expected to result in competitive advantage if the intangible resources is rare, valuable, cannot be imitated and also difficult to find alternative ((Buysse and Verbeke 2003). Russo and Fouts (1997) also emphasised that as a firm takes hold of proactive environmental practices, it is likely to redesign its production or service delivery process which may involve the acquisition and installation of technologies. Within the schema of resource-based view, it provides a solid foundation for the hypothesis that improved environmental performance is likely to enhance financial performance.

Butler et al. (2011) emphasised that sustainable environmental performance may increase product differentiation in the marketplace thereby enhancing organisational image to customers and result in increased profitability. It is also asserted that superior reputation can

be created through improved EMP as environmental practices beyond compliance strengthen a firm's fulfilment of stakeholder's expectation (Buysse and Verbeke 2003). This supports the earlier submission by Jones (1995) that when a firm's action results in improved environmental practices and becomes visible to the stakeholders, its reputation is enhanced and results in higher stock market performance. The RBV and the stakeholder theory is therefore considered as mutually reinforcing as proper integration of stakeholder expectation in relation to environmental practices can be considered as intangible asset that can drive financial performance (Trumpp and Guenther 2017).

With the advent of Porter "win-win" hypothesis developed in line with the above arguments, various empirical studies have confirmed that positive relationship exists between EMP and FP. Notably, Klassen and McLaughlin's (1996) work tested environmental and financial performance using event methodology and archival data at firm's level. The study used two types of announcements: positive event that confirm strong environmental performance and negative event that signalled weak environmental performance based on Nexis database newswire. The research identified 96 different publicly traded firms and 140 observations. They argued that if there is a change in stock price because of environmental event there is an indication that the market imputes a change in the net present value of the firm due to the event. The study measured significant positive returns for strong environmental performance, as represented by environmental awards and significant negative return was recorded for environmental crisis. Thus, in line with the stakeholder theory, the marketplace rewards firms that undertake environmentally proactive activities that reduce adverse environmental impacts. However, it is argued that assumptions used in event study methodology may not be valid in some circumstances, as due to stock market inefficiency, observed stock price is unlikely to reflect fully and immediately all available information (Sitthipongpanich 2011) and this is likely to affect the test results.

Hart and Ahuja (1996) used regression analysis to test the economic and strategic implication of environmental regulations and corporate greening to ascertain whether pollution reduction affects bottom line results or just add investment burden and costs. The study was drawn from S & P 500 list of corporations in the manufacturing and the mining industry. Toxic Release Inventory (TRI) from IRRC corporate environmental database was used as a proxy of environmental performance and return on sales, return on assets, and return on equity as dependent variables. The study revealed that the relationship between emission reduction and return on sales or return on assets initially increased within one to two years and began to fall. As indicated in the study, the biggest benefits accrue to the high polluting firms where

there is more opportunity to make low cost improvements. However, similarly to many studies on environmental and financial performance relationships, the study focussed on large listed firms

Russo and Fouts (1997) drew on the resource-based view of the firm in analysing the relationship between environmental and financial performance. A sample size of 243 firms was observed over two-year period using independently developed environmental ratings. Using growth as a mediating factor on the relationship between environmental and financial performance, Russo and Fouts (1997) argued that the level of an industry growth influences how return to risk affects profitability. Hence, firms that invest in pollution prevention, although adding to risk also have higher prospective return in high growth industry. However, the study was only based on a two-year data and thus, it is recommended that a study that is explicitly longitudinal is likely to be more beneficial.

Similar to Russo and Fouts and many other studies on EMP and FP, Christmann (2000) also used the resource-based to analyse the role of complementary assets in moderating the relationship between proactive environmental management performance and firm's performance. The results of the study revealed that competences for process innovation and implementation are complementary assets that moderate the relationship between best practices and cost advantage, which is an important factor in determining performance. The finding of the study was supported by Russo and Fouts (1997) who grounded their arguments on the resource-based view of the firm. However, unlike Russo and Fouts (1997) which was conducted in different industries, this study only focussed on 88 chemical industries in the US.

Unlike many studies on EMP and FP relationships which used independent environmental rating as a proxy of environmental performance, Carter et al. (2000) employed survey instrument to test the relationship between environmental purchasing and firm performance. Carter et al. (2000) focussed on environmental purchasing due to its growing prominence. As stated by Trent and Monczka, (1998) purchasing managers identified environmental regulations on purchasing as second most important future concern. The study, which was modelled on stakeholder theory, revealed that environmental purchasing is positively associated with firm performance. They argued that purchasing managers could liaise with important stakeholders like upstream supply chain partners to commit to waste reduction goals that can significantly impact on cost.

In the case of the study by Karagozoglu and Lindell (2000), the relationship between environmental and financial performance was applied to high technology and traditional manufacturing sectors. The rational of the study was to examine the key relationships at the core of the "win-win" hypothesis involving regulatory factors, environmental strategy, and environmental innovativeness. Although the impact of government regulations on environmental innovativeness has been noted by many studies (Porter and Linde 1995, Shrivastava 1995), Karagozoglu and Lindell (2000), however emphasised that regulation themselves do not result in environmental innovativeness but other factors, particularly, environmental strategy reinforces the effect of regulations on innovativeness which also impact on competitive advantage. Although the conclusions from the study validated the positive competitive and financial impact of proactive environmental strategies, they argued that this is contingent upon the existence of favourable internal and external conditions. In line with the resource-based view, the study recognised that environmental issues are complex and therefore requires state-of-the-art management technique and organisational skills to get on the learning curve required to establish the required competitive edge. The study, however, failed to analyse the impact of firm size and industry differences on proactive environmental practices and financial performance.

Dowell et al. (2000) study, however, concentrated on how environmental performance affect the market value of the firm and establishes if the firm value is linked to Multinational Corporations (MNCs) corporate environmental policy. Multinational corporations involve in only manufacturing and mining which operate in countries with per-capita income of GDP below $8000 was selected for the study. Dowel et al. (2000) argument for selecting the companies involved was based on the premise that affluent societies of the developed world account for more than 75% of the world's energy and resource use, and create most of the industrial, toxic and consumer waste. As reiterated by Daly (1994), dirty operations are, however, shifted to countries where there is lax in regulatory standards. Based on the MNCs selected from S & P 500 in the US, the study indicated that firms adopting a single stringent global environmental standard have much higher market values than firms defaulting to less stringent or poorly enforced host country standards. Arguing from stakeholder view, they indicated that if better environmental practices are embedded into latest technology due to stakeholder pressure, it is likely to impact on profitability. The study was limited to only a few environmental variables and shorter time series.

(King and Lenox 2001) used both accounting and market-based measures to test the relationship between environmental and financial performance. The study used emissions as

environmental performance variable and relying on a sample size of 652 manufacturing firms in the United States, it found a positive association between pollution and higher financial valuation. However, King Lennox argued that firm fixed characteristics and strategic position might have moderated the association between environmental and financial performance and therefore it is more appropriate to ask the question "When does it pay to be green?" rather than the question "Does it pays to be green?"

Konar and Cohen (2001) identified that more than $120 billion was used by US firms in 1994 to comply with environmental laws in addition to several billions on research and development. The work of Konar and Cohen (2001) examined the extent to which environmental reputation is valued at the marketplace by dividing firm value into tangible and intangible. The findings of the study revealed that there is a significant positive relationship between environmental performance and intangible asset value of public traded firms whereas bad environmental performance negatively correlated with intangible asset value of the firm. Thus, in line with the stakeholder theory, the results suggested that large companies that invest in environmental reputational capital are rewarded by the marketplace. This study was however limited to only large listed companies.

Unlike many studies on EMP and FP relationships that have focussed on large listed companies, Melnyk et al. (2003) concentrated on SMEs and used ISO 14001 certification as environmental performance measure and survey questionnaire as data collection methodology. It was discovered that firms that have formal EMS certification experience achieved a greater impact in many dimensions of operational performance. Melynk at al. (2003) reiterated that developing a formal EMS provides indications that the firm has access to sufficient level of resources and this has been confirmed by many studies (Russo and Fouts 1997, Christmann 2000) that firm resources moderate the positive relationship between environmental and financial performance. However, it has been argued that using only ISO 14001 as environmental performance variable may not capture all components of environmental performance

Lending support to the positive correlation between environmental and financial performance is Sroufe's (2003)study which took place in the United States and happened around the same time with his co-research work with Melynk and Calatone. Both studies used the same survey instrument. Srouf (2003) maintained that unique resources help to integrate environmentally oriented interactions with other levels and systems from both internal and factors that are external to the firm. Like Melnyk et al. (2003), with both studies

obtaining data from the same three professional associations, Sroufe's (2003) study also revealed positive relationship between EMS, environmental practices and operational performance measures.

Similar, to Melynk et al. (2003) and Sroufe (2003), Clemens' (2006) study also concentrated on SMEs environmental and financial performance relationships. Clemens selected smaller companies due their economic significance which according to Hillary and Burr (2011), SMEs account for more than 99% of all enterprises and by their sheer number, exert pressure on the environment. Clemens (2006) used survey instrument as a data collection method to test the relationship between green practices and environmental performance and showed a positive correlation between two. The study, which also looked at the effects of green incentives on the relationship between environmental and financial performance, also established that there is significant positive relationship between green economic incentives and financial performance. The conclusions drawn from the studies confirm the results of other studies which employed the RBV (Russo and Fouts 1997, Christmann 2000) that resources are relevant for positive relationship between EMP and FP. However, like many other studies, it focussed on only one industry, the scrap yard industry in the US.

Montabon et al. (2007) research used content analysis and regression analysis to test the win-win hypothesis of Porter (1991). Montabon et al. (2007) used content analysis to identify environmental performance metrics and accounting-base measures of return on investment and sales growth as dependent variables. Arguing from RBV and stakeholder theory, they averred that in anticipation of more efficient utilisation of resources and improved corporate image, firms become more environmentally proactive. The findings of the study indicated a significant positive correlation between environmental management performance and financial performance. The study, therefore, supports the win-win hypothesis of Porter and Linde (1995) that pollution is a sign of inefficiency and therefore better environmental performance is beneficial for firms. The study although very comprehensive, as it used data across different countries, it was based on cross-sectional analysis. However, as with all cross-sectional analysis, ascertaining the time lag between EMP and FP is difficult to determine.

Makrinou et al. (2008) analysed how SMEs could improve their competitiveness and their position in the market by adopting prevailing environmental practices through the utilisation of information technology accessed through the internet. The study found that environmental performance improvement combined with large cost savings could increase the

competitiveness of SMEs. They reiterated that smaller and medium-sized enterprises could gain competitive edge in both regional and global markets if they employed proactive environmental practices. The study, therefore, aligns to the stakeholder view that firms can use improve environmental practices to establish legitimacy with the stakeholders and improve their competitive edge. The study was, however, limited to the application of two environmental variables: water and energy. This has been criticised for causing most of the inconsistencies in the existing studies on EMP and FP relationships.

One of the few studies that focussed on UK SMEs was undertaken by Aiyub et al. (2009). The study used survey questionnaire that centred on issues relating to pre-implementation, environmental performance after implementation, and suitability of ISO 14001 implementations, and had 59 valid responses. The study revealed that SMEs that have ISO 14001 certification benefited in many areas including financial savings in the use of energy, reduction in water consumption, waste reduction as well as compliance to legislation. However, in relation to differences between environmental and financial performance of small and medium-scaled enterprises, Aiyub et al. (2009) indicated that the smaller the organisation the lesser the financial savings. The study also showed that the amount of money saved by SMEs could not be compared to larger organisations due to difference in size, quality and quantity of employees, resource availability, and working capital. Thus, in line with the RBV, the study identified that resources influence the EMP and FP relationships. This was however limited to only 59 firms and therefore difficult to generalise the findings due to the sample size.

Similarly, Lopez-Gamero et al. (2009) study also concentred on SMEs. However, unlike Aiyub et al. (2009) which was based on UK SMEs, this study employed Spanish SMEs. The study grouped sampled firms under high polluting and less polluting firms. The main idea of the study was to analyse whether the resource-based view mediates the positive relationship of proactive environmental management and improved environmental performance with consequence for competitive advantage and financial performance. The service industry, specifically, the hotel industry was selected as less polluting firms based on the ideas of Henriques and Sadorsky (1996). The conclusion drawn from the study was that resources are relevant to competitive advantage and financial performance but whilst cost-based competitive advantage influences financial performance of high polluting firms, the influences on the service sector relates to differentiation competitive advantage. The study however employed perception-based approach, which is considered as lacking objectivity.

Most of the studies on the relationship between environmental and financial performance have used perception-based studies (e.g. Lopez-Gamero). Molina-Azorin et al (2009), like Lopez-Gamero et al (2009), also employed perception-based study and concentrated on the Spanish hotel industry. The results showed that stronger commitment to environmental practices results in higher performance levels and the regression analysis proved that environmental practices impact greatly on several performance variables. The results from their study confirmed their arguments that proactive environmental practices can allow cost savings in relation to the use of resources such as energy and water. It also supported their assertions from the stakeholder point of view that implementation of environmental practices permits differentiation in the hotel industry as reduction in pollution level is likely to increase the demand from environmental sensitive tourists. Similarly, to Lopez-Gamero et al. this study also employed perception-based study which is criticised for lacking objectivity.

Moneva and Ortas (2010) applied multivariate approach to establish the link between environmental and financial performance arguing from stakeholder's view. Moneva and Ortas (2010) explained that profits maximisation is not the absolute goal or purpose of corporations but rather, it is an outcome of a well-managed company which stakeholder theory emphasises. The results of the study indicated that companies with better level of corporate environmental performance improved their internal efficiency and corporate financial performance in the next periods. The results also revealed that apart from the significance relationship between environmental and financial performance, the link between the two is also persistent and not based on short-term issues. The study is, however, limited by the lack of long series of environmental performance data of the organisations which affect broader analysis such as the time effect of EMP on FP.

Busch and Hoffman (2011) used outcome-based and processed-based approach in determining the relationship between environmental and financial performance. Outcome-based approach typically involves exploiting ecological efficiencies to achieve operational cost savings. In the view of Porter and van der Linde (1995), significant cost savings could be obtained through a more efficient use of raw materials, addressing life-cycle cost as well as reduction of waste. Using a carbon emission as an outcome-based measurement, Busch and Hoffman's study indicated positive relationship between environmental and financial performance. In line with the stakeholder theory, they argued that stakeholders that participate in the capital market consider superior environmental performance as a virtue and emphasised that in investor preference model, demand for investment in carbon premium

firms is greater than the offering and consequently impact on the market value. However, similar to many studies, the study was only limited to only large listed companies.

Hoejmose et al. (2012) work explored the environmental management practices among UK SMEs using perception-based study. They stated that small businesses tend to exhibit reactive approach to environmental management practices compared to their larger counterparts. This stems from the fact that apart from SMEs lacking the resources and skills to pursue proactive environmental practices, they also find it difficult to justify the investment in environmental management practices from economic point of view. The findings of the study indicated that although both small and medium enterprises' main driver for environmental management practices is strategic intent, medium-sized firms appear to perceive greater payoffs to environmental management practices than that arise from financial benefits and increased market share than smaller firms thereby complementing the findings of Aiyub et al (2009). However, like similar SMEs study on EMP and FP relationship in the UK, the study adopted perception-based study that has been criticise for lacking objectivity.

Hayward et al. (2013) study referred to as "CEO study on sustainability" which also employed perception-based study is considered as the world's largest CEO study to date, involving more than 1000 top executives from 27 industries across 103 countries. One of the key objectives of the study was to assess how leading companies are adopting innovative strategies to combine impact and value creation. The findings indicated that 93% of CEOs regard sustainability as key to success, 80% viewed sustainability to competitive advantage, and 81% also believe that sustainability reputation of their company is important in consumer's purchasing decision. Thus, in line with stakeholder theory, the study confirmed that sustainable environmental practice enhances competitive position of the firm and consequently impact on financial performance.

Woo et al. (2014) also based their study on the viewpoint of the RBV and outlined the effect of complimentary assets in moderating the relationship between environmental and firm's performance. Woo et al. (2014) explained that different environmental practices required different complementary assets and therefore used business group affiliations and listing status as complementary assets for Korean SMEs. The study, apart from confirming significant positive relationship between environmental innovation and productivity also concluded that SMEs could take advantage of business group affiliations and listing status to increase their environmental and financial performance relationships. They explained that

SMEs within the affiliated network could take advantage of sharing resources and external investment to implement environmental innovation with consequence on labour productivity to improve financial performance. The study was however only restricted to Korean Innovation Survey (KIS) 2010 data which mainly concentrated on only environmental innovation as environmental performance variable.

Mensah (2014) also used ISO 14001 as one of the main indicators of environmental performance to assess 200 small and medium-sized hotels in Ghana. The result of the study which pointed to the same direction as most of the earlier work on SMEs environmental performance indicated that medium-sized hotels that are normally 3-4-star hotels perform better in almost all the areas identified including compliance, conservation, ISO 14001 as well as air pollution than small-sized hotels. The findings from the study reinforce the arguments from the resource-based view that larger companies are more likely to undertake proactive environmental practices than smaller companies are because they have more access to resources. Although the study was conducted in developing economy with lax environmental practices, as argued by Zhu et al. (2008), the influence of globalisation, foreign affiliation and the use of ISO 14001 makes the study comparable to similar studies worldwide.

In support of the resource-based view, argument is Leonidou et al. (2016) which reiterated the mediating effect of existing resources on the relationship between environmental and financial performance. The study emphasised the instrumental role of environmental regulations and environmental public concern in harnessing environmental practices within small firms. Leonidou et al. (2016), apart from showing positive relationship between environmental and financial performance of SMEs, also emphasised that the link between the two becomes stronger when the firm possess adequate resources and capabilities and this confirms the results of some earlier studies that dwelt on the NRBV (Russo and Fouts 1997, Christmann 2000, López-Gamero et al. 2009). However, the study was only limited to manufacturing SMEs.

A very recent study by Trumpp and Guenther (2017) also used the theoretical framework "too-little of a good thing (TLGT)" to test the relationship between environmental and financial performance relationships based on a panel study of 2361 firms from 2008 to 2012. The study digressed from most of the existing studies which mostly used linear regression by employing non-linear relationship to model the relationship between environmental and financial performance. The argument for using the non-linear analysis is on the basis that

environmental and financial performance relationships may be positive, negative, or neutral, depending on the explanatory variable, the environmental performance. Whereas the study confirms U-shaped relationships between environmental and financial performance for companies in both the manufacturing and service industries based on accounting-based measures, the U-relationship between carbon performance and stock market performance was only significant in the manufacturing industries. Thus, the U-shaped relationship confirmed positive relationships for companies with high environmental performance. Linking the results to theoretical arguments, they reiterated that companies with superior EMP could be termed TLGT which incorporates RBV and instrumental stakeholder theory within the environmental and financial performance relationship context. Like many studies on EMP and FP relationships, this study only focused on large companies.

4.2.2 Studies that Supports Negative Relationships

Although many theoretical arguments and empirical findings have supported the view that proactive environmental management practices may result in "win-win" situation by reducing environmental pollution and at the same time improve financial performance, others have expressed contrary view. Building on Friedman's (1970) trade off hypothesis, they argue that when a firm pursues proactive environmental practices, it impacts negatively on financial performance because the financial benefits that are generated are lower than the costs (Preston and O'Bannon 1997). Similarly, Jones (1995) argued from instrumental stakeholder view that stakeholder expectation, on one hand, can generate improved company's reputation through better stakeholder responsiveness and improve financial performance (Trumpp and Guenther, 2017). However, they emphasised that enhanced environmental performance for the satisfaction of stakeholders can generate extra costs as it is not likely to economically internalise all benefits from sustainable environmental practices. Arguing from the point of view of how proactive environmental practices may negatively affect performance, Gilley et al. (2000) indicated that the negative link between environmental and financial performance suggests lack of understanding on the part of the investors on the potential social consequences and may affect their reactions towards the environmental decision of the firm. The result of their study also suggests that investors may be interested in product driven environmental initiatives which directly impact on cost and profitability rather than embracing themselves with process driven initiatives that could be achieved through the spill over effect from the product driven initiatives. Proactive environmental measures may also take time for the benefits to be realised thereby increasing uncertainty about outcomes on the part of the investors (Khanna and Damon 1999, Aiyub et al. 2009). Furthermore, Hart and Milstein (1999) emphasised that the resulting impact of

sustainable environmental practices on financial performance pertains in many cases to long-term competitiveness.

In line with these arguments, results from many empirical findings have supported this view. Freedman and Jaggi (1992) study examined the linkage between pollution, economic and market performance based on paper and pulp industry in the US. Freedman and Jaggi (1992) documented that the nature of association between pollution performance and economic performance depend mostly on the nature of the impact of pollution performance as well as the nature of investors' interest in the firm. The likelihood is that investors with short interest in the firm will exhibit negative reaction due to negative economic impact in the short-term. Contrary, investors that have long-term interest in the firm and believe the long-term economic impact to be positive may result in positive association between pollution and the performance of the market. This line of argument has been confirmed by some other studies including Horváthová (2012) which concluded that the effect of environmental performance on financial performance is negative in the short-term but the relationship is positive in the long-term. Systematic risk and price earnings ratios which indicate a risk to a particular firm and investors' reaction on profitability were used as market-based measures of financial performance. The result of the study revealed that there is negative association between pollution performance and economic performance as the market ignores the expected better performance, in the end, resulting from the effects of pollution reduction activities. However, pollution performance used in the study was only restricted to water pollution and air pollution but other pollutions such as energy and waste which constitute a very important component of pollution were not considered and therefore the results need to be interpreted with caution.

Cordeiro and Sarkis (1997) used a security analyst's earnings forecasts and criticised both the market-based and accounting-based as measures of financial performance. They argued that whilst financial accounting measures are retrospective as they are based on past performance, stock market measures are also influenced by market or economy-wide measures such as recession, and energy price hikes which are beyond the control of managers, hence the use of earnings forecasts. The study was based on a sample size of 523 companies in the US. It used Toxic Release Inventory data as a measure of environmental performance. Cordiero and Sarkis (1997) concluded that there was a significant negative relationship between environmental proactivism and industry analyst's earnings per share performance forecasts. The results of the study support their hypothesis that analysts and investors do not appear to support corporate sales and stock market valuation adequately to

surpass environmental proactivism in the short-term. However, their study has some shortcomings as the firm financial performance forecasts used was a mere summary of a measure of performance and were limited to a brief period.

Khanna and Damon (1999) research which was conducted in the United States used regression analysis and panel data to test the relationship between environmental and financial performance from 1988 to 1993 based on a sample of 123 companies that participated in the US Environmental agency programme intended to reduce high priority toxic chemical by 50%. The study used financial accounting measure return on investment as a short-term measure of financial performance and market-based measure as long-term measure of financial performance. The result showed a negative relationship between environmental and financial performance based on short-term measure of financial performance return on investment. The market-based measurement as a long-term measure of financial performance, however, revealed positive correlation between environmental and financial performance. Thus, the result of the research which was in line with the neoclassical arguments indicated that cost of pollution appears not to fully offset by gains in inputs efficiency and improvement in consumer goodwill. The study, however, only focussed on large listed companies operating in the chemical industry.

Wagner's (2005) study was undertaken in four European countries namely United Kingdom, Italy, Germany, and Netherlands in the pulp and paper industry. Two corporate environmental strategies involving end of pipe strategies (emission-based index), and integral pollution prevention strategies (input-based index) were used for environmental performance. The result of the study shows that for emission-based index, there is a predominantly negative relationship between environmental and economic performance but for input-based index, the relationship is positive. This study, therefore, provides strong indications that the choice of strategy towards environmental proactive activities is a strong determinant of the relationship between environmental and financial performance.

Hassel et al. (2005) study relates to how environmental information is reflected in the market value of Swedish listed companies. It used a sample of 71 companies listed on the Stockholsmborsen. Based on quarterly analysis equivalent to 407 observations, it was found that environmental performance has negative influence on the market value of firms. Thus, using two schools of thoughts, cost concerned school of thought argues that environmental investment only increase cost resulting in decrease earnings and lower market value and therefore the relationship between environmental performance and a market value of a firm

is expected to be negative (Jaggi and Freedman, 1992). On the contrary, the other school of thought, the value creation school of thought regards environmental efforts as a way to increase competitive advantage and improve financial returns to investors and therefore the relationship between environmental and financial performance is expected to be positive (Dowell et al. 2000, Konar and Cohen 2001). The study by Hassel et al. (2005) therefore is in line with ideas of the cost-based school of thought and therefore sees investment in environmental efforts as only costs with no positive effect on the market value of the firm. The study, however, focussed on only large listed firms.

Busch and Hoffmann (2011) study which concluded positive relationship between environmental and financial performance using the outcome-based, also indicated negative correlation when the processes-based approach was used. Busch and Hoffman (2011) explained that the process-based approach is a managerial effort to increase corporate environmental performance by focussing on the company's internal efforts without incorporating outcome-based environmental performance. This approach has also been used by scholars such as Klassen and McLauglin (1996). The study revealed negative relationship between environmental and financial performance. This finding supports the arguments of neoclassical economists such as Friedman (1970) which opined that there are no financial benefits for superior environmental performance efforts and instead every environmental activity causes additional costs when starting to manage issue.

Horváthová (2012) argued that the previous meta-analysis and other primary studies ignored the possibility that the effect of environmental performance on financial performance is time-varying. The study was built on the work of Porter and Linde (1995) that better environmental performance may be beneficial since pollution is a sign of inefficiency. However, she argued Porter's idea might only be varied for long-term, as it is likely to take time for firms to restructure and take into consideration new environmental regulations. The study, therefore, considers the time dimension in analysing corporate environmental and financial performance relationships. Focussing on the post transition from Communist state to EU membership from 2004 to 2008 of Czech firms, the study was intended to establish the validity of Porter and Linde (1995) hypothesis. Porter and Linde (1995) proposed that regulations could lead to win-win situation in which social benefits, as well as private gains, can increase as regulations may require that firms invest in new environmentally friendly and efficient equipment. Using environmental certification as environmental performance variable and accounting bases measures ROA, ROE, and Sales as financial performance indicators, the result of the study showed that whilst the effect of environmental performance

on financial performance is negative in the short-term, the relationship is positive in the long-term. The results of the study support Porter's proposal but only in the long-run, as it takes more than one accounting period to benefit from decreasing pollution practices.

Muhammad et al. (2015), similar to the study of Khanna and Damon (1999), also employed both accounting-based measures and market-based measures for financial performance. Return on Assets was used for accounting-based and Tobin's Q was employed for market-based financial performance with Australian Pollutant Release Transfer Register (PRTR) as a proxy of environmental performance similar to that of Horváthová (2012) and Cohen et al. (1997) which used Czech PRTR and United States PRTR respectively as proxies for environmental performances. The study related environmental and financial performance to growth by looking at pre-financial crisis and during the financial crisis. Muhammed et al. (2014) study complements the different views that have been expressed on green investment and financial performance during financial crisis. Whereas Cheney and Mcmillan (1990) argued that during economic contraction, firms become more conservative, defensive and unwilling to invest in sustainable projects. Reyes-Rodríguez et al. (2014) believed that environmental scores did not deteriorate during the financial crisis but rather improved. Muhammed et al. (2015) study, however, showed negative association between environmental and financial performance during the financial crisis and positive association between the two in the pre-financial crisis. The study, therefore, supports the view expressed by Cheney and McMillan (1990) and contradicts that of Rodriguez et al. (2014).

4.2.3 Studies that Support No Relationships

Whereas most studies on EMP and FP relationships have indicated positive correlation between environmental and financial performance or negative correlation, other studies have indicated that there is no correlation between the two. Some proponents of no correlation, including Gilley et al. (2000), explained that environmental initiatives are expected to impact on cash flow. However, similar to any present value computations, while changes in expected cash flow that occur early from environmental initiatives are likely to have larger impact on the stock price, changes in cash flow that occur later might not have any significant impact. It has also been argued that the impact of greening initiatives on financial performance will depend on the motivation for introducing the green initiatives. Again, Gilley et al. (2000) explained that whilst environmental product driven initiatives are designed specifically to generate revenue through reputation enhancement, changes in the underlying process of the organisation, for instance, to comply with regulation may not necessary improve revenue. Therefore, whereas product driven initiatives may be directed

to stimulate sales through enhanced environmental reputation, environmental process driven initiatives may not necessary impact on financial performance. The latter argument has also been complemented by Filbeck and Gorman (2004) that for some companies, it is possible that compliance to environmental regulations may bring no added value.

Results from some empirical studies have complemented the view that proactive environmental practices may not impact on financial performance. Fogler and Nutt (1975), one of the earlier studies on environmental and financial performance relationship which identified no relationship between environmental and financial performance, focussed on environmentally conscious investors and assessed whether firms with higher pollution ratings would have higher price earnings ratio. The study which focussed on United States was based on sample of 9 large listed companies in the pulp and paper industry using pollution ratings and price earnings ratios as environmental and financial performance respectively. They also tested whether the publicity of the firm pollutions performance results affected the market by observing stock prices 9 days before and after the release of the results. The study did not find any evidence to support that there is a significant relationship between polluting ratings and financial performance nor identified any impact on pollution rating results on the market. However, the study result needs to be interpreted with caution as it was based on only 9 listed firms in one industry.

Gilley et al. (2000) research also dwelled on how environmental initiatives influences investors perception of organisational performance using event study methodology. The study grouped environmental initiatives under those designs to improve organisational process and those designs to improve firm products based on a sample size of 71 from 16 industries with 39 under process driven, and 32 products driven. Although the study did not identify any direct effect of greening on perceived performance in line with their arguments from the stakeholder theory, the findings revealed that investors react significantly more positively to announcements of product driven initiatives. The study however adopted event study methodology which was limited to specific period, and therefore research which extends the period of the study is recommended.

Filbeck and Gorman (2004) study was based on single industry, the utility company in the US and used regulations, that IRRC compliance index as a measure of environmental performance. Filbeck and Gorman (2004) study did not find any positive relationship between environmental and financial performance. They explained that the possible reason to this might be attributed to the fact that environmental performance that existed in late

1980s and 1990s might have been captured in today prices and therefore not beneficial for new investors to attempt to capitalise on this opportunity. This study, however, employed IRRC compliance index as environmental performance variable but it has been argued that using IRRC compliance index does not show environmental performance beyond compliance and therefore needs to be interpreted with caution.

Revell and Blackburn (2004) (Blackburn 2004)argued for a business case for UK SMEs in improving their environmental performance by dwelling on the win-win hypothesis. Based on a sample size of 52 SMEs in the construction and restaurant sectors in the UK, the study indicated that no business case improved their environmental performance. The finding of the study also complement the findings of earlier studies including Baylis et al. (1998) and Rutherfoord, et al. (2000) where SMEs did not see any financial benefits in improving their environmental performance.

Also supporting the empirical studies that there is no correlation between environmental and financial performance is Darnall and Ytherthus (2005). The study evaluated the possible link between environmental and financial performance by relying on survey data from Canada, Japan, Hungary, Norway, Germany, and the United States. The sector analysis with respect to high and low polluting firms did not show any difference in the link between environmental performance and profit but it indicated that low growth sectors that achieve positive correlation had more often reduce the use of their natural resources and global pollutants in the same sector than facilities that did not. The results of the study, however, contradict the findings of Russo and Fouts (1997) that environmental and financial performance relationship is moderated by high industry growth. The study, however, was only limited to large utility companies and therefore the results might not be representative to other sectors outside the utility companies.

Arguing from McGuire et al. (1988) point of view, Earnhart and Lizal (2007) reiterated that lower pollution levels may reduce financing costs as lenders and investors associate lower risk with high environmental management practices. Based on the income statement and balance sheet for the years 1996-1998 on companies listed on the Prague Stock Exchange, Earnhart and Lizal (2007) study found that pollution control neither improves nor undermines financial success. The findings from the study, similar to the findings of Filbeck and Gorman (2004), reject their initial hypothesis that pollution prevention improved production process that result in lower costs and consequently impact on profit. However, the study which was conducted in Czech Republic immediately after transition from the

socialist economy would require confirmatory studies to determine if the relationships between environmental and financial performance is likely to change as the Czech economy matures from the transition.

In support of Lizal and Earhart (2007) is Naila's (2013) study which took place in Tanzania, a developing economy in East Africa. In determining the effect of financial regulations on manufacturing companies in Tanzania, Naila (2013) study found that environmental compliance has no significant effect on financial performance. The findings support the ideas advanced by McWilliams and Siegel, (2000)) that the relationship between environmental and financial performance is expected to be neutral. This line of thinking has also been supported by Murray et al. (2006) that environmental performance and share returns have no direct relationship. Naila (2013) study was however based on only five manufacturing industries.

Adding to the no relationship argument based on market-based measures is Qiu et al. (2016). Whereas Hart and Ahuja (1996) argued that environmental disclosures can confer competitive advantage such as strong reputation to firm, Qui et. (2016) study which was based in the UK covering FTSE350 index from 2005-2009 showed that environmental disclosures have no effect on financial performance but rather it is social disclosures which matter most to investors. In line with the resource-based view, they argued that firms with greater economic resources make more extensive disclosure that yields positive economic benefits. The study, however only concentrated on large companies listed in the main markets in the UK.

Aside the fact that the above empirical review demonstrates lack of consensus among existing studies between environmental and financial performance, it also revealed that existing studies are mainly focussed on large listed firms and therefore additional studies that focus on SMEs' environmental and financial performance relationships is in the right direction.

4.3 The Impact of Cash Resources on EMP and FP Relationships

It has been debated that increase in cash reserve affects a firm's ability to pursue profitable investments. Fazzari et al. (1988) for instance documented positive correlation between internally generated cash flow and investment. However, there have been different views on how increase in cash affects financial constraint and unconstraint firm's sensitivities to investment. Fazzari et al. (1988) found that firms that have difficulties accessing external market are likely to have stronger relationship between cash holding and projects with

positive outcome. They averred that the difference between internally and externally generated funds resulted in the strong relationship between cash holding and investment and that capital market friction may cause some firms to forgo projects with positive outcome.

Almeida et al. (2004) found small firms, non-dividend payers, and those firms with poor credit rating usually accumulate more cash balances out cash flow. Denis and Sibilkov (2010) explained that greater cash holdings are positively correlated with investment with constrained firms which require higher hedging needs and that the association between investment and value is stronger for constrained firms than unconstrained firms. They reiterated that cash holdings allow firms to undertake value increasing project which otherwise might be overlooked. This implies that whereas constrained firms might invest in sustainable environmental projects which might not be related to their core activities and reap the associated financial benefits, these might be overlooked by unconstrained firms. This line of argument has been supported by Reyes-Rodríguez et al. (2014) which identified that despite cash flow constraint faced by SMEs, the 14 years' longitudinal study found that the motivation for SMEs to engage in sustainable environmental initiative stems from the expected competitive advantage and financial performance. Thus, whilst larger companies, which are usually not constrained by cash may ignore investments in proactive environmental practices due to their insensitivity to investment, these are exploited by SMEs to obtain the associated financial benefits.

However, many other studies have argued otherwise. Kaplan and Zingales (1997) documented that there is no monotonic relationship between the degree of external market responsiveness and cash flow. The study found that unconstrained firms have the largest sensitivity to cash flow than constrained and partially constrained firms. Their finding has been supported by other studies including Cleary (1999). Cleary (1999) identified a reverse relationship between investment cash flow sensitivities and constraints firms, thus whereas most constraints firms have the lowest sensitivities to investment cash flow, unconstraint firms are highly sensitive to investment cash flow. The above argument has also been emphasised by Aiyub et al. (2009) that environmental management practices including implementation of ISO 14001 are difficult for SMEs to implement due to cash flow and other constraints. They asserted that SMEs face pressure on financial resources and as results tend to concentrate on projects with short payback periods. Proactive environmental practices such as ISO 14001 which involve long-term investment tend to create a higher risk for SMEs if they are not offered incentives in the short-term. SMEs that are mostly financially constrained may therefore not be sensitive to sustainable environmental investment.

However, AIM listed firms comprise both old and new firms which may be constrained or unconstrained by financial resources, therefore assessing how EMP and FP relationships affect constrained and unconstrained firms is important.

4.4 The Impact of Growth on EMP and FP Relationships

Many studies on the relationship between environmental and financial performance have suggested many moderating factors that act between environmental and financial performance. Horváthová (2012) for instance, argued time-varying as a mediating factor, and many others have argued resources as a moderating factor on the relationship between environmental and financial. This study, however, intends to find out if firm growth, whether organic or inorganic influences environmental and financial performance relationships. Hofer (1975) for instance explained that low growth industries are likely to consist of mature firms with hierarchical, inflexible and bureaucratic organisational structure and therefore less likely to accommodate efficient proactive environmental management practices. Notably, this argument has been supported by the empirical findings of Russo and Fouts (1997). Russo and Fouts (1997) explained that firms are more likely to benefit from increased environmental performance when they are in high growth industries rather than low growth industries. Sourcing their argument from the theoretical underpinnings of discounted cash flow techniques, they argued that the level of industry growth moderates the expected probabilities of return as the expected payoff of any investment risk is higher in high growth industries. The study which was based on a sample size of 243 firms indicated that the connection between environmental and financial performance strengthens in high growth industries.

In a similar vein, Darnall and Ytherthus (2005) hypothesised whether companies in high growth industries may derive positive impacts from proactive environmental actions. Their idea was grounded on the premise that high growth industries have more organic rather than bureaucratic management style and therefore more likely to capture additional financial benefits by pursuing environmental measures beyond compliance because of their innovative culture. It is also argued that firms with high growth abilities tend to undertake more proactive environmental performance measures in order to meet the needs of the stakeholders and to obtain legitimacy from the public. However, in contrast to Russo and Fouts (1997), this study only recorded modest differences and indicated that the companies that achieved positive results reduced the use of their natural resources and global pollutants more than companies in the same sector that did not record positive results from environmental practices did.

In support of Darnall and Ytherthus (2005) findings is the study by Elsayed and Paton (2009) which was grounded on panel data from UK companies. The study found that financial performance has no significant impact on environmental policy for those firms in the growth stage. In conformity with Preston and O' Bannon (1997), Elsayed and Paton (2009) argued that the existence of business opportunities at the growth stage means that managers tend to be less motivated to use limited resources on environmental investment instead of their own returns.

Also, contradicting the results of Russo and Fouts (1997) Cainelli et al. (2015). The study which investigated more than 60,000 Italian manufacturing firms, rejected its initial hypothesis that firm growth can be achieved alongside emission intensity decreases as the result of the study revealed that higher levels of emission intensity appear to deliver relative turnover growth. In the case of Co2 where there is no policy, heavy emitters grew more and low emitters did not benefit from better economic performance resulting from the higher environmental performance.

Given that most SMEs lack financial resources to pursue acquisition and mergers, they are expected to grow organically than large companies which normally have the financial resources to pursue acquisition and mergers. Large and mature companies that grow inorganically are very bureaucratic and inflexible and therefore unlikely to pursue innovative environmental practices as argued by Hofer (1975). It is therefore expected that the growth structure of the firm will influence the relationship between the environmental and financial performance of companies listed on AIM which consist of both growing and mature firms.

4.5 The Control Variables

Variables that are held constant to evaluate the relationship between the other variables is termed as control variables. A control variable could be the influencing factor when assessing the relationship between environmental and financial performance. One critical difficulty here is selecting the appropriate control variables. The control variables are grouped under governance and firm specific characteristics.

4.5.1 Governance Characteristics and Financial Performance

Corporate governance is well documented to have relationship with almost every aspect of a firm's strategic decision and as such turn to influence the financial performance of business entities. Research has found that good corporate governance result in effective and efficient environmental management (Amore and Bennedsen 2016). Firm performance is how value created by corporate governance can be measured. There is a relationship between corporate

governance and environmental management hence corporate governance characteristics that influence financial performance may moderate the association between environmental and financial performance if not controlled. The existing literature on corporate governance has identified factors including board size, Number of Non-Executive Directors (NEDS) and Remuneration of Directors as influencing firm financial performance.

4.5.1.1 Board Size

The size of corporate board which is basically denominated by the number of persons on it is well noted to influence financial performance of a firm. The main function of the board is to mitigate the agency cost by aligning the interest of the agent (manager) to that of the principal (Shareholders) (Fama and Jensen 1983, Vintila and Gherghina 2012) . The board is supposed to achieve this objective through efficient monitoring, provision of expert advice and supporting management in the efficient performance of their duty (Dalton et al. 1999). There is a debate on the appropriate size of a board and its impact on a firm's financial performance. There seem to be no consensus among researchers as to whether small or larger board size is better at influencing the financial performance (Lipton and Lorsch 1992, Alhaji et al. 2012)

Some studies have found positive relationship between board size and financial performance. Examining boards of 69 banks from five developed countries, Andres and Vallelado (2008) found an inverted U-shape relationship between board size and financial performance. They argued that larger boards are efficient at the advisory, monitoring and improved governance roles, as well as raise returns. They put the upper limit of directors at 19 beyond which control, coordination and decision-making becomes difficult causing the cost to outweigh the expected benefit. Also, Mangena et al. (2012) based on sample from Zimbabwean Stock Exchange, found a positive correlation between large board size and performance.

On the other hand, there are those who have found negative impact of board size on firm financial performance. Large board size, it is argued, result in coordination and communication challenges (Eisenberg et al. 1998). It also increases cost in terms of members' remuneration, coordination and communication. These challenges may result in the ineffectiveness of the board which may impact negatively on the firm's performance since the board becomes symbol rather than a functional entity (Hermalin and Weisbach 1988). Guest (2009) undertook empirical study of UK listed firms from 1981 to 2002 and the result show that large board size is negatively related to profitability.

4.5.1.2 Number of Non-Executive Directors

Corporate boards are seen mostly as being independent usually in terms of numbers of outside directors represented on the board. These outside directors' thinking is supposed to align more with thoughts of shareholders since they are non-executive directors and hence minimize the agency cost further. Hardwick et al. (2011) investigating the effect of corporate board on insurance firms' profit efficiency noted a positive impact of independent non-executive directors on the profit of the firms. The inclusion of the independent outside director's acts to balance the scale of decision making at the boardroom to prevent management's opportunistic behaviour which may relate to psychological or economic needs. According to Abidin et al. (2009), outside directors assist objective evaluation of management and also help control and monitor opportunistic behaviour and this improves performance. Tanna et al. (2005) also found positive and significant association between outside directors and bank efficiency in the UK.

On the other hand, it has been argued that independent outside directors do not improve firm performance. Fernandes (2008) found clear alignment of both management and shareholder interest and lesser agency problems in firms without outside directors. Mangena et al. (2012) discovered that independent executive directors on a board affect performance (ROA and Tobin's q) negatively. They suggested that the environment plays critical role hence the sample firms reduced monitoring and increased the executive directors' role as a strategic management tool in crisis environment.

4.5.1.3 CEO Remuneration

According to the agency and resources dependency theories, the main functions of the board are provision of monitoring and advisory services within the firm to protect shareholders and improve performance (Hillman and Dalziel 2003). The provision of incentives is expected to impact on the directors' roles and the firm's performance. Mehran (1995) using Tobin's q and ROA demonstrated that firm performance is positively associated with equity than cash base incentives of directors. He suggested that executives are motivated most when their compensation is closely tied to performance indicators thereby making the compensation structure more relevant than the level.

Doucouliagos et al. (2007) found a positive relation between total pay of directors and two years lagged earning per share of Australian banks. They explained this to mean that past performance determines directors' remunerations. Studying executive compensation of some listed Kenyan firms, Miyienda et al. (2013) reported a strong positive association of directors' remuneration with financial performance (ROA and EAT) but weak positive effect

of Tobin's q and ROE. Contrary to the positive link Abdullah, (2006) noted a significant negative link between the directors' pay and profitability among sampled firms in Malaysia. He asserted that firm size seems to influence directors' incentive than profitability. Similar observation was made by Fernandes (2008) who also concluded that firm size is the main determinant of directors' remuneration and that there is no link between directors' pay and firm performance of 58 listed firms in Portugal.

4.5.2 Firm Specific Characteristics

Most of the previous empirical studies selected size of the firm, the industry in which the firm operates, liquidity, and capital structure or risk tolerance as control variables.

4.5.2.1 Size of the Firm

Ullmann (1985), Waddock and Graves (1997), Orlitzky (2001) argued that size is a very important control variable, as bigger firms tend to invest more in environmental sustainability practices than smaller firms. The size of the firm is the most compounding factor when determining the relationship between CSER and FP (Beurden and Gössling, 2008) . Even in assessing the environmental and financial performance of small and medium-sized enterprises size is still very important, and this has been confirmed by many studies including Clemens (2006) which reiterated that even differences could exist between the sizes of small firms. Whereas some studies, including Lopez-Gamero et al. (2009), have used the logarithm of number of employees to measure the size of the firm, other studies have used the logarithms of sales (Cordeiro and Sarkis 1997, Carter et al. 2000). Many authors have also shown how size is related to performance. Notably, in the empirical research of Tarziján and Ramirez, (2011), it is argued that economics of scale and increased efficiency are eminent when firms grow. Their research conducted on Chilean firms revealed that the size enhances a firm's profitability.

Lending support to the findings of Tarzijan and Ramirez (2011), earlier finding by Elsyed and Paton (2009) had argued that control of firm size is relevant due to possible existence of economic of scale inherent in socially and environmentally oriented investments. The influence of size on profitability was empirically tested by Górriz and Fumás (1996), which is supported by the findings of Tarzijan and Remirez (2011). Górriz and Fumás (1996) reiterated that size is important due to economic of scale and market power effect. They continued that if a firm has market power, then it would be able to raise prices above costs and generate value added that cannot be attributed to production efficiency. The study, which used 81 non-financial firms quoted on the Spanish market, found that price effects are more important than economic of scale effect.

The issue of size and profitability has also been discussed by Porter (1980). Similarly, Porter (1980) emphasised economic of scale associated with manufacturing, marketing and R & D and indicated that it puts new entrants into significant cost disadvantage. In relation to size advantage, Cohen et al. (1997) study controlled for firm size and argued that firm size contributes to the ability of the firm to absorb the financial consequences of environmental risks.

4.5.2.2 Industry

Firms from different industries are confronted with different environmental, social, financial concerns, as well as different stakeholders. Various empirical studies have also shown that the nature of the industry may have effect on profitability. Spanos et al. (2004) examined the impact of industry specific factors on profitability of Greek manufacturing firms from 1995-1996 and found that profitability is higher in industries characterised by higher entry barriers and higher growth. The finding of the study is consistent with that of Porter (1980) which indicated that rapid industry growth ensures strong performance of the incumbent even if there is a market share gain by new entrants. Evidence also exist that industry factors are responsible for about 10% to 20% of variation in firm's profitability (Victer and McGahan, 2006).

Claver et al. (2002) also examined the importance of firm resources and industry membership to establish their affects profitability. Based on a sample size of 679 companies operating in a total 100 different 4 digit SIC industries, the study revealed that both industry effect and firm effect affect profitability. Claver et al. (2002) findings is supported by the research of Rumelt (1991)which also identified that firm effect is about three times more important than industry effect. In the study of environmental and financial performance relationships, Hart and Ahuja (1996), Russo and Fouts (1997) and (Horváthová 2012) used industry effect as control variables and the results showed a significant relationship with financial performance.

4.5.2.3 Risk tolerance (Leverage)

Other control variables supported by writers such as Waddock and Greaves (1997), McWilliams and Siegel (2001) is the risk tolerance indicated by the level of debt or gearing. Aside size and industry effects, numerous studies have also used leverage or capital structure as a control variable in the relationship between environmental and financial performance. Cordiero and Sarkis (1997) used leverage as control variable and argued that the degree of financial leverage influences the earnings per share. Studies that have argued for relationship between leverage and profitability include Li and Hwang (2011). Their study analysed the

effects of firm size and leverage on firm earnings and concluded a positive correlation with profitable firms. The study which was based on 2078 observations from 212 Standard & Poor companies, however, emphasised that increase in financial leverage could have negative impact on unprofitable firms.

Gill et al. (2011) in the study of long-term survivability of firms investigated the relationship between capital structure and profitability from 272 American listed firms. The findings from the empirical studies revealed a positive relationship between short-term debts to total assets and profitability, as well as long-term debt to total assets and liability of manufacturing firms in the United States. However, Kapopoulos and Lazaretou (2007) study on how variations across ownership structures affect firm performance on 175 Greek companies indicated that leverage negatively affect profitability. Kapopoulos and Lazaretou (2007) found evidence of reducing effects of the differences between the interest obligation incurred when borrowing took place and interest rate during the sample period. Confirming the results of Kapopoulos and Lazaretou (2007), Xu (2012) findings also revealed negative relationship between leverage and profitability from a study which was conducted in the manufacturing industry in North America from 1989 – 2004 with a sample size of 3938 firms.

4.5.2.4 Liquidity

Liquidity measures the extent to which a firm's short-term assets such as cash and cash equivalents can meet their immediate short-term obligations. Various studies have shown that liquidity has significant relationship with financial performance. García-Teruel and Martínez-Solano (2005) investigated 8872 Spanish SMEs and revealed that shortening the cash conversion cycle can improve profitability. The findings of the study also revealed that managers could create value by reducing their inventories and number of days for which their accounts are outstanding. Eljelly (2004) also empirically examined the relationship between liquidity and profitability of companies in Saudi Arabia using current ratio and cash conversion cycle as measure of liquidity. The results of the study like Garcia-Teruel and Martinez-Solano (2007) found that negative relationship exists for firms with higher current ratio and longer cash conversion cycle.

Saleem and Rehman (2011) study which was conducted in developing economy of Pakistan showed that there is a positive relationship between holding liquidity and profitability up to certain point beyond which holding further liquidity diminishes profitability. The study, therefore, showed consistency with Miller and Orr (1966) model which provides that when cash reach the maximum level it should be invested in marketable securities. Trumpp and

Guenther (2017) also showed significant positive correlation between short-term assets and profitability when assessing environmental and financial performance relationships.

4.6 Summary of Studies on the Relationship between Environmental and Financial Performance

Table 1: Summary of Studies on EMQ and FP Relationships

Study	*Sample Size*	Type of Firm	Independent Variable	Dependent Variable	Main Analysis	Variables Confirmed as significant	Variables confirmed as not significant	Limitations Identified
Fogler & Nut,1975 (USA)	*9*	Large listed	Pollution Ratings	Price earnings ratios	Event study	Pollution ratings		The study focussed on only large listed companies
Freedman and Jaggi 1992 (USA)	*13*	Large and SMEs	Water pollution performance index	ROA, ROE, Cash flow and Price earnings ratio	Pearson correlation	Pollution disclosure for large firms	Pollution disclosure for smaller firms	Only water pollution was included in the pollution index
Klassen & McLauglin, 1996 (USA)	*96*	Large listed	Environmental awards and environmental crisis	Stock/equity returns	OLS Regression, ANCOVA, Event study	Environmental crisis, Environmental awards, Industry	Industry	The study used event study methodology and the market may underestimate or overestimate the effect of EP on FP
Hart & Ahuja, 1996 (USA)	*127*	Large listed	IRRC Compliance Index	Return on sales, return on assets and return on equity	Multiple regression	Emission reduction, capital intensity, advertising intensity, industry, leverage		Longitudinal studies very important for the nature of the study but only use one-year emission reduction measures
Cordiero and Sarkis, 1997 (USA)	*523*	Large listed	Toxic Release Inventory (TRI)	Earnings per share forecasts	Regression analysis	Environmental proactivism, firm size, leverage		Financial performance limited to a brief time period

Wood and Graves, 1997 (USA)	*469*	Large Companies	KLD Index	Return on assets, Return on Equity and Return on Sales	Regression analysis	Corporate social performance, debt to total assets		KLD ratings include other social performance measures and not just environmental performance
Russo & Fouts, 1997 (USA)	*243*	Large listed	FRDC environmental ratings	Return on assets	Regression analysis	Environmental ratings, firm size, capital intensity, firm growth rates		Using only environmental ratings as a proxy of environmental performance does not measure efforts beyond compliance
Baylis *et al*. 1998 (UK)		Large and SMEs	Environmental regulations	Cost savings/Profits	Descriptive, Qualitative analysis			Used perception-based studies
Khanna and Damon, 1999 (USA)	*123*	Large listed	17 high toxic chemicals	Return on investment and market-based measures	Regression analysis of panel data	Emission to air, emission to land	emission to water	Measurement problem. Only used companies that deal with 17 high toxic chemicals
Christmann, 2000 (USA)	*88*		Perception of managers on environmental performance	Cost advantage	Regression Analysis	complementary asset-innovation, complementary asset-early timing, superfund	pollution prevention and early timing	Process innovation and implementations were used as complementary assets, but different environmental practices may require different complementary assets

Carter *et al*. 2000 (USA)	*437*		Performance index EPINDEX developed through survey	Cost of goods sold and Profits	Regression Analysis	EPINDEX, size	Leverage	EPINDEX, environmental performance measure was based on perception of managers
Dowel *et al*. 2000 (USA)	*89*	Large listed	IRRC Compliance Index	Compustat reporting of firm's equity, book value of long-term debt and net current liabilities	Regression analysis	Environmental standards, R & D intensity, advertising	Leverage	More measurable variable required and long-time series will be more appropriate for the study
Karagozoglu & Lindell, 2000 (United States)	*83*	Large Companies	Regulatory standards, environmental innovativeness	Financial performance, competitive advantage	Correlation, Regression analysis	size, regulatory supportiveness, environmental innovations	Industry, comprehensive superiority relative to environmental performance, environmental strategy	Focussed on only large companies
Gillery *et al.* 2000 (USA)	*71*	Wall street Journal printed index	Stock/equity returns		Product driven initiatives, process driven initiatives, firm size	Product driven initiatives, process driven initiatives, firm size	Environmental initiatives, firm's reputation	Some important announcements might be ignored by the researchers
Konar & Cohen, 2001 (USA)	*321*	Large listed	IRRC Compliance Index	Market Value of Equity (MVE)	Regression Analysis	environmental law suits, toxic chemicals, advertising, firm size	Age of assets, import intensity, capital expenditure	Concentrated mostly on large listed manufacturing firms

King and Lennox, 2001 (USA)	*652*	Large listed	Total emissions, relative emissions, industry emissions	Tobins Q, Return on Assets, Return on Equity, Return on investment	Panel data regression analysis	Total emission, relative emission, industry emissions, growth, capital intensity, leverage, R & D, Regulatory stringency		The study concentrated on only large listed firms
Patten, 2002 (USA)	*131*	Large Companies	TRI from EPA	Environmental disclosure scores	Regression Analysis	TRI, size, industry classification		Study only focussed on large companies
Srouf, 2003 (USA)	*1510*	Large Companies	Design practices, Recycle practices, waste practices	Operational performance measures including, quality, lead time and cost	Structural equation model	EMS, Environmental designs practices, waste practices		Perception-based study lacks objectivity
Melynk *et al*. 2003 (USA)	*1510*	Large Companies	EMAS	sales, reduction in cost, product quality, company reputation	Regression Analysis	Formal EMS performance variables		Perception-based study lacks objectivity
Hawawini *et al.* 2003 (USA)	*562*	Large listed companies	SIC (Industry type)	Total Market Value	Descriptive statistics			Based on only large listed companies
Filbeck & Gorman, 2004 (USA)	*24*	Large listed	IRRC Compliance Index	Shareholder returns	Regression analysis	Proactive environmental performance	Firm size, regulatory climate	Compliance index does not measure how proactively the company is making effort to go beyond compliance

Wagner, 2005 (UK, Italy, Netherlands' , Germany)			Environmental Performance Index including UK Pollution index and Dutch emission register	ROS, ROE and ROCE	Regression Analysis	Emission-based index	input-based index, Firm size,	Study was conducted on only one industry
Darnall & Ytherhus, 2005 (USA)			Self-reported information on environmental and financial performance	Self-reported information on environmenta l and financial performance	Regression analysis	Global pollutants, use of natural resources	waste and water effluent, solid waste generation, local or regional air pollution	Lack of objective secondary data
Hassel *et al.* 2005 (USA)	*71*	Large listed	Caring Company (CC) environmental performance rating index	Book value of equity and net income	Regression analysis of panel data	Environmental performance	industry	Used environmental ratings that does not address all the environmental performance measures
Clemens, 2006 (USA)		SMEs	Better environmental policy, investment in environmental responsiveness	Growth in earnings, Growth in revenue, ROA, Profitability	Regression analysis	Environmental performance, green economic incentives	Firm size, effectiveness of current standards	Used perception based studies
Earnhart and Lizal, 2007 (Czech Republic)	*436*	Large listed	Rezzo database which record air emission	Profits	Regression Analysis	Total asset turnover, total liabilities, physical assets	Pollution emission	Used only air emission as environmental performance

Revell and Blackburn, 2007 (UK)	*52*	SMEs	Self-reported environmental performance measures by managers	Cost Savings	Descriptive/Qualitative analysis			The study is purely based on the perception of managers
Montabon *et al.* 2007 (USA and Non- USA)	*45*		recycle, waste reduction, environmental certification	Return on investment, sales growth, product innovation	Canonical Correlation analysis	recycling, Proactive waste reduction, environmental design, specific design targets, surveillance of market for environmental issues	Market for waste, environmental standards for suppliers, environmental risk, environmental mission statement	Lack of standard for environmental reporting
Aragon-Correa *et al.* 2008 (Spain)	*108*	SMEs	eco-efficient practices, innovative practices, shared vision	Return on investment/Earnings growth	Structural equation model, Regression analysis	eco-efficient practices, innovative practices, shared vision	size, dealer affiliation, stakeholder management	Based on only the automobile industry
Elsayed and Patton, 2009 (UK)	*227*	Large Companies	Community Environmental responsibility score	Return on Assets/Tobin Q	Correlation, Regression analysis	Environmental policy, log of total assets, intangible asset intensity, R & D intensity, capital intensity, Age, Dividend pay out		Focussed on only large companies
Lopez-Gamero *et al*. 2009 (Spain)		SMEs	Self-reported environmental performance measures by managers, ISO 14001	value added growth, economic and profitability	Structural equation model	proactive environmental management, early investment time and intensity in environmental issues		The research is heavily based on self-reported measurement by the firm mangers

Molina-Azorin et al. 2009 (Spain)	*301*	Various	Survey questionnaire to obtain environmental variables	Occupancy rate and Gross Operating Profit	Regression Analysis, advance environmental commitment	Advance environmental commitment, size	Basic environmental commitment	Study was only limited to the hotel industry and it may not be possible to replicate the findings in some industries
Moneva and Ortas, 2010 (18 EU Countries)	*230*	Large Companies	AIS environmental ratings index	ROA and Return on Equity	Regression analysis	Environmental initiatives		The study used environmental rating index and that may not measure effort beyond compliance
Busch & Hoffman, 2011 (USA)	*2500*	Large listed	carbon emission and carbon management	Return on Assets and Return on Equity	Regression analysis	carbon intensity, carbon management, firm size, financial risk		Perception based study. Considered only two environmental variables
Hillary & Burr, 2011 (UK)	*31*	Small and medium-sized Enterprises	ISO14001, EMAS BS8555/Acorn	Cost Savings, New business	Descriptive statistics			Very small sample size of only 31 respondents
Horvathova, 2012 (Czech Republic)		Large Companies	Integrated register of pollutant emission, EMAS (Eco Management Audit Scheme Certification and ISO 14001	Return on Assets, Return on Equity and Sales	Regression analysis	Pollutant emissions, emission, company size, industry	Environmental systems (ISO 14001, EMAS) debt to total assets	The study mostly concentrated on emission although she recognised that could result in measurement risk

Brammer *et al.* 2012 (UK)	*110*	Small and medium-sized companies	Self-reported environmental performance measures by managers	Self-reported financial performance measures by managers	Descriptive, Qualitative analysis			The study is purely based on the perception of managers
Naila, 2013 (Tanzania)	*5*	Large listed companies	Expenditure on pollution control and ISO certification	Return on Investment	Correlation, Regression analysis	Capital intensity, firm age	Capital expenditure on pollution technology, ISO 1401	Sample size of only five manufacturing companies
Heyward *et al.* 2013 (103 Countries)	*More than 1000*	Large Companies	Sustainability reporting	Profitability, firm's reputation, competitive advantage	Descriptive, Qualitative analysis			Used perception-based studies
Reyes-Rodriguez, 2014 (Denmark)	*239*	Small and Medium	ISO 14001 and other environmental management practices	Lower cost, differentiation positioning	Correlation, Regression analysis	Environmental initiatives at strategic level, strategic intent, managerial attitude	size	The study was based on perception of mangers
Qui *et al*. 2014, (UK)	*214*	Large listed	Environmental score based on 60 environmental data points	ROA and ROE	Correlation, Regression analysis	size, leverage	environmental disclosures	Focussed on only large companies
Woo *et al.* 2014, (Korea)	*1656*	SMEs	Environmental innovation	Labour productivity	Pearson correlation	Environmental innovation, R & D, Age, Business group affiliations, listing status		Only environmental innovation was used as a measure of environmental performance

Mensah, 2014 (Ghana)	*200*	SMESs	ISO 14001, Environmental purchasing, Waste, Recycle		ANOVA	Environmental purchasing		The study was only focussed on the hotel industry
Mohammed *et al*. 2015 (Australia)		Large listed	Toxic weighting scores	Return on Assets, Tobin Q	Factor analysis, Regression analysis	Environmental performance, size	Environmental team, environmental awards	Focussed on only large companies
Tumpp and Guenther, 2017 (Many countries)	*2361*	Large listed companies	carbon performance and waste intensity	ROA and Total Shareholder Return	Non-Linear Regression analysis, Panel study	waste, carbon dioxide, leverage, growth, size R & D	Legal origin	Focussed on only large companies. It also used on manufacturing and service industry

4.7 Limitations of Existing Research and Need for Further Research

The above literature review suggests that there are several limitations and therefore the need for further research to examine EMP and FP relationships. First, most of the existing studies on EMP and FP have focussed on large listed companies (Hayward et al. 2013, Muhammad et al. 2015). Fassin (2008) argued that the way large companies deal with social and environmental issues is different from SMEs and cannot be simply transposed to SMEs as they are less bureaucratic, and most cases solve problems on day-to-day basis. SMEs are likely to be motivated if there is concrete data on financial benefits of pursuing environmental proactive activities. However, Hillary and Burr (2011) explained that the low occurrence of SMEs with environmental management practices could be attributed to lack of concrete data on financial benefits of EMS and sustainability for SMEs. This study, therefore, provide evidence specific to the SMEs to address these failures as evidence obtained on the relationship between environmental and financial performance on large listed companies may not be relevant to SMEs. SMEs also constrained by the availability of resources to manage the environment and therefore the results obtained from the large listed companies cannot be seen as a representative of SMEs. The result of this study is therefore expected to add evidence specific to the SME sector and to address the market failure to provide concrete data on the relationship between SMEs' environmental and financial performance.

Second, the results of the previous studies on the relationship between environmental and financial performance are not conclusive. Whereas some evidence suggests positive relationship between environmental and financial performance, (Carter et al. 2000, López-Gamero et al. 2009, Hillary and Burr 2011, Trumpp and Guenther 2017) others argue a negative correlation between the two (Cordeiro and Sarkis 1997, Muhammad et al. 2015). Some of the studies, including Naila (2013), did not show any significant relationship between environmental and financial performance. However, Trumpp and Guenther (2017) attributed the inconsistency in the results to fact linear regression models dominate the previous studies on environmental and financial performance relationships, they argued for the use of non-linear relationship. Ramanathan (2016) in line with Trumpp and Guenther (2017) also averred that a more complex model such as moderating effect of innovation and non-linear relationship might be more appropriate for the studies on environmental and financial performance relationship. Although Ramanathan (2016) and Trumpp and Guenther (2017) tested environmental and financial performance relationships based on non-linear models, their studies were only validated in large manufacturing firms. This study is

therefore expected to provide new evidence by testing the relationship between environmental and financial performance of listed SMEs operating in many industries based on non-linear model.

Third, many studies have documented that availability of financial and other resources affect SMEs ability to implement proactive environmental practices. As explained by Gilchrist and Himmelberg (1995), an increase in cash resources directly affects fund available for investment and it is expected that companies with higher cash resources are likely to undertake more investment. Increase in cash resources impacts on the net worth and premium on external funding falls. This creates an opportunity for businesses to invest through external financing. However, the moderating effect of cash resource on environmental and financial performance relationships has not been considered by the existing studies particularly in the Alternative Investment Market. This study, therefore, provides new evidence in this area by showing the effect of cash resource constraint on environmental and financial performance relationships.

Fourth, it has been argued that growth impacts on environmental and financial performance relationships. Russo and Fouts (1997) for instance, argued that firms are more likely to benefit from increased environmental performance when they are in high growth industries rather than low growth industries. Explaining their assertions based on the discounted cash flow technique they indicated that the level of industry growth moderates the expected probabilities of return, as the expected payoff of any investment risk is higher in high growth industries. Similarly, Hofer (1975) also explained that low growth industries are likely to consist of mature firms with hierarchical, inflexible, and bureaucratic organisational structure and therefore less likely to accommodate efficient proactive environmental management practices. Others have also argued that high growth industries have more organic rather than bureaucratic management style and therefore more likely to capture additional financial benefits by pursuing environmental measures beyond compliance because of their innovative culture (Darnall and Ytherthus, 2005). However, firm growth, as well as the growth structure of a firm which could be organic or inorganic and how it affects environmental and financial performance relationships has not been tested by the existing empirical studies. This study is therefore expected to provide evidence in environmental and financial performance relationships studies by showing whether firm growth and growth structure of the firm affects environmental and financial performance relationships particularly, for AIM listed companies.

Fifth, many empirical studies on the relationship between environmental and financial performance, particularly for SMEs have used perception-based studies (Blackburn 2004, Aiyub et al. 2009, López-Gamero et al. 2009, Hillary and Burr 2011). However, the use of perception-based studies on environmental and financial performance relationships has been criticised in many studies. Vijfvinkel et al. (2011) for instance emphasised that obtaining sustainable activities based on perception of individuals is subjective, as it can be interpreted differently per firm. Others have also reported that perception-based studies lack reliability because participants may produce false information and self-reported environmental and financial performance by mangers could lack objectivity (Darnall and Ytherthus 2005). This study is however based on published annual reports and financial statements in order to provide alternative methodology of studies on SMEs' environmental and financial relationships in the UK, which have been dominated by perception, based study.

Sixth, the existing studies did not show the level of heterogeneity that exist between small and medium-sized environmental and financial performance relationships (Christmann 2000, López-Gamero et al. 2009, Molina-Azorín et al. 2009). Jeppesen et al. (2012) however, indicated that medium-sized firms have higher levels of corporate, social, and environmental responsibilities compared to smaller firms. Medium-sized firms are also more formalised than small firms in terms of following regulations and procedures. Hoejmose et al. (2012) found that medium-sized firms engaged both their internal and external stakeholders. This is in contrast to smaller firms which are only embedded in their local community. Similarly, Afrifa and Tauringana (2015) have shown that there are differences in how corporate governance affect small and medium-sized firms. It is therefore likely that the evidence obtained on the relationship between environmental and financial performance of small and medium-sized enterprises would differ and this study establish such differences.

Seventh, lack of objective environmental criteria has been cited as one of the major setbacks on the existing studies on environmental and financial performance relationships (Horváthová 2010). Other studies have also pointed out the difficulty in generalizing the result of particular study because of the absence of clear definition of environmental performance. Russo and Fouts (1997) study has been criticized for using FRD environmental ratings which do not show environmental performance beyond compliance. Wood and Graves (1997) also used KLD index, which captures other social performance variables and therefore not limited to only environmental performance measures. Many other studies

(Konar and Cohen 2001, Filbeck and Gorman 2004, Earnhart and Lizal 2007) have used third party environmental rating index which are not available for SMEs and also captures one or only few environmental performance variables. The two major studies on small and medium-sized environmental and financial performance relationships Aiyub et al. (2009), Hillary and Burr (2011) also relied on only environmental certification (ISO 14001) as environmental performance measure. Based on DEFRA (2013) and Ilinitch et al. (1998) environmental performance guidelines, this study employs environmental performance measures that are considered comprehensive enough and capture most aspect of corporate environmental activities and not just one or few areas as seen in most of the existing studies. These environmental performance measures include efficient usage of materials, waste reduction, protection of ecosystem/biodiversity, and lowering emission to air, land and water (Greenhouse Gas), others are material and resource efficiency managing relationships with stakeholders, as well as compliance with environmental regulations. This is intended to address the problem of lack of objective environmental criteria, which is considered as one of the major causes of inconsistent results in the existing studies.

4.8 Summary and Conclusion

Various arguments have been advanced on why existing studies on environmental and financial performance relationships have mainly focussed on large companies citing from lack of data on environmental management practices of SMEs to the fact that SMEs are not normally involved in environmental management practices due to resource constraint. However, it has been argued that whilst larger companies have greater resources communicating their environmental actions and policies, on the contrary, SMEs benefit from more coherent identity and informal means of communicating among members and therefore lower coordination and implementation costs (Hamman et al. 2017). Thus, why not disputing financial constraint faced by SMEs in implementing sustainable environmental practices, these unique resources (coherent identity and informal means of communication) also put them in competitive position to undertake proactive environmental practices and therefore resource-based view has been used as one of the main theoretical underpinning for this study as it is suitable for both SMEs and larger firms. Aside the resource argument, stakeholder and institutional pressure may also compel SMEs to undertake improved environmental practices. Hamman et al. (2017) explained that family owners will be willing to invest in proactive environmental practices and accommodate the costs associated with it in an attempt to resist stakeholder and institutional pressure that could result in the loss of family status, bad reputation, tarnished identity as well as shame directed towards family members. Therefore, in addition to the resource-based view, stakeholder theory is also another key

theory use in the study in explaining environmental and financial performance relationships. However, whilst various pressure such as stakeholder or institutional pressure may compel firms to undertake sustainable environmental practices, the issue of whether sustainable environmental practices impact on the bottom-line has been subject to very extensive debate supported by various empirical findings.

Similar to the neoclassical and revisionists theorists that have argued that proactive environmental practices generate costs or financially beneficial for neoclassical and revisionists respectively, the findings from existing studies have also show that there are no generally accepted results on the relationship between environmental and financial performance. Whereas most studies (e.g. Klassen and McLauglin 1996, Hart and Ahuja 1996, Konar and Cohen 2001, Montabon 2007, Hayward et al. 2013) discovered significant positive relationship between environmental quality and financial performance, others have suggested otherwise. For instance (Freedman and Jaggi 1992, Cordiero and Sarkis 1997, Wagner 2005, Bush and Hoffman, Muhammed et al. 2015) found negative relationship between environmental proactivity and financial performance.

The lack of consistent results, positive and negative findings suggest that the relationship could be non-linear. Therefore, emulating the example of Trumpp and Guenther (2017) which found u-shaped relationship between environmental and financial performance relationships, this study whilst reviewing literatures that have established positive and negative finding, it also highlights the few studies that found non-linear relationship between EMQ and financial performance. The review of the empirical literature has also discussed how firm growth is likely to impact on EMQ and FP relationships as AIM firms mostly consist of new and growing firms and therefore the issue of firm growth on EMQ and FP could be substantial. Finally, as financial resources are major issue for SMEs, the chapter has also considered whether financial strength could also be moderating factor on EMP and FP relationships.

CHAPTER FIVE

HYPOTHESES DEVELOPMENT

5.1ntroduction

Existing empirical and theoretical literatures have provided collaborations on the relationships that exist between environmental and financial performance. The relationship suggests that environmental quality affects financial performance and value of the firm. Based on the resource-based view, Hart (1995) explained that proactive integration of environmental issues with strategy results in competitive advantage and impact positively on performance. Similarly, Endrikat et al. (2014) arguing from instrumental stakeholder view indicated that proper integration of environmental resources with strategy can result in competitive advantage and enhance performance and corporate value. They clarified that as corporations exhibit responsible behaviour toward the natural environment, they meet stakeholders' expectation as firms may gain many sources of competitive advantage including enhanced reputation, loyal relationship with customers and suppliers. Various empirical studies (Russo and Fouts 1997, Christmann 2000, López-Gamero et al. 2009) have also provided evidence that resources, both tangible and intangible, are relevant in developing competitive advantage that enhance environmental and financial performance relationships.

In line with the existing studies, this study has focussed on those factors that are identifiable and measurable as influencing environmental and financial performance. The study has therefore developed testable hypothesis based on empirical and theoretical studies on environmental and financial performance relationships. In discussing the testable hypothesis, the chapter has been divided into four sections. Section 5.2 focussed on environmental performance, the effect of financial resource constraint on environmental and financial performance, as well as the extent to which firm growth structure impacts on environmental and financial relationships. Section 5.3 examines the control variables, and section 5.4 provides summary for the chapter.

5.2 Environmental Management Performance

The environmental performance variables that have been used in the analysis of environmental and financial performance relationships are energy efficiency, compliance waste, emissions (greenhouse gases), material and resource efficiency, compliance, and stakeholder/supply chain relationships. The combined variables are termed as environmental management quality (EMQ):

5.2.1 Environmental Management Quality (EMQ) and Financial Performance (FP)

Two contrasting views have been expressed by the studies that have been undertaken on environmental and financial performance relationships: those in favour of positive relationship between environmental and financial performance, as against those that have indicated that proactive environmental practices would have negative effect on financial performance. Those that support positive relationship argument aver that proactive environmental measures provide cost-based competitive advantage which influences financial performance. Porter (1980) explained that one best way for organisations to achieve competitive advantage is pursuing a low-cost strategy and where environmental performance has significant impact on costs should result in increase in profitability realised through internal accounting-based performance measures such as ROA. In line with Porter's (1980) assertion, it has been argued that improved measures of environmental performance reduce cost as regulatory scrutiny, emission charge, community pressure, and regulatory sanctions are minimised. Hart (1995) indicated that pollution prevention and product stewardship could result in competitive advantage through "first mover" strategy in emerging green oriented products. In the view of Hart (1997), pollution prevention enables significant cost savings to be achieved and as a result, environmental and financial performance relationship is enhanced through efficient input and energy consumption as well as reuse and recycling.

The advocates for positive environmental and financial performance relationships reiterated that environmental stewardship derive greater benefits than those that only aimed at fulfilling regulatory requirements. Internal benefits such as personnel benefits (higher staff morale, higher staff retention and improved communication), operating efficiency (avoidance of fines, reduce waste, lower insurance, higher energy efficiency) as well as external benefits such as improved corporate image, competitiveness, attraction of investors and customer loyalty (Cordeiro and Sarkis 1997) are derived when proactive environmental practices are targeted beyond compliance. Arguing from the point of view of how proactive environmental practices can confer competitive advantage, Butler, et al. (2011) emphasised that sustainable environmental practices may increase product differentiation in the marketplace thereby enhancing organisational image to customers and as a result, improve financial performance. The positive relationship arguments have been confirmed in many empirical studies. Notably, Russo and Fouts (1997) drawn on the resource-based view on a sample of 243 firms and concluded that firms that invest in pollution prevention, although adding to risk also have higher prospective return. Christmann (2000) also employed the resource-based view argument and revealed that competences for process innovation and

implementation are complementary assets that enhance the relationship between best practices and cost advantage which is an important factor in determining performance. Carter et al. (2000), based on perception study, revealed that environmental purchasing is positively associated with firm performance. Similarly, Melnyk et al. (2003) found firms that have formal EMS certification experience achieved a greater impact in many dimensions of operational performance. Clemens (2006) focussed only on the scrap yard industry in the US and established that there is a significant positive relationship between green economic incentives and financial performance. Montobon et al. (2007) employed content analysis and regression analysis to test the win-win hypothesis of Porter and confirmed that pollution is a sign of inefficiency as proactive environmental practices improve financial performance.

López-Gamero et al. (2009) also concentrated on small and medium sized hotel industries in Spain and using perception-based study concluded that resources are relevant to competitive advantage and financial performance, but whilst cost-based competitive advantage influences financial performance of high polluting firms, the influences on the service sector relates to differentiation competitive advantage. Trumpp and Guenther (2017) which also employed a sample of 2361 international firms found non-linear relationship between environmental and financial performance and concluded that environmental and financial performance relationships may be positive, negative, or neutral, depending on the explanatory variable, environmental performance. Martínez-Ferrero and García-Sánchez (2017) also used a sample of 1410 international firms from 2007-2014 that attached assurance statements to their sustainability reports and confirmed that firms that attached voluntary assurance to their sustainability reports have significantly lower costs that impact on their financial performance than those firms with no assurance statements.

However, those that expressed negative sentiments on the effect of proactive environmental practices on financial performance built their argument on Friedman's (1970) trade off hypothesis. They argued that when a firm pursues proactive environmental practice, it impacts negatively on financial performance because the financial benefits that are derived are lower than the costs (Preston and O'Bannon 1997). In emphasis, Trumpp and Guenther (2017) explained that stakeholder expectation, on one hand, could generate improved company's reputation through better stakeholder responsiveness and improve financial performance. However, Trumpp and Guenther (2017) averred that enhanced environmental performance for the satisfaction of stakeholders can generate extra costs because it is not likely to economically internalise all benefits from sustainable environmental practices and that negatively affect the link between environmental and financial performance. Other

negative sentiments between environmental and financial performance have also been expressed by Gilley at al. (2000). They explained that the linkage between environmental and financial performance could also result from the lack of understanding on the part of the investors on the potential social consequence. They emphasised that in most situations, investors are interested in product driven environmental initiatives which directly impact on cost and profitability rather than process driven initiatives which could be achieved through the spill over effect from the product driven initiatives. It has also been argued that the negative relationship between environmental and financial performance relationships may come about as it takes time for the benefits to be realised thereby increasing uncertainty about outcomes on the part of the investors (Khanna and Damon 1999, Aiyub et al. 2009). Additionally, Hart and Milstein (1999) emphasised that the resulting impact of sustainable environmental practices on financial performance pertains in many cases to long-term competitiveness.

Results from some empirical studies have supported the view that proactive environmental practices would affect financial performance negatively. Jaggi and Freedman (1992) study disclosed a negative association between pollution performance and economic performance and explained that the market ignores the expected better performance in the long-run, resulting from the effects of pollution reduction activities. Similarly, Cordiero and Sarkis (1997), based on sample of 523 US firms, concluded that there is a negative relationship between environmental performance and earnings. Khanna and Damon (1999), using panel data from 1988-1993, found a negative relationship between environmental and financial performance based on short-term measure of financial performance. Conclusions drawn from their study support the view that investment in proactive environmental practices may only be realised in the long-term, as the costs may not be fully offset in the short-term. Supporting the view that proactive environmental practice may not produce “win-win“ situation is Wagner's (2005) study. This study maintained that there is a predominantly negative relationship between environmental and economic performance. Adding to the no relationship argument based on market-based measures is Qiu, et al. (2014). Whereas Hart and Ahuja (1996) argued that environmental disclosures can confer competitive advantage such as strong reputation to a firm, Qui et al. (2014) disputed this finding and claimed that environmental disclosures have no effect on financial performance but rather it is social disclosures which matter most to investors.

The positive and negative arguments suggest that the relationship between environmental management and financial performance could be non-linear. Therefore, based on the above theoretical and empirical underpinnings, it is hypothesised that:

H1: The relationship between environmental management and financial performance could be non-linear.

5.2.2. Energy Efficiency

The manufacturing industry historically is considered as one of the greatest consumers of energy and carbon emitters in the world (Trianni et al. 2014). It is therefore argued that the increasing price of energy and the demand for sustainable practices have exerted pressure on manufacturing organisations and other organisations to reduce the consumption of energy and save cost. It is also asserted that organisations that pride themselves with energy efficient products attract customers and improve financial performance. A research carried out by the US Department of Energy (2015) on sampling of buildings nationwide indicated that buildings with LEED and energy star certifications have higher rental rates, higher occupancy rate, lower utility bills, increased sales prices, as well as lower construction premiums.

Empirical study by Trianni et al. (2014) on drivers for energy efficiency for SMEs identified increasing prices of energy as one of the main drivers for companies to invest in energy saving technologies. Therefore, for companies to save cost on the increasing prices on energy and improve financial performance, there is the need to invest in energy saving technologies. As reiterated by Sahu and Sharma (2016), consumers' decision regarding the level of energy consumption and investment in energy savings technology is largely influenced by energy market and its prices. Sahu and Sharma (2016) further outlined that in situations where there is a persistent increase in energy price, it would significantly affect energy efficiency practices of firms and likely to replace old equipment and develop new and efficient energy products and services to reduce cost and improve their financial performance.

Aside US Department of Energy (2015) study which confirmed significant financial benefits on investment on energy efficient buildings, other empirical studies have also confirmed significant cost savings of energy efficient practices in different industries. A survey of 135 Dutch firms by De Groot et al. (2001) highlighted the achievement of cost savings through decrease energy use and adoption of energy efficient policies by the companies under the study. Based on the evidence from Indian firms, Sahu and Sharma (2016) also found that energy intensity is positively correlated with financial performance. Although Thollander

and Ottosson (2008) study of Swedish firms did not see energy efficiency as priority compared to their core activities, Trianni et al. (2014)study on 71 Italian manufacturing SMEs identified improved financial benefits and competitiveness as important drivers for SMEs to invest in proactive energy efficient practices. Although SMEs are dominated in the industrial sector which consumes greater proportion of energy, evidence from European Commission (2007) suggests that only a few SMEs have adopted proactive energy efficient measures. Such actions from SMEs have been emphasised by Waddock and Graves (1997) from resource-based view. They indicated that availability of resources would influence or discourage firms' ability to adopt proactive environmental practices such as energy efficient measures. This also reinforces the position by Aiyub et al. (2009) that SMEs lack resources to pursue efficient environmental practices such as energy efficiency measures to influence their financial performance. Therefore, it is posited that:

H2: There is a significant relationship between proactive energy efficient practices and financial performance.

5.2.3 Compliance

Various empirical and theoretical evidences suggest that due to the inherent cost of compliance such as technological standards, environmental taxes, and emission permits compel firms to allocate resources such as labour and capital for pollution control. From business point of view, this is considered unproductive. Technological standards, for instance, limit the flexibility of technology or inputs into the production processes and taxes, as well as emission permits as additional costs to the firm (Ambec et al., 2013). Filbeck and Gorman (2004), using IRCC compliance index, supported the above arguments because their study revealed a negative relationship between environmental compliance and financial performance but Naila (2013) did not identify any significant relationship between environmental compliance/regulation and financial performance. Russo and Fouts (1997) also indicated that environmental compliance that depends on pollution abatement through short-term end-of-pipe approach normally fails to achieve regulatory compliance and improve profitability.

These arguments have however been challenged by Porter and Linde (1995). They asserted that innovations prompted by regulation could have two effects: product related or cost reduction. The position of Porter and Linde (1995) is that a well-designed product related innovative regulation can lead to better quality products as well as improved product features. They also indicated that cost reduction measures that improve regulations such as

light packaging, material substitution and process that can lead to material savings, and reduced downtime or converted waste into valuable materials. Carter et al. (2000) have argued from many directions in support of how innovative environmental regulations could be beneficial to organisations. In the process related arguments, they indicted that cost may be reduced when organisations invest in management systems that reduce accidental environmental releases and liability. Carter et al. (2000) also asserted that proactive management of environmental regulations might create barriers which provide first-mover advantages that are difficult to imitate by competitors and improve the financial performance of the firm.

Aside, Porter and Linde (1995) arguments on financial benefits of innovative regulations, it is asserted that although costs of compliance could be huge, breaches of environmental regulations apart from its effect on profitability could also have reputational implications. Compliance to environmental regulations have also been noted by Clark et al. (2015) which reiterated that lack of compliance could seriously undermine the performance of the firm. The study indicated Anadarko and BP environmental failures did not only result in billions of dollar fines but severely affected profitability and share prices. Arguments for strong environmental compliance have also been supported Konar and Cohen (2001) where using IRRC compliance index as a proxy of environmental performance confirmed significant positive relationship between environmental performance and intangible asset value of the firm.

Compliance to environmental regulations has been mostly achieved through environmental certification such as ISO 14001 and EMAS. As explained by Popoola (2013), ISO 14001 is auditable standards for environmental management system which provides framework for performance improvement, control, regulatory compliance as well as means of demonstrating commitment to customers and other stakeholders. Many empirical studies (Aiyub et al. 2009, Hillary and Burr 2011) have therefore used ISO 14001 as a measure of environmental performance. Aiyub et al. (2009) for instance, argued that it is not just environmental certification, but it comprises strategies to prevent pollution at all stages of the process and ensure compliance. Similarly, Ann et al. (2006) also emphasised that the essence of ISO 14001 or other environmental management system is not to replace regulations or code of practice but provide a system for monitoring, controlling and improving performance regarding those requirements. It indicated that the benefits of ISO 14001 lie in cost savings through energy consumption, raw material usage, waste management, environmental impact, as well as improving public image. Massive cost

savings were achieved by Lockheed Martin Syracuse Plant after implementation of ISO 14001. The company reduced its wastewater by 86%, solid waste by 78%, process waste 34% and recycling at plant level also improved by 22% (Moretz 2000).

Many other studies have also shown positive correlation between environmental compliance through ISO 14001 certification and profitability (Zhu et al. 2008, Aiyub et al. 2009, Hillary and Burr 2011, Mensah 2014). Hillary and Burr (2011), as well as Aiyub et al. (2009) studies which were conducted in the UK and compared the environmental and financial performance of SMEs and large companies identified that companies that employed ISO 14001 and environmental management practices to comply with regulations and improve environmental performance also achieved financial benefits in many areas of operations. Aiyub et al. (2009) study provided that although compliance to environmental regulations are beneficial to both small and larger companies, the larger the company, the larger the financial benefits.

Research by OECD (2007) have shown how compliance to environmental legislation is beneficial to listed SMEs. The study explained that aside cost savings from material, energy, and waste reductions, compliance to environmental regulations attracts new customers and business opportunities to listed SMEs due to the positive public image it receives. Mahenc (2008) also indicated that listed SMEs could enhance their financial performance through higher prices by signalling their green products from environmental compliance. Consequently, ability to attract new business, customers, and charge higher prices because of environmental compliance will enable listed SMEs to establish competitive edge to improve their financial performance.

However, Baylis et al. (1998) compared SMEs and large companies on motivation for undertaking environmental proactive activities and found compliance to regulations as the most important source of motivation for all sizes of companies. The study also revealed that size is a very important factor in explaining the motivation for companies to make improvement in environment as large companies indicated 48% more stimuli to make improvements than SMEs. The explanation for this could be deduced from Aiyub et al. (2009) study which found that the smaller the size of the organisations, the lesser the financial savings hence the reason for low motivation for small-sized firms to undertake environmental improvements. It could also be attributed to fact that unlike larger firms which have many “low hanging fruits” and therefore can significantly save costs through sustainable environmental practices, due to smaller operational nature of SMEs, few

opportunities may exist by engaging in proactive environmental practices hence less financial savings. Based on these theoretical underpinnings and empirical evidence, the following hypothesis is developed.

H3: Compliance to environmental regulation will significantly impact on financial performance of AIM listed firms.

5.2.4 Waste

Over the years, several theoretical and empirical evidences have been presented on the relationship between environmental waste and financial performance. The evidences reveal that environmental waste significantly affects a firm's financial performance (Sroufe 2003, Trumpp and Guenther 2017). Bartolacci and Zigiotti (2015), arguing from the resource-based view indicated that where waste is used as differential resource through recycle and reuse, significant costs, which impact positively on financial performance, are saved. Waste reduction ensures that resources and energy used in the production processed are minimised and significantly impact on costs and performance (Ochiri et al. 2015). They reiterated from the resourced-based view and argued that waste management is a strategic resource that has higher opportunity of minimising costs by lowering waste management fees, hazardous materials management fees, reduced reporting time and costs, and these positively impact on performance. As identified by Mensah (2006), the Statler hotel in the United States obtained significant benefits and improved financial performance from efficient waste management practices by installing a refuse chute which directly deposited trash into a refuse room. This ensured that the refuse that was separated and paper obtained from the separated refuse was sold. These waste management practices resulted in improved financial performance.

The effect of environmental waste management practices has also been supported by many other empirical studies. Trumpp and Guenther (2017) using waste intensity measured as proxy of environmental performance found that there is positive relationship between environmental and financial performance for companies with high environmental performance. However, using the same waste intensity as a proxy of environmental performance, the result also showed negative relationship with companies with low environmental performance. Thus, whereas firms that adopted for higher level of waste management practices were rewarded financially, the effect on financial performance was negative for those companies with minimal engagement of waste management practices.

Sroufe (2003) also indicated that one of the main reasons that a firm reduced its waste is to control costs. This has been emphasised earlier by Royston (1980) that cost can be controlled by pollution abatement through waste detection and selling residuals as raw materials. Sroufe (2003) study, which was based on a sample of 1510 questionnaire in the United States found that the more a firm is involved in waste practices, the stronger the positive relationship with financial performance. Trumpp and Guenther (2017) study, therefore, confirms Sroufe (2003) study and it is also in line with the ideas of DEFRA (2013) that "win- win" situation could be achieved through waste abatement strategies.

Therefore, on the basis of these arguments, the hypothesis below is formulated.

H4: There is significant relationship between environmental waste management practices and financial performance.

5.2.5 Emission to air, land and water/Greenhouse Gases

Aside the harmful effect of emission in the environment, emission is considered as a sign of inefficiency. As indicated by Hart and Ahuja (1996), emission reductions are important as expenditures in pollution in the United States represent more than 2% of GNP and approaching more than $200 billion a year. Busch and Hoffman (2011) asserted that GHG has direct link with operational costs as the level of carbon emission is implicitly determined by the firm usage and in political regimes where emissions are priced carbon output will constitute a further cost component. Therefore, lower emissions are seen as useful signs of productive efficiency, as firms with high level of emission may be wasting resources (Hamilton 1995).

Various studies have shown possible link between pollution control and financial performance. Earnhart and Lizal (2007) provided that lower emissions and costs reductions were achieved by Czech firms that invested in efficient and environmentally friendly machineries. They indicated that the new production process required less use of materials, generated less waste and demanded less toxic inputs. Thus, apart from the companies saving the environment through reduction in pollution, they also benefit financially, and in effect provide strong support to the Porter's "win-win" hypothesis. In explaining how companies benefit financially by investing in pollution control, Ramanathan (2016) buttressed the position of Earnhart and Lizal (2007) and reiterated that firms that redesign their production processes or services delivery would achieve possible efficiency through accumulation of valuable know-how on pollution prevention which is inimitable and becomes source of competitive advantage. The strategic benefit of pollution control, that is, the creation of

opportunities for firms to modify the production process to translate into competitive advantage has resulted in some firms to lower their pollution levels below the legal levels (Konar and Cohen 2001). As shown by Earnhart and Lizal (2010), firms are therefore embracing riskier pollution prevention strategies by modifying their production processes instead of treating them. They recognised that whist this is riskier, proactive pollution abatement strategies may reduce pollution and reduce costs as well.

Despite the strong arguments presented for the correlation between pollution control and financial performance, some empirical studies have shown mixed results. Busch and Hoffman (2011) study revealed a positive correlation between carbon performance and financial performance based on output-based approach, however, using the process-based approach resulted in negative association between environmental and financial performance. Similarly, Cordeiro and Sarkis (1997) also revealed a strong negative correlation between environmental proactivism and financial performance with toxic release inventory index as a measure of environmental performance. Trumpp and Guenther (2017) also showed a positive association for firms with high environmental proactive activities and low association for firms with low environmental proactive activities. It has however been argued that small companies lack the resources to invest in more sophisticated environmental technologies due to resource constraint (Hillary and Burr 2011). Therefore, pollution control expenditures are considered as a drain on resources which could have been invested profitably. It is therefore postulated that:

H5. There is a significant association between pollution control and financial performance.

5.2.6 Material and Resource Efficiency

Materials input into the production process and efficient management of resources have been identified as one of the important ways for companies to improve their environmental performance and at same time improve their financial performance. Carter et al. (2000) for instance indicated that the efficient management of resources, notably recycling, has been used by some industries in decades as it provides low cost materials to virgin materials. Chadwick (2013) emphasised that raw materials and energy are significant cost of manufacturing, averaging up to 50% of total manufacturing cost. It is, therefore, becoming increasingly important to use environmental perspective as an avenue to establish cost and risk reduction as waste materials directly impact on profits.

Various alternatives have been given on how firms could effectively manage their resources and save the environment as well. In terms of recycling, it has been argued that recent

environmental initiatives such as the development of reverse logistic infrastructure has resulted in more recycle packaging becoming available at lower costs (Stock 1998). Study by Gillery et al. (2000) also provided that material and resource efficiency could be pursued through process-driven initiative or product-driven environmental initiatives. They indicated that resources could be effectively utilized using recycle or environmentally friendly inputs to production, through redesigning production or delivery system and waste reduction strategies. Minnesota Mining and Manufacturing, for instance, redesigned its manufacturing process to reduce harmful by-products and saved the company over $500 million (Hart and Ahuja, 1994). This has also been emphasised by Biddle (1993), which indicated that process driven initiatives impact on firm performance through cost reduction. Thus, process-driven initiatives allow the organisation to reduce their costs by using inputs more efficiently, reduce use of hazardous substance, accidents, and their resultant litigations, as well as removing unnecessary steps in the production process. These arguments have also been supported by the work of Hart (1995) that cost advantage can be achieved through the implementation of best practices which focused on the production process.

Water usage has also been identified as another area in which resources can be managed efficiently. It is argued that efficient management of water could result in "win-win" solution in several cases. Molina-Arizon et al. (2009) for instance indicated that SMEs in the hotel industry could save water and costs through efficient use of water and improve their financial performance. They explained that water savings could be achieved, and costs can be saved through changes in routine such as reducing washing, checking regularly for leaks from cistern, taps, and water saving fitters in kitchens, guest, and public room. This is evidenced in the case of Hotel Homebush in Sydney, Australia, which reduced its portable water consumption by 50% through dual piping system (Hotel Online Special Report 2002) and significantly improve their performance. Similarly, Mensah (2006) also emphasised the dual piping system as a measure adopted by the hotel industry to improve environmental management to save cost. Dual piping system consists of distribution network that is usually used to supply potable water through one distribution network and non-portable water from other distribution network. This system helps hotels to save costs and improve on their performance by ensuring that whilst expensive potable water is used for drinking purposes, cheap untreated or recycle water could be used for other purposes such as street cleaning and irrigation of lawns

Packaging and the use of lightweight materials is also seen as an efficient way of managing resources. It has been suggested that light weight packaging does not only reduce material

cost but can also reduce the transportation cost by increasing the volume of products which can be shipped (Gray and Guthrie 1990). In conformity with Gray and Guthrie (1990), Erfle and Fratantuono (1992) examined 49 companies based on the existence of environmental initiatives such as recycling, waste reduction and packaging programmes concluded that environmental performance is positively and significantly correlated with return on equity (ROE), return on assets (ROA) and return on investment (ROI).

However, contrary to most of the studies which indicated positive correlation between resources and material efficiency and profitability, Cordeiro and Sarkis (1997) concluded negative environmental relationship between environmental proactivism which included recycling and financial performance. Conclusions drawn by Cordeiro and Sarkis (1997) support the views expressed by authors such as Walley and Whitehead (1994) which have questioned the optimism of environmental advocates. This is also in line with Williamson (1993) survey which indicted that many executives expect net cost from corporate environmentalism as environmental compliance costs such as environmental taxes, environmental permits and installation of additional environmental equipment are only additional costs to the business which negatively impact on performance.

SMEs' actions in terms of efficient management of resources to improve environmental performance and financial performance has been elucidated by Hoejmose et al. (2012). Supporting the views expressed by Lepoutre and Heene (2006), they reiterated that small businesses tend to exhibit reactive approach to environmental management practices compared to their larger counterparts. This stems from the fact that apart from SMEs lacking the resources and skills to pursue proactive environmental practices, they also find it difficult to justify the investment in environmental management practices from economic point of view. This supports the findings of their study which indicated that although both small and medium enterprises' main driver for environmental management practices is strategic intent, larger and medium-sized firms appear to perceive greater payoffs to environmental management practices from financial benefits and increased market share than smaller firms. Legislation was also seen as the main driver of environmental management practices in medium firms as compared to smaller firms. In conformity with the work of Aiyub et al. (2009), Hoejmose et al. (2012) also found that smaller firms perceive few financial benefits compared to medium-sized firms, hence limited participation in environmental management practices. Based on these arguments the following hypothesis is developed

H6. Efficient management of materials and other resources is significantly related to financial performance.

5.2.7 Stakeholder Relations/Supply Chain

Efficient stakeholder integration into environmental management practices can also enhance a firm's financial performance. Aragón-Correa et al. (2008) argued that stakeholder's pressure contributes to the adoption of proactive environmental management practices by corporations. In the view of Henriques and Sadorsky (1996), corporations see stakeholders as very important when pursuing environmental strategies. Freeman (1984) had earlier put these assertions forward in his social impact and reputation building hypothesis that fulfilling the needs of the diverse stakeholders would result in positive financial performance. Building on the work of Freeman (1984), Makrinou et al. (2008) emphasised that the implicit demand of stakeholders enhances company's reputation which in turn influences financial performance.

Engaging and communicating with stakeholders on issues of environmental sustainability as suggested by Illinitch (1998) is likely to commit relevant stakeholders such as employees, suppliers, customers and the community to the environmental strategy of the firm. Where stakeholders are involved in the firm's environmental strategy, it improves the firm relationship with important stakeholders such as investors, banks, and government agencies. The improved relationship with the stakeholders can be beneficial to the firm in terms of increased investment levels, improved employee morale and customer goodwill with consequence on financial performance (Carter et al. 2000). As indicated by Cornell and Shapiro (1987), the cost of a firm is not only related to explicit costs but implicit cost as well. They reiterated that firms that are seen as environmentally responsible by government agencies have lower implicit costs than those that are viewed as less socially and environmentally responsible. Therefore, where relevant stakeholders such as environmental agencies are involved in the development and implementation of environmental management practices of the firm, it enhances public trust and image that can improve the competitive position of the firm.

Other line of argument reiterated by Aragon-Correa et al. (2008) is the pressure from the environmental non-governmental organisations. Such organisations mostly target larger companies that are likely to respond to avoid damage to their reputation. Therefore, regular communications with such organisations on environmental management issues help reduce pressure from them. This can create negative PR for the firm and adversely affect its

performance. On supply chain, Carter et al. (2000) underscored the importance of liaising and communicating with suppliers in the supply chain process. They argued that purchasing is at the beginning of the value chain. A firm's environmental efforts are not likely to be successful without integrating the companies' goals into purchasing activities, hence the need to involve suppliers. Liaising with supply chain partners is important in developing recycle packages, lighter weight materials, and environmentally friendly products that are more likely to enhance the environmental performance of the firm. Others also include participating in the design of the products, committing suppliers to waste reduction and participating in the design of the products for recycle or reuse. Such environmental efforts are likely to catch the eyes of other stakeholders, improve the firm's reputation and in anticipation of improved performance shareholders will also react positively (Fombrun and Shanley 1990). Carter et al. (2000) indicated that environmental purchasing is positively correlated with financial performance and this has also been confirmed by Bourlakis et al. (2014) where small firms benefited from sustainable supply chain measures. Although it is expected that stakeholder engagements on environmental practices will improve the corporate image and enhance financial performance, SMEs tend to react only to intense pressures from external stakeholders with whom they have relationships (Spence et al. 2012).

Muposhi and Dhurup (2016) also argued from internal stakeholder's viewpoint. They reiterated that employee training that focuses on embedding value system that support green image allows employees to communicate the environmental benefits of green products to customers, improve firm relationship with customers, and consequently influence financial performance. Recent study by Cheng et al. (2017) also averred that better stakeholder engagement in relation to environmental practices improve financial performance. Cheng et al. (2017) explained that better stakeholder engagement and transparency around CSER is important in reducing capital constraints and enhance performance. Similarly, Lannelongue et al. (2015) indicated that allocating resources to report environmental activities to stakeholders, informing them of their actions and keeping communication open to them to receive feedback on environmental matters, is a valuable resource that can enhance the relationship between environmental management and financial performance. We posit therefore that:

H7. A proactive stakeholder engagement in adopting environmental proactive measures will have significant influence on financial performance.

5.2.7 The Impact of Firm Growth on the Relationship between EMP and FP

Various arguments have been made on the growth implication on environmental and financial performance relationships. Russo and Fouts (1997) argued that the level of growth moderates the expected probabilities of return as the expected pay-off of any investment risk is higher in high growth industries. This is in line with pollution prevention practices which entail higher financial risk, as replacing existing production processes is involves significant costs but the expected benefits are also higher. Hofer (1975) also indicated that low growth industries are likely to consist of mature firms with hierarchical, inflexible and bureaucratic organisational structure and therefore less likely to accommodate efficient proactive environmental management practices. Darnall and Ytherthus (2005) emphasised that companies in high growth industries may derive positive impacts from proactive environmental actions. Their argument was based on the premise that high growth firms have more organic rather than bureaucratic management style and therefore more likely to capture additional financial benefits by pursuing environmental measures beyond compliance because of their innovative culture.

Arguing from the resource-based view, various prepositions have been made on how firm growth influences environmental and financial performance relationships. Elsayed and Paton (2009) indicated that at growth stage, firms have various strategies open to them to create competitive advantage through accumulation and management of its tangible and intangible resources. They indicated that one of such strategies is to invest in social and environmental practices. Such practices are important to establish differentiation in the market because the exhibition of unique ethical behaviour gives the firm competitive edge over rivals and positively influences financial performance. Similar argument has earlier been advanced by Sharma (2000) that firms in growth stage are in better position to establish competitive position because they can acquire environmentally friendly machines and equipment that ensure compliance with environmental regulations. Growing firms can pursue strategies to raise rival cost and establish competitive edge. Fombrun and Shanley (1990) advocated for investment in environmental and social reputation at growth stage which can create unique differentiation that is difficult to be imitated by rival.

However, Elsayed and Patton (2009) found that financial performance has no significant impact on environmental policy for those firms in the growth stage. In conformity with Preston and O'Bannon (1997), Elsayed and Patton (2009) argued that the existence of business opportunities at the growth stage means that managers tend to be less motivated to use limited resources on environmental investment instead of their own returns. The result

is particularly true for SMEs which normally grow organically from internally generated funding due to lack of resources and therefore unlikely to pursue extensive environmental practices. Whereas smaller firms usually grow organically due to financial constraints to pursue mergers and acquisitions, larger firms usually pursue both organic and inorganic growth. As indicated by Rahman (2011), where a firm has limited access to capital, it undermines its ability to pursue optimal investment policy and hinders the firm's growth. Rahman (2011) continued that alleviating of financing constraint could foster firm growth. Therefore, larger companies, due to higher access to financial resources, may pursue many growth opportunities including mergers and acquisitions and pursue optimal investment opportunities such as investment in sustainable environmental practices to create competitive edge with consequence on improved financial performance. Therefore, larger firms that pursue inorganic growth also achieve better environmental performance because of higher access to financial resources. They are also more likely to disclose their environmental activities to the market thereby signalling their long-term focus to differentiate themselves. This ensures that a positive feedback loop is created, there is increase in the transparency around the environmental reporting, and further, there is enhanced stakeholder integration to build competitive edge and enhanced financial performance. Therefore, based on these arguments, the following hypothesis is formulated.

H8 (a): Firm growth moderates' environmental management performance and financial performance relationships.

5.2.8 The Impact of Cash Resources on EMP and FP Relationships

Financial constraints affect firm's ability to undertake profitable investment opportunities (Arslan et al. 2006). Different opposing arguments have been documented on investment sensitivities to financial constraint and unconstraint firms. Some studies have shown that constraint firms are more sensitive to investment opportunities than unconstraint firms (Fazzari et al. 1988, Patten 1992). They explained that greater cash holding has more positive impact on investment with constraint firms that require higher hedging needs than unconstraint firms. This implies that SMEs which are usually cash constraint may take advantage to improve their competitive position and the bottom line by pursuing better environmental practices which many studies have documented to have positive impact on profitability (Aragon-Correa et al. 2008, López-Gamero et al. 2009).

However, some other studies have argued otherwise by providing evidence that it is rather unconstraint firms that are more sensitive to investment cash (Kaplan and Zingales 1997,

Cleary 1999). Allayannis and Mozumdar (2004) clarified that in situations where there is severe cash shortfall, the firm is forced into financial distress and only make investment that are essential to the core objectives. They further averred that more constrained firms have more difficulties accessing external financing and reaches minimal investment threshold more quickly. Unconstrained firms are therefore likely to exhibit greater investment cash flow sensitivity than constrained firms, particularly where internal cash flows are low (Alloyannis and Mozumdar, 2004). This argument has been elucidated by Aiyub et al. (2009) that SMEs find it difficult to invest in proactive environmental management practices due to financial and other resource constraints. They emphasised that SMEs considered investment in sustainable environmental practices as beneficial only in the long-term. Therefore, due to financial constraint SMEs are more likely to concentrate on their core objectives and projects with short-term returns instead of investment in environmental management practices. Thus, unconstraint firms may invest in proactive environmental practices to improve their reputation and the bottom line. It is argued that proactive environmental practices such as ISO 14001 which involve long-term investment tends to create a higher risk for SMEs if they are not offered incentives (Aiyub, et al, 2009). Supporting the view that SMEs are usually more cash constraint and therefore less likely to take advantage of profitable investment opportunities, the hypothesis below is formulated:

H9 (a) Cash resources moderates environmental and financial performance relationships

5.3 Control Variables

5.3.1 Size of the Firm

Many authors have shown size is related to performance although the direction of the relationship differs. Notably, in the empirical research of Tarziján and Ramirez (2011), it is argued that economics of scale and increased efficiency are eminent when firms grow. Their research conducted on Chilean firms revealed that size enhances firm's profitability. Lending support to the findings of Tarzija and Ramirez (2011), El-Sayed (2013) had argued that control of firm size is relevant due to possible existence of economic of scale inherent in socially and environmentally oriented investments. The influence of size on profitability was empirically tested by Górriz and Fumás (1996). They indicated that size is important due to economic of scale and market power effect. They continued that if a firm has market power then it would be able to raise prices above cost and generate value added that cannot be attributed to production efficiency. Larger firms enjoy preferential treatment over smaller firms in many areas of operations including negotiation of loan terms and access to skilled human capital. It is also asserted that large companies have the financial resources to engage

highly qualified and experienced personnel to enhance the achievement of their strategic objectives including financial performance (Majumdar 1997, Odalo et al. 2016). Larger companies are more resourced to diversify their operations and hence less prone to market failures in contrast to smaller companies which lack the necessary resources to diversify their operations. Hence, whilst market shocks may severely influence the operations of smaller companies and impair their profitability, this is likely to be avoided by larger companies as low demand for their products or services in a market might be compensated by the growth of their operations in another market due to the diversified nature of their operations. These have been confirmed in many existing studies including Majumdar (1997), which documented that larger firms are more profitable than smaller firms.

Despite the strong arguments supporting the view that larger companies are more profitable than smaller companies, Symeou (2008) argued that smaller firms possess certain unique characteristics such as high level of flexibility, non-hierarchical structures and less likely to suffer from agency problems as they are mostly owner managed. Lower agency cost in terms of lower monitoring costs and lesser issues of management opportunism ensure that smaller companies are more align to the profitable objectives of the organisation, in contrast to larger companies where management acting as agents to the owners may pursue their own interest instead of profit maximising objectives. Also in disputing the correlation between size and profitability, Ilaboya and Ohioka (2016) basing their argument on the theory of structural inertia, indicated that as firms grow larger, they increase bureaucracy and inflexibility which may cause resistance to change with ultimate effect on profitability. These theoretical underpinnings have been confirmed in the recent study by (Niresh and Velnampy (2014) where the results of their study confirmed that firm size has no profound impact on the profitability of listed manufacturing firms in Sri-Lanka.

Hypothesis (10): There is a significant influence between firm size and profitability.

5.3.2 The Nature of the Industry

Research has shown that industry factors are responsible for about 10% to 20% of variation in firm's profitability (Victer 2006) (Victer 2006). The existence of entry barriers and other structural features of industries create remarkable performance differences among firms (Porter 1980). Porter (1980) argued that firms could earn above average profits if they position themselves in attractive industry. Porter (1980) reiterated that rapid industry growth ensures strong performance of the incumbent even if there is a market share gain by new entrants. This has been confirmed by Spanos et al. (2004) which identified that industries

characterised by higher entry barriers and higher growth industries achieved higher profits. It has also been confirmed that both industry effect and firm effect affect profitability (Claver et al. 2002).

In spite of the various arguments supporting industry effect on profitability, other studies have completely discounted any link between the industry and profitability. Schiefer and Hartmann (2013) arguing from the market-based view (MBV) perspective documented that although the attractiveness of the industry is important element in determining performance, the MBV approach acknowledged that the strategic positioning within the market is an important factor which allows persistent firm specific deviation from the average profit of the industry. This has been recognised in the earlier study by Fairfield et al. (2009) which identified that industry-specific models do not elevate a firm's profitability and pointed that there is no industry effect on profitability forecasting. In addition, arguing from the resource-based view, Schiefer and Hartman (2013) explained that being a member of a specific industry is of little or no relevance to performance differentials; rather factors responsible for superior profits are more connected to the heterogeneity of the firm resources. The difficulties involve in copying the benefits that accrued to firms with tangible and intangible resources that are assumed to be rare and costly to imitate enhance the profitability of the firm and deviate from the average industry profit. Rumelt (1991)for instance found that firm effect is about three times more important than industry effect. Hawawini et al. (2003) also concluded that on the average, firm effect on profitability is more important than industry effect on profitability. Based on the theoretical and empirical discussion, the hypothesis below is formulated.

H11: Membership of an industry has significant impact on the profitability.

5.3.3 Risk tolerance (Leverage)

It has been suggested that financial leverage influence cost of capital, improves firm's profitability and stock price. On the basis of signalling theory where there is asymmetric information, debt should be positively correlated to profitability (Kebewar and Shah 2012). Nawaiseh (2015) explained that when a debt instrument is issued by the firm, it gives positive signal to the market that the firm is expecting a positive future cash flow and consequently impacts on stock performance. It is also argued that debt is beneficial when a firm attains maximum profit which maximises the return to the shareholders (Ahmad et al. 2012). Ahmad et al. (2012) explained that if a company have more debt it would have less income tax commitment although financial risk will increase. They explained that leverage is a key

aspect of strategic planning because it helps to increase the rate of return by generating excess return than the cost of borrowing. Arguing from the Agency theory, Kebewar and Shah (2012) indicated that the correlation between debt level and profitability could be positive or negative depending on whether we are looking at agency cost of shareholders and managers or agency cost between shareholders and lenders. Whilst positive relationship under the agency theory is expressed on the former, in the case of shareholders and lenders, it is seen as negative. These assertions have been supported by many empirical studies. Gill et al. (2011) for instance identified positive relationship between short-term debts to total assets and profitability as well as long-term debt to total assets and liability of manufacturing firms in the United States. Li and Hwang (2011) confirmed that firm size and leverage impact on firm earnings and concluded a positive correlation with profitable firms. They, however, emphasised that increase in financial leverage could have negative impact on unprofitable firms.

Ahmad et al. (2012) however argued that whilst financial leverage is more beneficial to firms in the period of economic boom, in the period of economic recession, financial leverage could have adverse impacts on profitability. They explained that high financial leverage could cause cash flow problems during the period of economic recessions because lower sales firms may not be able to meet high interest commitments. This argument is in line with the findings of Li et al. (2011) that increasing financial leverage could have negative impact on financial performance of unprofitable firms. In the analysis of how variations across ownership structures affect firm performance, Kapopoulos and Lazaretou (2007) also analysed how variations across ownership structures affect firm performance and found evidence of reducing effects of the differences between the interest obligation incurred when borrowing took place and interest rate during the sample period. Confirming the results of Kapopoulos and Lazaretou (2007), Xu's (2012) findings also documented negative relationship between leverage and profitability from a study which was conducted in the manufacturing industry in North America. Aligning the above arguments with the fact that most companies listed on AIM are new and unprofitable, the following hypothesis is postulated.

H12: Financial leverage has significant influence on profitability of AIM listed firms.

5.3.4 Liquidity

Liquidity measures the extent to which firm cash and other short-term resources can meet their immediate short-term obligations. Various studies have shown that liquidity has

significant relationship with financial performance. Teruel and Solano (2007) found that shortening the cash conversion cycle could improve profitability. The study revealed that managers could create value by reducing their inventories and number of days for which their accounts are outstanding. Similarly, Teruel and Solano (2007) indicated that negative relationship exists for firms with higher current ratio and longer cash conversion cycle with profitability. Saleem and Rehman (2011) showed that there is a positive relationship between holding liquidity and profitability up to a certain point beyond which holding further liquidity diminishes profitability. The study, therefore, shows consistency with Miller and Orr (1966) model which provides that when cash reaches the maximum level, it should be invested in marketable securities. In similar vein, Assaf Neto (2003) explained that investment in current assets are usually less profitable than fixed assets and investment in current assets generate additional cost for maintenance thereby reducing profitability of the firm. These ideas are also supported by economic theory of risk and returns. Lower investment in working capital whilst sacrificing the margin of safety of the firm by increasing the insolvency risk, positively impacts on profitability as it reduces the funds tied up in less profitable assets (Assaf Neto 2003).

However, Umobong (2015), arguing from the trade-off hypothesis, averred that the advantage of holding cash is the savings that are achieved from transaction costs to raise funds and does not require liquidation of any assets to make payments. The other argument presented by Umobong (2015) is that liquid assets can be used by firms to finance their operations if medium funds are not available or they are exorbitant. Positive relationship between liquidity and financial performance has been confirmed by Trumpp and Guenther (2017) on the analysis of environmental and financial performance relationships of larger international firms. Others have also documented that high liquidity is usually considered as a sign of financial strength. Based on these arguments the hypothesis below has been developed.

H13: There is a significant relationship between liquidity and profitability

5.3.5 Board Size

There has been contrasting arguments on the extent to which board size influences corporate performance. Whilst some studies have argued for positive relationship between larger board size and profitability, others have argued that the existence of large board size negatively influence profitability. Large board size is normally seen as fair representation from the various shareholder interests which may reduce information asymmetry. Dalton and Dalton

(2005), arguing in favour of large board size indicated that companies could receive valuable advice from a diversified board and enhance their performance. Dalton and Dalton's (2005), argument stems from the fact that large board size brings in pool of expertise with diversity of specialization that can enhance the decision-making process and improve profitability. Larger board size, aside ensuring effective supervision and monitoring of management (Klein 1998), the possibility of CEO dominance is also reduced. Andres and Vallelado (2008) in their analysis of 69 banks found a U-shape relationship between board size and financial performance. They argued that larger boards are efficient at the advisory, monitoring, and improved governance roles as well as raise return. They put the upper limit of directors at 19 beyond which control, coordination and decision-making becomes difficult causing the cost to outweigh the expected benefit.

Others have also strongly argued against large board size. Large board size, it is argued, results in coordination and communication challenges (Eisenberg et al. 1998). It also increases cost in terms of members' remuneration, coordination and communication (Raheja 2005). These challenges may result in the ineffectiveness of the board which may impact negatively on the firm's performance since the board becomes symbol rather than a functional entity (Hermalin and Weisbach, 1988). Guest's (2009) empirical study of UK listed firms from 1981 to 2002 found that that large board size was negatively related to profitability. Bathula (2008) also reiterated that smaller boards could avoid conflict and factions that normally exist in the case of larger boards. Therefore, companies with smaller board size can enhance their profitability by avoiding costs and other resources that might be used in resolving conflicts in the case of larger companies. On the basis of these arguments, the hypothesis below has been formulated.

H14: There is a significant relationship between board size and profitability

5.3.6 Number of Non-Executive Directors (NEDS)

It has been argued that the existence of non-executive directors presents a balance of interest between shareholders and other stakeholders in terms of monitoring management behaviour. This is important in ensuring that the principal-agency problem that exists between shareholders and management is curtailed. It is claimed that the non-executive directors' thinking is supposed to align more with thoughts of shareholders since they are non-executive directors and hence minimize the agency cost further. Hardwick et al. (2011) investigating the effect of corporate board on insurance firms' profit efficiency noted a positive impact of independent non-executive directors on the profit of the firms. The

inclusion of the independent outside directors acts to balance the scale of decision making at the boardroom to prevent management opportunistic behaviour which may relate to psychological or economic needs. Abidin et al. (2009) found that outside non-executive directors assist objective evaluation of management and help control and monitor opportunistic behaviour which improves performance. Tanna et al. (2011) also found positive and significant association between outside directors and bank efficiency in the UK.

However, contrary to the positive arguments on the existence of independent executives and financial performance, others have argued that independent outside directors do not improve firm performance. In support of negative correlation between NEDS and financial performance, Fernandes (2008) found a clear alignment of both management and shareholder interest and lesser agency problems in firms without non-executive directors. This has also been supported by Mangena et al. (2012) which discovered that independent executive directors on a board affect performance negatively. They suggested that the environment plays critical role hence the sample firms reduced the monitoring role played by NEDS and increased the executive directors' role as a strategic management tool in crisis environment. In view of these arguments, the hypothesis below is formulated.

H15: There is significant relationship between the number of non-executive directors and financial performance.

5.3.7 CEO Remuneration

In the UK, pay for performance by listed companies has been in existence for more than three decades (Tatton 2014). Tatton (2014) documented that the acceptance of this culture has gone beyond boardroom with investors and political parties supporting the assertions by the UK secretary of state that 'generous rewards are justified where a company has shown a strong long-term performance'. In line with the agency and resources dependency theories, the main functions of the board are provision of monitoring and advisory services to protect shareholders and improve performance. Provision of incentives is expected to impact on the directors' roles and the firm's performance (Hillman and Dalziel 2003). Mehran (1995), based on Tobin Q and ROA, demonstrated that firm performance is positively associated with equity than cash base incentives of directors. He suggested that executives are motivated most when their compensation is closely tied to performance indicators. Doucouliagos et al. (2007) also found a positive relation between total pay of directors and earning per share of Australian banks. They explained that past performance determines directors' remunerations. Miyienda et al. (2013) also reported a strong positive association

of directors' remuneration with financial performance from both accounting and market-based perspectives.

However, whilst some studies have shown positive correlation between CEOs' remuneration and performance contrary views have been expressed. Bruce and Skovorada (2015), arguing from optimal contracting theories, cite many instances why CEOs' remuneration may not be related to performance. They indicated that based on competitive and efficient market, pay arrangements for CEO's and other senior executives are based on complex set of factors including talents, experience, size of the firm and the complexity of the firm business. Bruce and Skovorada (2015) reiterated that performance-based remuneration is less relevant when performance measures are less reliable. This idea supports Abdullah's (2006) study which noted a significant negative link between the directors' pay and profitability among sampled firms in Malaysia and asserted that firm size seems to influence directors' incentive than profitability. Similar observation was made by Fernandes (2008) who also concluded that firm size is the main determinant of directors' remuneration and that there is no link between directors' pay and firm performance. Based on these theoretical and empirical arguments the hypothesis below has been formulated.

H16: There is a significant relationship between CEO remuneration and financial performance.

5.4 Summary

Although many studies have been conducted on environmental and financial performance relationships, the results have been contradictory with some producing positive relationship between environmental and financial performance whereas the other studies have also concluded negative relationship between environmental and financial performance relationships. Whereas the inconsistency in the existing studies has emerged from theoretical arguments based on revisionist and neoclassical perspectives, others have attributed it to lack of objective environmental criteria. Horvathova (2010) for instance, pointed out the difficulty of generalising the results of particular study due to absence of clear objective environmental criteria. Whereas Russo and Fouts (1997) study has been criticised for using FRD environmental ratings which do not give environmental quality beyond compliance, Wood and Graves (1997) study has also been downplayed for using KLD index which include other social performance variables and therefore not restricted to environmental quality variables.

To overcome these limitations this study has developed testable hypothesis based on comprehensive environmental quality measures identified by GRI, UNGC, Defra and has been considered as suitable for both smaller and larger firms. These environmental quality criteria are energy efficiency, compliance to regulations, waste control, pollution control, material and resource efficiency and stakeholder engagement. Whilst the hypothesis has been built on the basis of regulatory, theoretical and empirical findings on the composite environmental quality (EMQ), the study has also developed hypothesis based on the disaggregated measures of environmental quality, namely energy efficiency, compliance to regulations, waste control, emission control, material and resource efficiency and stakeholder engagement in order to draw distinction on how different components of environmental practices impact on financial performance.

In relation to EMQ and FP relationships, based on the line of arguments from theoretical predications and empirical findings, it is hypothesised that the relationship between EMQ and FP is not expected to be linear and therefore depending on the level of environmental engagement the relationship could be u-shaped or inverted u-shaped. Drawing our argument from Vijfvinkel et al. (2011) it is postulated that although sustainable environmental practices are valued by the society and likely to pay premium for environmental friendly products, it is not expected that the relationship will be linear as at some point the opportunity to derive financial benefits from sustainable environmental practices may be lost. Thus, becoming more sustainable does not guarantee financial benefits in perpetuity. Hypotheses has also been formulated for other key objectives of the study, the effect of cash resources on EMQ and FP relationship as well as the impact of firm growth on EMQ and FP relationships. Finally, the chapter has discussed the hypothesis for both company specific factors such as size, liquidity, industry, and risk tolerance, as well as governance factors including the board size, the number of non-executive directors and CEO remunerations with justifications on how they could influence profitability. The study has included governance variables as evidence from Tauringana et al. (2017) has shown that board of directors are becoming increasing concern about environmental issues due pressure from regulators and stakeholders. Therefore, it is expected that listed SMEs similar to large firms are also likely to face pressure from stakeholders and therefore governance factors are likely to have substantial impact on EMQ and FP relationships.

CHAPTER SIX

RESEARCH METHODOLOGY

6.1 Introduction

This chapter dwells on the research methodology and the overall design to achieve the research objectives. The chapter is structured into three main parts. The first aspect discusses the research philosophy and approaches. The second section deals with the research methods and discusses quantitative data, secondary data, population, sample, as well as the dependent and the independent variables. The third aspect concentrates on data analysis and different regression models used for the analysis. The chapter ends with the summary and conclusion of the research methodology.

6.2 Research Philosophy/Methodology

The concept of methodology refers to the whole process of research work. Collis and Hussey (1997) defined research methodology as the overall approach of the research from theoretical underpinnings to the collection and analysis of data. Remenyi et al. (1998) also document that it is the procedural framework within which the research is conducted. Dudovskiy (2014) however argued that the research philosophy reflects the author's important assumption and these assumptions are the basis for the research strategy. It is therefore important that each research set out the philosophical assumptions and procedural framework used to explain its findings. Burrell (1979) provided that the two philosophical assumptions that are commonly used in social science and management are ontology and epistemology. Other philosophical assumptions also given by Burrell (1979) are human nature and methodology.

Blaikie (2007) defined ontology as "the science of studying being" and it is about the nature of reality. Ontology centres on whether social entities need to be perceived as objective or subjective. Dudovskiy (2014) therefore classified ontology as objectivism and subjectivism. Saunders et al. (2009) indicated that objectivism assumes the position that social entities exist in reality external to social actors concerned with their existence. Objectivism is, therefore, an ontological position that asserts that social entities and their meanings have existence that are independent of social actors (Bryman 2004). Subjectivism, however, is grounded on the preposition that social phenomena are created from perceptions and actions of social actors concerned with their existence. It has been formally defined by Bryman (2004) as ontological position which believes that social phenomena and their meanings are continually being accomplished by social actors. The ontological position that was adopted in the current study is objectivism. The study observed the several annual reports of

companies and took the position that social phenomenon and their meanings exist independent of the social actors. Perceptions, feelings as well experiences of managers, were therefore not considered as the study is only based on observable facts.

Epistemology, on the other hand, is concerned with the nature, sources, and limitations of knowledge. It involves organising and explaining knowledge in the form of theories (Lancaster 2005). Saunders et al. (2008) also indicated that epistemology constitute a researcher's view on what is acceptable knowledge. Epistemologists believed that there are four different sources of knowledge: intuitive, authoritarian, logical, and empirical. Intuitive knowledge is based on feelings and beliefs in contrast to reliance on facts. On the other hand, authoritarian knowledge depends on information that has been obtained from books, experts, supreme powers, and research papers. Logical knowledge deals with creation and the application of logical knowledge, whereas empirical knowledge relies on objective facts that have been established and can be demonstrated. Dudovskiy (2014) emphasised that a research process may integrate these sources of knowledge within a single study.

In terms of epistemology, intuitive knowledge, which is based on beliefs and feelings of individuals, are not considered. As indicated, the study only relied on observable facts. However, all the other sources of knowledge or theories were very relevant for the study. The study largely depends on authoritarian knowledge as it obtained much information from books, research papers, as well as guidance from experts. The research has also used extensively, previous empirical studies that have demonstrated the relationship between environmental and financial performance and therefore empirical knowledge is a key to the study. Most importantly, the study is also expected to create new knowledge through the application of logical reasoning based on the outcome of the observation from the study. Thus, authoritarian, logical, and empirical knowledge were acceptable for the study, whereas intuitive knowledge was not acceptable.

The philosophical assumption of human nature is concerned with how human beings relate to the environment. Burrell (1979) identified that the association between human being and the environment is either determinism or voluntarism. Determinism assumes that human beings, including their activities, are determined by their environment. On the contrary, voluntarism postulates that human beings are completely independent from their environment and create the environment rather than being determined by the environment. The other philosophical assumption identified by Burrell (1979) is methodology, which relates to the methods used to learn or investigate the social world. The two contrasting views

identified by Burrell (1979) are nomothetic and ideographic. Nomothetic view proposes rigorous and scientific testing of hypothesis as ideal research technique. Ideographic, however, assumes subjective position and argues that one can only understand the social world by participating and being involved in the situation.

This study takes the position of nomothetic view as it is also based on rigorous scientific testing of hypothesis involving the use of econometric model to test several hypotheses on the relationship between environmental and financial performance. Analysis of subjective data as proposed by the ideographic views is not incorporated into the study.

6.2.1 Research Paradigms

Different paradigms have taken place due to remarkable growth in social science research. However, Dash (2013) believed that there are mainly two paradigms to the verification of theoretical prepositions: positivism and anti-positivism (interpretivism or constructivism). A paradigm provides a basic set of beliefs that guide action. Thus, it provides more clarification from the basic ontological and epistemological position and helps categorise different research approaches. Positivists and anti-positivists assertions are discussed below.

6.2.2.1 Positivism

Bryman (2004) explained that positivism is an epistemological position that advocates the application of the methods of natural science to the study of social reality and beyond. It is built on the idea that only factual information gained through observation is trustworthy. In positivism, the role of the researcher is restricted to data collection and interpretation through objective approach and the research findings are normally observable and quantifiable (Dudovskiy 2014). Similarly, Collins (2010) stated that positivism has ontological view of the world, as observable elements and the events that interact in it are observable, determined, and are in regular manner. Thus, studies from positivist's point of view are usually a structured methodology to enable replication (Gill and Johnson 2002). Collis and Hussey (1997) summed up positivist research approach as involving the use of quantitative data, use of large sample size, concerned with hypothesis testing and use of highly specific data. Other features of positivist approach also include the use of artificial location and generalisation from sample to population.

6.2.3 Anti-positivism (Interpretivism or Constructivism)

Crotty (1998) recognised that a major anti-positivist stance is interpretivist. Interpretivists assert that natural reality is different from social reality and therefore require different

methods. It is argued that whilst natural sciences are looking for consistencies in data to deduce laws (nomothetic), social sciences often deal with individual action (ideographic). Interpretivism, therefore, integrates human interest into the study. Interpretivist's research assumes that access to social reality is only through social construction such as language, consciousness, share meanings and instruments (Myers 2009). Therefore, understanding of knowledge is seen as one's own interpretation of realities that is faced based on one's experience. It is therefore considered as inductive in nature, there is no generalisation of this perspective, and it is often related to qualitative method of data collection.

It, therefore, follows that whilst positivism stands for objectivity, measurability, controllability and predictability, construct of laws and human behaviour, interpretivism focuses on understanding and interpretation of phenomena and making meaning out of the process. The study clearly takes the position of positivism. It involves the use of quantitative data such as return on assets, earnings per share and environmental performance measures expressed quantitatively. Large sample size, which is the hallmark of this study, is also a strong feature of positivist approach. The study, to ensure that the data is more representative would use annual report of 201 companies for a period of six years thereby giving 1206 observations. Hypothesis testing which Collis and Hussey (1997) linked with positivists is also largely employed on the study. The study has developed different hypothesis based on the empirical review of the previous studies to show the association of environmental and financial performance. Those hypotheses supported by the findings of the study and supported by the findings from other empirical studies are accepted, whilst others have been rejected in line with the outcome of the study. In line with the positivists approach, generalisation has been made from the sample of 1206 observations as to whether the relationship between environmental management performance and financial performance of AIM listed firms are positive, negative or no relationship.

6.3 Research Approach

6.3.1 Deductive and Inductive Research Approaches

Related to positivism and interpretivism are deductive and inductive research approaches. Deductive approach is concerned with developing hypothesis from a theory and designing a research methodology to test the hypothesis. It begins with an expected pattern that is tested against observations. After the hypothesis is tested mainly through observation, a principle is confirmed, refuted, or modified. The hypothesis usually presents assertions about two or more concepts and attempts are made to explain the relationship between them (Gray 2012). Deductive approach of research, therefore, ensures that principle or ideas are tested through

empirical observation or ideas. In contrast, inductive approach starts with observations and theories are formulated at the end (Goddard and Melville 2006) . Thus, no theories will apply at the beginning of the research and the researcher is not sure about the nature of the findings until the study is completed. Gray (2012), explaining inductive process indicated that it commences with data collection and analysis to see if a pattern emerges that suggests relationship between variables. Inductive approach therefore essentially reverses the process found at the deductive approach, as there is no theory or hypothesis at the beginning of the research (Lancaster 2005). This study on the relationship between environmental management and financial performance takes the deductive approach. The study developed a set of hypotheses to test the extent of association between environmental and financial performance. Thus, expected pattern as to whether the relationship between environmental proactive management and financial performance are positive or negative are taken during the hypothesis development. Research methodology involving the use of linear regression model and non-linear relationship are used to test the relationships. Based on the results from regression models, generalised position has been taken as to whether the relationship between environmental performance is positive or negative.

6.4 Research Methods

Researchers only have two main choices in terms of the research methodology to be used and this can either be quantitative or qualitative research. Whereas quantitative research follows nomothetic methodology and therefore uses rigorous scientific testing of hypothesis, qualitative research is based on ideographic methods and considers human feelings and ideas as key component of the research. Although Mora (2010) argued that both qualitative and quantitative research complement each other, they constitute alternative research strategies from different ontological and epistemological perspectives. Obviously, this research follows nomothetic methodology and therefore adopts quantitative research.

6.4.1 Quantitative Method

Quantitative research methodology emphasises the measurement of analysis of causal relationship between variables (Denzin and Lincoln 1994). Mora (2010) stated that quantitative research is conclusive in its purpose as it usually quantifies a problem and understand how prevalent it is by looking for projectable results to a larger population. Worrall (2000) asserted that one reason why quantitative research is widely used lies in its predictive advantage. Quantitative research ensures reliability owing to its inherent objectivity and thereby making it more representative and easier to generalise findings (Collis and Hussey, 1997). Although Bryman and Bell (2015) have shown that the setback

of quantitative research as being overreliance on measurements and could alienate the research from everyday reality, Tewksbury (2009) claimed that its continuous and widely use lies in its corrective and predictive nature.

6.4.2 Definition of SME

In line with the research objective to measure the corporate environmental management performance and financial performance of companies listed on AIM, all the three categories of companies, small, medium and large companies that disclose their environmental management practices were selected. The sample period of the study is from 2011 to 2016. It is estimated that about 90% of all enterprises are small to medium enterprises (SMEs) and employ about 63% of the workforce in the world (Munro 2013). However, finding a universally acceptable definition for SMEs is difficult. Berisha and Paula (2015) indicated that academia, policy makers, and authors apply SME definition in terms of a dichotomy between universality and standardisation; quantitative criteria are mainly used for their classification. Some definitions that are based on quantitative criteria have been given by the European Commission. European Commision (2015) definition is based on the number of employees, annual turnover and the balance sheet and indicated that whilst the criteria for the number of employees is mandatory, filling the criteria for the two other financial criteria: turnover and the balance sheet, is at the discretion of the enterprise. SMEs which are made up of micro, small, and medium enterprises consist of businesses which employ less than 250 persons, and which have an annual turnover not exceeding €50 million, and/or an annual balance sheet not exceeding €43 million (European Commission, 2015). The detail EU classification of SME is given in the table below.

Table 2: Definition of SMEs

Enterprise Category	Number of Employees	Annual Turnover	Annual Balance Sheet Total
Medium-sized	< 250	≤ ≤€50 million	≤€43 million
Small	< 50	≤€10 million	≤€10 million
Micro	< 10	≤€2 million	≤€2 million

Source: European Commission (2015)

Similarly, The World Bank uses three quantitative criteria which are also based on the number of employees, annual total assets in US dollars, and the annual sales based on the

US dollars. The World Bank's definition of SMEs provided by World Bank (2008) also defines SMEs as businesses with less than or equal to 300 employees, with annual sales of less than or equal to $15 million and have an annual total assets less than or equal to $15 million. Thus, aside the number of employees that was quite comparable, the other two measures turnover and annual balance sheet are not comparable. Storey (1994) recognised the lack of single and universally accepted definition for SMEs. To resolve the lack of consensus on SMEs definition, Bolton (1971) proposed economic definition based on three criteria listed below to identify SMEs (Bolton, 1971):

- The size of the market share must be very small
- Personalized management with no formal organisational structure
- Independent with no affiliations to the larger enterprises

The definition of SME based on economic attributes have also been emphasised by the EU Commission (2015). The EU report (2015) indicated that aside the numerical strength such as the number of employees, access to additional resources must also be considered. They argued that a smaller firm that has access to significant resources, linked with a larger enterprise or has more complex and ownership structure might not be eligible for SME status. However, in line with many studies on environmental management performance and financial performance (Aiyub et al. 2009) and as most of the companies listed on the Alternative Investment Market are from the European Economic Area, the EU definition of SME based on the number of employees which is also comparable with World Bank's definition is adopted in this study.

6.4.3 Sample Selection

In all 201 companies were selected from 1049 companies listed on the AIM as at February 2016 spread across 26 different industries. However, the industries have been amalgamated into three sectors in accordance with the level of pollution. The three sectors are Services, Manufacturing, and Mining/Construction. Less polluting firms mainly banks, financial services, real estate investment trusts, and real estate investment services (Konar and Cohen 2001) were excluded. Ntim and Soobaroyen (2013) also indicated that such companies should be excluded as they are subject to different disclosure and regulatory requirements. Thus, firms that are included must consistently disclose their environmental performance. This is in line with disclosure theory that there is a positive link between environmental performance and environmental disclosure as inferior firms are unlikely to disclose their lack of environmental engagement (Gómez-Bezares et al., 2017). All the 1049 companies were

obtained from the London Stock Exchange website and the 201 were selected based on the criteria below:

- The company must be listed on the Alternative Investment Market.
- The company must disclose at least one measure of environmental performance.
- The company must have the last 6-year annual report (2011 – 2016) which is the period selected for the study.
- Financial and other less polluting firms were excluded.

Table 3: Sectors and Industries of the Selected Companies

Services	**Number**	**Percentage**
Media	10	4.98%
Marketing	10	4.98%
Professional Service	2	1.00%
General Retailers	6	2.99%
Support Services	31	15.42%
Travel & Leisure	6	2.99%
Total	**65**	**32.34%**
Manufacturing		
Chemicals	4	3.77%
Electric and Electronic Equipment	5	3.14%
Engineering	10	6.29%
Health Care Equipment & Services	4	1.89%
Industrial Engineering	6	3.14%
Pharmaceuticals & Biotechnology	5	1.89%
Software & Computer Services	12	5.03%
Technology, Equipment & Hardware	4	1.89%
Telecommunication	2	2.52%
Food Producers	5	2.52%
Household Goods	4	2.52%
Leisure Goods	4	1.89%
Industrial Metals	3	0.63%
Personal Goods	6	1.26%
Total	**74**	**36.82%**
Mining and Others		
Alternative Energy	4	3.14%
Construction & Mat	4	1.89%
Forestry & Paper	2	0.63%
Electricity	3	0.63%
Mining	30	17.61%
Oil and Gas Producers	19	11.32%
Total	**62**	**30.85%**
Grand Total	**201**	**100.00%**

The criteria used for selecting the companies were set for many reasons. Firstly, they allow for easy comparability with similar studies (Khanna and Damon 1999, Ramanathan 2016, Trumpp and Guenther 2017). The above period (2011 – 2016) was also selected as it gives the latest financial statement available and during this period, many environmental initiatives were taken by the UK and the EU. For instance, EU Directive 2012/27/EU, which was

adopted by member companies in October 2012, was expected to improve environmental performance by reporting companies. AIM in the UK was also employed as a sample frame as most of the existing studies on environmental and financial performance relationships had only focussed on large companies listed on the main markets. (Earnhart and Lizal 2007, Qiu et al. 2016). In selecting AIM listed companies provides likely provides likely opportunities for new evidence in this area of research.

6.5 Variables

6.5.1 Dependent Variables (Corporate Financial Performance)

Existing studies on environmental and financial performance relationships have used different measures of financial performance with no consensus on proper measures of financial performance (Cochran and Wood 1984). However, the wide range of financial performance falls into two categories, accounting returns (internal measures of measures and investor returns (market-based measures).

Accounting-based methods are regarded as the primary measures of financial performance and focus on how a firm's profits/earnings respond to various managerial decisions. The most common measures of accounting-based methods that have been used in environmental and financial performance relationships include earnings per share - EPS (Cordeiro and Sarkis, 1997), Price-Earnings Ratio - P/E Ratio (Freedman and Jaggi 1992), and Return on Assets (Hart and Ahuja 1996, Russo and Fouts 1997, Trumpp and Guenther 2017), with ROA being the most popular method for accounting-based measures. Other measures also include Return on Equity (ROE) and Return on Shareholders Fund. However, Cochran and Wood (1984) identified that there are several problems associated with EPS and P/E ratio as measures of financial performance. They indicated that EPS and P/E ratios are influenced by growth rate and the accounting practices adopted by the firms. They also noted that EPS and P/E Ratios cannot be accurately compared to other firms without considering the effect of financial leverage and risk differences.

Although ROA, not a perfect measure of performance as it also faces some of the problems enumerated under EPS and P/E ratios, it is considered as the most effective and broad measure of performance (Hagel et al. 2013). It is argued that ROA captures the fundamental performance of the business in entirety as it looks at the performance of both the income statement and the assets that are used in running the business. In comparison with Return on Equity and Return on Shareholders Fund, Hagel et al. (2013) emphasised that these measures are more susceptible to financial engineering through leverage that can obscure the fundamental of the business. However, Hagel et al. (2013) asserted that ROA has a minimal

vulnerability to short-term manipulation that can transpire on the income statement, as many assets both tangible and intangible, involve long-term decision making and difficult to be manipulated in the short-term. Afrifa (2013) has also argued that ROA is widely used as a measure of profitability because they provide strong indication of management performance in relation to a given resource. Therefore, considering the advantages that ROA has over other measures of financial performance and in line with many studies on environmental and financial performance relationships (Hart and Ahuja 1996, Russo and Fouts 1997, Trumpp and Guenther 2017), this study adopted ROA as a measure of financial performance.

In the case of market-based measures, financial performance is measured based on the perspective shareholders. The market-based measure is more of a forward-looking and depicts the expectation of shareholders regarding the future performance of the firm (Al-Matari et al. 2014) . The most widely used performance measures are changes in share price/market value (Moskowitz 1972, Konar and Cohen 2001), Total Shareholder Return (Filbeck and Gorman 2004, Trumpp and Guenther 2017), and Tobin's q (Elsayed and Paton 2009, Muhammad et al. 2015). However, market-based measure of performance based on changes in share prices or market value is considered flawed as changes in share price is regarded as only one aspect of return to shareholders and that dividend income, which is another aspect of return to shareholders must also be included (Cochran and Wood, 1984). Although Total Shareholders Return, which captures both changes in share price and dividends to shareholders is considered a comprehensive measure of financial performance than just changes in share price, it has also been criticised that it fails to capture another dimension very important to investors that is risk. In the case of Tobin's q, although estimating the replacement cost of assets can be very difficult, especially where intangible assets are included, it provides additional information relating to risk face by shareholders as it identifies whether the shares of the company are overvalued or undervalued. Thus, higher Tobin's q represents success in a way by providing an indication that the firm has leveraged its investment to develop a company that is valued higher by the market compared to its book value (Kapopoulos and Lazaretou 2007). Therefore, in line with many studies on environmental and financial performance relationships, and the fact that it provides more information to the shareholders than the other types of market-based measures, this study employed Tobin's q as a measure of investors return.

6.5.2 Independent Variables (Environmental Performance of Measures)

The importance of well-defined environmental performance measures helps business to implement strategies by linking the various levels of the organisation business with clearly

defined targets and benchmarks. On the contrary, many of the previous studies have used one or few environmental performance measures instead of well-defined performance guidelines such as Ilinitch et al. (1998) and DEFRA (2013) indicators. For instance, Clemens (2006) survey questionnaire on environmental performance only relates to green investment. Similarly, Fogler and Nutt (1975), Earnhart and Lizal (2007), Wagner (2005), as well as Muhammed et al. (2015) used only pollution rating as an environmental performance measure. Klassen and McLauglin (1996) also used only environmental awards, whereas Filbeck and Gorman (2004) and Naila (2013) used only environmental regulations. Based on DEFRA (2013) guidelines, environmental performance measures (independent variables) used for the study are discussed below.

6.5.2.1 Waste

Waste is an unwanted or unsuitable substance. Examples of waste include nuclear waste, refuse, waste water, litter, scrap, and debris. An organisation's waste and its subsequent disposal represent costs that could be very significant depending on the type of industry that the firm belongs. Waste reduction at source means more profit and less pollution as each amount saved on material cost goes to the bottom line. In support of DEFRA (2013) ideas, a very recent empirical research by Trumpp and Guenther (2017) that measured waste intensity as negative total amount of waste produced divided by sales and as a proxy of environmental performance, found that there is a positive relationship between environmental and financial performance for companies with high environmental performance. However, the result also showed a negative relationship with companies with low environmental performance. As shown by Sroufe (2003), one of the main reasons that a firm reduces its waste is to control costs. This has been emphasised by Royston (1980) that cost can be controlled by pollution abatement through waste detection and selling residuals as raw materials.

6.5.2.2 Emission (Greenhouse Gases)

The greenhouse effect is a natural phenomenon where certain gases such as carbon dioxide and water vapour in the atmosphere increase the temperature on earth owing to an ability to trap heat (DEFRA, 2006). Busch and Hoffman (2011) described GHG as emissions from the onsite production process, onsite power generation, combustion of fossil fuels in boilers and furnaces as well as consumption of purchased energy. They argued that GHG has a direct link with operational costs as the level of carbon emission is implicitly determined by the firm usage. In political regimes where emissions are priced, carbon output will constitute a further cost component. Therefore, whereas higher emissions negatively impact on profits,

corporations that put measures in place to control emissions are saving costs. As shown by Cordeiro and Sarkis (1997) and Hamilton (1995) emissions are a useful signal of the firm's productive efficiency since firms with high emissions may be wasting resources.

6.5.2.3 Material and Resource Efficiency/Energy

Efficient use of resources involves recycling of materials and waste, reuse and use of lighter weight materials. As shown by DEFRA (2006), recycling is more efficient than using virgin materials. It indicated that recycling aluminium for energy is 95% more efficient than using virgin aluminium; likewise, recycling paper is 60% more efficient than using new paper. Recycle is measured as tonnes of materials/waste recycling during a period.

Gilley et al. (2000) also explained that material and resource efficiency could be pursued through process-driven initiative or product-driven environmental initiatives. They indicated that resources could be effectively utilised through using recycle or environmentally conscious inputs to production, through redesigning production or delivery system and waste reduction strategies. This has also earlier been identified by Biddle (1993) that process-driven initiatives impact on firm bottom-line through cost reduction. Thus, process-driven initiatives allow the organisation to reduce their costs by using inputs more efficiently, reduce the use of the hazardous substance, reduce accidents and its resultant litigations as well as removing unnecessary steps in the production process and thereby impacting positively on profits. Also, Vijfvinkel et al. (2011) confirmed that firms that have a policy on the re-usage of materials significantly perform better in terms of profit development.

6.5.2.4 Stakeholder Engagement

In the external stakeholder's relations, Illinitch et al. (1998) and Wood (1991) provided that stakeholder relations include the willingness of the firm to communicate with the various stakeholder groups by disclosing environmental performance information. Aragon-Correa et al. (2008) identified categories of stakeholders that are important when pursuing environmental proactive activities. These include local communities, shareholders, the media, environmentalists, and customers. Others are suppliers, friends, and relatives, unions, as well as environmental activists.

Carter et al. (2000) indicated that liaising with suppliers based on environmental purchasing metrics such as recycle packages, use of lighter weight materials, and environmental friendliness of products and packaging are likely to catch the eyes of a variety of stakeholders, improve the firm's reputation and in anticipation of improved performance and shareholders, will also react positively (Fombrun and Shanley 1990). Carter et al. (2000)

concluded that environmental purchasing is positively correlated with financial performance and this has also been confirmed by Bourlakis et al. (2014) study where small firms benefited from sustainable supply chain measures.

6.5.2.5 Compliance/Regulations

This deals with how the firm meets minimum requirements that are prescribed by law. Regulations that are well established positively impact on the environment whilst the cost impact on the business is at worst controllable (Dulipovic 2001). Illinitch et al. (1998) observed that record of regulatory compliance mostly includes citations, fines, and penalties for breaching regulatory requirements. In the study by Cohen et al. (1997), compliance issues which were noted include a number of environmental litigation proceedings, superfund sites, the number of non-compliance penalties and a number of chemical spills. Similarly, the IRRC compliance index used by Filbeck and Gorman (2004) also provides information on penalties assessed to firms in relation to waste clean-up responsibilities, permit restrictions and reported spills.

Although costs of compliance could be huge, breaches of environmental regulations, apart from its effect on profitability, could also have reputational implications. Compliance with environmental regulations has also been noted by Clark et al. (2014), which reiterated that lack of compliance could seriously undermine the bottom-line. The study pointed out Anadarko and BP environmental failures that resulted in billions of dollar fines and strongly affected both their profit and share prices. Konar and Cohen (2001) using IRRC compliance index confirmed the significant positive relationship between environmental performance and intangible asset value of the firm. On the contrary, Filbeck and Gorman (2004) using the same compliance index revealed a negative relationship between environmental proactiveness and financial performance, whereas Naila (2013) using environmental regulation did not identify any significant relationships.

6.5.3 The Control Variables

Variables that are held constant in order to estimate the relationship between the other variables is termed as control variables. Control variables could be influencing factors when assessing the relationship between environmental and financial performance. One critical difficulty here is selecting the appropriate control variables. Some of the control variables which have been used in the existing studies which have been adopted in this study are size (Cordeiro and Sarkis 1997, López-Gamero et al. 2009), industry (Rumelt 1991, Claver et al. 2002), risk tolerance (Cordeiro and Sarkis 1997, Waddock and Graves 1997, Li and Hwang

2011), and liquidity (Eljelly 2004, García-Teruel and Martínez-Solano 2005). The control variables are fully discussed under the empirical literature review.

6.6 Summary of Dependent, Independent, and Control Variables

Table 4: Definition of Regression Model for Dependent, Independent, and Control Variables

Variables	Measurement
Financial performance	ROA and Tobin' q are financial performance indicators
ROA	Return on assets is calculated as net income divided by the total assets at the end of the financial year.
Tobin Q	Market Value of Firm divided by the total assets (logarithm of this figure was taken)
EMP	This is the composite of all environmental quality variables measured (Energy + Waste + Materials + GHG + Compliance + STAKE). Calculated by adding all items retained under each construct.
Energy	Number of energy efficient measures such as reduction in energy use, cost savings in the use of energy, use of alternative energy, fuel savings on light weight cars and plants, efficient use of energy disclosed in the annual report or standalone reports
Waste	Number of waste management measures such as destination of waste recycle, incinerated, reuse or recycle. Energy produced from waste, cost reduction from waste, activities undertaken to divert waste from landfills, improved waste prevention, cost savings in waste management, creating market for waste disclosed in the annual report or standalone reports
Materials	Number of material and resource efficiency measures such as use of light materials resources, cost savings in material usage, improved packaging, recycling, reuse, increase use of alternative raw materials with lesser waste, improved materials/product quality, reduction in utility bills, improved raw material handling/shorter lead times disclosed in the annual or standalone reports
GHG	Number of Pollution reduction measures such as such as reduction in the use of carbon dioxide, nitrous oxide, hydrofluorocarbons. Reduction in mobile combustion such as trucks, buses, trains. Reduction from operating facility or chemical process and cost savings from reduced emissions disclosed in the annual or standalone reports.
Compliance	Number of environmental compliance measures and policies such as obtaining environmental certification, environmental compliance policies, Identification of environmental risk, allocating environmental responsibilities to staff, absence of fines and penalties disclosed in the annual or standalone reports
STAKE	Stakeholder engagement. Joint environmental projects with the community, regular communication with stakeholders on environmental quality issues including collection and use of feedbacks, collaboration with customers and suppliers in terms of new product design and environmental audit of suppliers, Involving employees on environmental issues
Size	The logarithm of a total number of employees.
Liquidity	Current assets divided by current liabilities
Gearing	Level of risk measured by total liabilities divided by total assets
Industry	Industry represented by 1= Knowledge Service, 2= Other Service, 3 Medium-High Tech Manufacturing 4 = Low – Medium Tech Manufacturing, 5 = Other Manufacturing
Board Size	Board Size
NEDS	Number of Non-Executive Directors (Board Independence)
CEORem	CEO Remuneration
G	Growth in Assets
Cs	Cash and Cash Equivalents
$\mathcal{E}_i$	The error term

6.7 The Research Strategy

6.7.1 Content Analysis

Content analysis was used to obtain environmental performance variables as seen in the case of Montabon et al. (2007) and Chithambo (2013). Weber (1990) defined content analysis as a technique of coding content or text of a piece of writing into categories based on selected criteria. Content analysis is a systematic and replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Montabon et al. 2007, Karagiorgos 2010)

In social and environmental reporting, content analysis has been widely used to evaluate the extent of disclosure of various items in the annual reports (Guthrie and Abeysekera 2006). Guthrie and Abeysekera (2006) have also stated that content analysis has been focussed on annual reports of listed companies but combining annual reports with other information such as stand-alone environmental reports, internet materials, and newspaper articles should provide more robust empirical evidence in analysing social and environmental accounting. This approach has been adopted by Chithambo and Tauringana (2014) in their work on company specific determinants on greenhouse gas. Many other studies that have used content analysis in environmental and financial performance relationships (Patten 2002, Montabon et al. 2007, Karagiorgos 2010, Moneva and Ortas 2010a).

In citing the benefits of using content analysis, Montobon et al. (2007) suggested that it allows researchers to make inferences that can be collaborated with other methods of data collection. They also indicated that the use of content analyses makes it possible to use data which could have been too costly, no longer possible, or too obstructive using other techniques. However, despite such positive arguments in support of content analysis, Guthrie and Abeysekera (2006) identified its setbacks as including the fact that it captures the quantity of information rather than the qualitative aspect of the information. It has also been argued that the coding instrument may not capture the subject matter being investigated, as the coding instrument can be very subjective. For content analysis to be effective, it needs to fulfil certain requirements. Specifically, the sampling unit must be clearly defined, and the data capture must be systematic.

6.7.1.1 Sampling Unit

Vourvachis (2008) provided that one of the first decisions to be made when using content analysis is on the sampling unit. Krippendorf (2004) described sampling unit as units that are separated for selective inclusion in an analysis. It is important that content analysis defines sampling units so that if there are connections across sampling units, they do not

result in bias in the analysis. In achieving the research objectives, annual reports and standalone sustainability reports normally shown in the company's website formed the sampling units.

Many studies on Corporate Social Responsibility (CSR) including environmental proactive activities have used annual reports exclusively as sampling units (O'Dwyer 1999). Various reasons have been cited for exclusive use of annual reports. Campbell (2000) provided that annual report is the most widely distributed public documents of companies and therefore it can be accepted as relevant source of the company's attitude towards the environment. In addition, it has been argued that the regular pattern in which annual reports are produced makes it a reliable source of information. Similarly, Adams and Harte (1998) indicated that annual reports are the most singular important source of information on companies' activities. It is also considered as credible and consistent source of information in comparison with other sources of information. Environmental performance being an important aspect of a company's operation and performance indicator, it is highly unlikely that it will not be disclosed in the annual reports. Aerts and Cormier (2009) for instance indicated that where firms intend to signal good environmental behaviour, then the annual report is the appropriate forum.

In line with the positive arguments for using annual reports, many studies on environmental and financial performance relationships have used content analysis of the annual reports. Notably, Patten (2002) used content analysis of annual reports to study the relationship between environmental performance and environmental disclosure of 131 US listed companies. Karagiorgos (2010) also exclusively used annual reports in the study of Corporate Social Responsibility (CSR) and financial performance of Greek firms. Other studies, Montabon et al. (2007), and Fauzi (2009) have also used content analysis with annual reports as sample units to assess the relationship between environmental and financial performance.

However, it has been argued that the exclusive use of annual reports results in incomplete representation of the quantum of environmental performance (Zéghal and Ahmed 1990). This view is also supported by Unerman (2000) who reiterated that annual reports are not the only medium through which companies report their social and environmentally responsible behaviour. As a result, the use of other standalone sustainability reports in addition to annual reports has been on the increase. This has been confirmed by Erusalimsky

et al. (2006) that since 1990 there has been a rise in the use of voluntary standalone reports in addition to annual reports.

Also, Guthrie et al. (2008) indicated that companies may use annual reports and corporate website for reporting all kinds of information and therefore Unerman (2000) argued that future studies focussing exclusively on annual reports may not produce appropriate results. Studies that have used annual reports in addition to other standalone reports include Chithambo and Tauringana (2014), Al-Tuwaijri et al. (2004), as well as Harte and Owen (1987) . However, Unerman (2000) cautioned that a limit is set to the range of documents included in any research study as the researcher may be overwhelmed by the number of documents. O' Dwyer (1999), as well as Guthrie et al. (2008) also argued that it is impossible to identify all environmental responsible activities of the organisation under one study and therefore it is justifiable for studies to employ annual reports and standalone reports as sampling units, as these should contain majority of the CSER information.

6.7.1.2 Recording Units

Once sampling unit is identified, it is important that the recording unit is also established. Holsti (1969) defined recording unit as "specific segment of the content that is characterised by placing it in a given category. Krippendorf (2004) also emphasised that recording units typically should be contained in the sampling units but not exceeding it. Vourvachiz (2008) identified four main recording units as sentences, words, photographs and proportion of pages and pages size data. In support for using sentences as recording units, Gray et al. (1995) opined that sentences should be given priority if the intention is to infer meanings. Fahy et al. (2000), as well as Hillman (1999), employed sentences as recording units arguing that it is easy to use and reliable. In confirming the reliability of their studies, Fahy et al. (2000) reported a percentage agreement of 94%, whereas Hillman (1999) also reported a Kappa of 0.96%. However, the use of sentences as a recording unit has been criticised by Rourke et al. (2001) on the grounds that it introduces additional subjective steps as coders must first interpret the message before transforming them into sentences.

Wilmshurst and Frost (2000) however, used words and opined that compared to sentences, words seen to be appropriate of being smallest unit of measurement and this has the advantage of providing maximum robustness in assessing the level of disclosure. Krippendorf (2004) has also argued that to ensure agreements among different coders in content analysis it is important that the recording unit is defined as the smallest as possible and bear all the information required for the analysis and words seem to fulfil these criteria.

Others have also argued that using words as recording units allow tables to be captured; Hackston and Milne (1996) have indicated that one table may be taken as approximation of one sentence. Unerman (2000) has also given the setbacks of using words as recording unit by arguing that any non-narrative CSER disclosure such as photographs and charts may be ignored. Therefore, in economies such as US and UK where large proportion of annual reports are reported in graphs, using words as recording units imply that relevant aspect of the information may be ignored. In support of using photograph as recording unit, Preston et al. (1996) averred that the use of photographs to present and highlight corporate external financial reporting is being increasingly recognised by several regulatory bodies including Canadian Institute of Chartered Accountants.

In addition to sentences, words and visual presentation as recording units, others have also argued for the use of proportion of a page. Vourvachiz (2008) has shown that the main benefit of using proportion of page as recording unit is to generate detail measurement and comparable findings across similar reports and different companies. However, this has been objected by other researchers who argued that it is difficult to identify whether the information is related to CSER or not and there is also the problem of appropriate classification (Deegan et al. 2000). It has also been argued that using proportion of a page introduced additional areas of subjectivity regarding treatment of font and page sizes as well as margins and blank pages. To ensure objectivity, reliability and completeness of information, this study combined different recording units as far as they identify environmental performance measures and not repetitive of other recording units. Specifically, the use of statements, narratives and non-narratives such as photographs, charts and graphical presentations were relied on as recording units as seen in the study of Chithambo (2013). Combining different scoring procedures or recording units that considers thorough scrutiny of the information presented in the annual and standalone sustainability reports will ensure that both quantitative and qualitative information regarding environmental performance measures are considering during the recording process in contrast to other recording units that only consider mere counting of words or sentences.

6.7.1.3 Scoring Rules and Process

In content analysis, another important process is a decision on how to identify and capture information from the sampling units (annual and standalone sustainability reports). To ensure credible coding system that enhances credibility and replicability of results, Gray et al. (1995) recommended the establishment of clear decision rules. The essence of the decision rule is to simplify how items should be scored or coded, from the annual and

sustainability reports. Following the disclosure rule of CSEAR, Chithambo (2013) and Aburaya (2012) the following scoring rules were adopted:

- Any disclosure item that discusses environmental performance measures in relation to the organisation was recorded.
- Any information recorded must be explicitly stated. Implied meanings were not recorded.
- All information disclosed in the annual/standalone sustainability reports that identify the environmental performance measures regardless of their formats was to be recorded. Therefore, financial statements, narratives, non-narratives such as photographs, charts and other pictorial presentation were recorded.
- Where the information disclosed have more than one possible classification or categorisation, the item was classified under each appropriate category.
- Information repeated on the same sampling unit or another sampling unit was not recorded. That is, more than one disclosure containing the same information is recorded once.

As already indicated, the scoring rules that were adopted for the study ensured that both quantitative and qualitative disclosures were accounted for. Thus, sentences, statements as well as non-narratives were used and not mere counting of words or sentences; an approach which has been discredited by many authors (McMurtrie 2005, Stanny 2013). Once the scoring rules have been established, it is also important to determine the scoring system. Cooke (1989) indicated that there are two main approaches to developing scoring scheme to capture the level of disclosure. The first approach which was advocated by Copeland et al. (1968) involves a scale disclosure which varies from one to zero or any range deemed necessary. This approach has been used by Montabon et al. (2007) where raters measure environmental performance from annual reports based on Likert scale of 1-5, with 1 representing low intensity of environmental practices, and 5 representing high intensity of environmental involvement. However, Cooke (1989) criticised this approach and argued that the allocation of scores along a continuum is subjective. He, therefore, recommended the use of dichotomous process in which an item scores 1 if it is disclosed and zero if it is not disclosed. Cooke (1989) emphasised that if no weight is attached to disclosure item, then subjective weight of user groups will average out.

This study followed recommended procedures of Cooke (1989) by adopting the binary system of one if the item is disclosed and zero if it is not disclosed. This ensured that subjectivity associated with the continuum approach is avoided. Chithambo (2013) also used the binary approach and reiterated that using unweighted scoring system permits analysis to

be free from bias of a particular user group. Annual and standalone sustainability reports were obtained from the sample companies' website. Attention was paid to both narrative and non-narrative aspects of the reports as Guthrie et al. (2008) have shown that in the US and UK about 80% of the annual reports are in pictorial form. Spreadsheet, based on categories of environmental performance index identified above, was used to record the environmental performance disclosures by the sample companies. In circumstances where information was deemed relevant but could not be identified with a disclosure item, it was placed as others under relevant category.

6.7.1.4 Coding Process and Unit of Coding

Environmental management quality was divided into six made up of energy, greenhouse gases, waste, materials and resource efficiency, stakeholder relationship and compliance. Within each sub measure, there are five different performance variables that constitute each sub measure. Binary coding system is used to identify items under each sub measure where 1 is recorded where an item in the sub measure is disclosed and 0 is also recorded where the item under the sub measure is not disclosed. The number of items disclosed under each sub measure is added together to obtain the value for the sub measure. Once the process is completed for each sub measure as identified above, all the sub measures are added together to obtain total environmental quality (EMQ). Thus, the composite of environmental management quality is obtained by adding the different sub measures of environmental management quality together.

This is demonstrated in the tables below by selecting six AIM listed firms made up of small, medium and large firms used in the study.

Table 4b Summary of Environmental Quality Table for six AIM listed firms

Company: 600 Group

Case ID: 1 Size: Large Company	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Energy Efficiency Measures (Energy)							
Reduction in energy use/savings	0	0	0	0	0	0	
Cost savings in energy use (Gas and electricity)	0	0	0	0	0	0	
Fuel savings for using light weight cars and plants	0	0	0	0	0	0	
Efficient use of energy/energy saving devices	0	0	0	0	0	0	
Improved use of alternative energy/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Greenhouse Gases (GHG)							
Reduction in emission	0	0	0	0	0	0	
Reduction in the use of toxic materials in place of non-toxic and reduction of dust	0	0	0	0	0	0	
Cost savings from reduced emissions	0	0	0	0	0	0	
Procedure to monitor emissions	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Compliance							
Existence of Environmental Policy	1	1	1	1	1	1	p13/9,13/p13/p13/p12
Environmental Certification e.g. ISO, EMAS, Permits approval	0	0	0	0	0	1	p7
Absence of fines/penalties, benchmark, improvements	0	1	1	1	1	1	p8,13/13/p13/p13/p12
Identification of Environmental Risk	1	1	1	1	1		p13/9,13/13/p13/p12
liaising with employees/other stakeholders on compliance issues/Others	1	1	1	1	1	1	p13/p13/p13/p13/p12
Total	3	4	4	4	4	4	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Waste							
Reduction in waste generated	0	0	0	0	0	0	
Cost savings in waste disposal	0	0	0	0	0	0	
Proper waste disposal	0	0	0	0	0	0	

Creating market or increase revenue for waste products	0	0	0	0	0	0	
Reduction in disposal to landfills and/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Materials and Resource Efficiency							
Cost savings in material usage/resource efficiency/recycle	0	1	1	1	1	1	p5,13/p1/p1/p3/p3
Reduce material input (light weighing)	0						
Increased use of alternate raw material with lesser waste	0	0	0	0	0	0	
Improved product quality, packaging/reuse/design	0	1	1	1	1	1	p3,13/p3/p13/p13/p3
Improved raw material handling/shorter lead times Others	0	1	1	1	1	1	p3,13/p3/p1/p13/p3
Total	0	3	3	3	3	3	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Stakeholder Engagement							
Increased alliances with other firms or stakeholders to jointly work on environmental projects	0	0	0	0	0	0	
Improved communication of environmental quality with stakeholders including collection and use of feedbacks	0	0	0	0	0	0	
Increased collaboration with suppliers in terms of new product design, environmental standards for suppliers and environment audit of suppliers	0	0	0	0	0	0	
Collaborating with employees and customers on environmental issues	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

EMP (Energy + GHG + Waste + Compliance + Materials + Stakeholder)	3	7	7	7	7	7	

Company: 7 Digital PLC

Case ID 2: Size: Medium	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Energy Efficiency Measures (Energy)							
Reduction in energy use/savings	0	0	0	0	0	0	

Cost savings in energy use (Gas and electricity)	0	0	0	0	0	0	
Fuel savings for using light weight cars and plants	0	0	0	0	0	0	
Efficient use of energy/energy saving devices	0	0	0	0	0	0	
Improved use of alternative energy/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Greenhouse Gases (GHG)							
Reduction in emission	0	0	0	0	0	0	
Reduction in the use of toxic materials in place of non-toxic and Reduction of dust	0	0	0	0	0	0	
Cost savings from reduced emissions	0	0	0	0	0	0	
Improved Chemical Handling	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Compliance							
Existence of Environmental Policy	1	1	1	1	1	0	p13/p12/p11/p8/p9/p13
Environmental Certification e.g. ISO, EMAS, Permits approval	0	0	0	0	0	0	
Absence of fines/penalties, benchmark, improvements	0	0	0	0	0	0	
Identification of Environmental Risk	1	1	1	1	1	0	p13/p12/p11/p8/p9/p13
liaising with employees/other stakeholders on compliance issues/Others	1	1	1	1	1	0	p13/p12/p11/p8/p9/p13
Total	3	3	3	3	3	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Waste							
Reduction in waste generated	0	0	0	0	0	0	
Cost savings in waste disposal	0	0	0	0	0	0	
Proper waste disposal	0	0	0	0	0	0	
Creating market or increase revenue for waste products	0	0	0	0	0	0	
Reduction in disposal to landfills and/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No

Materials and Resource Efficiency							
Cost savings in material usage/resource efficiency/recycle	0	0	0	0	0	0	
Reduce material input (light weighing)	0						
Increased use of alternate raw material with lesser waste	0	0	0	0	0	0	
Improved product quality, packaging/reuse/design	0	0	0	0	0	0	
Improved raw material handling/shorter lead times Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Stakeholder Engagement							
Increased alliances with other firms or stakeholders to jointly work on environmental projects	0	0	0	0	0	0	
Improved communication of environmental quality with stakeholders including collection and use of feedbacks	0	0	0	0	0	0	
Increased collaboration with suppliers in terms of new product design, environmental standards for suppliers and environment audit of suppliers	0	0	0	0	0	0	
Collaborating with employees and customers on environmental issues	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

EMP (Energy + GHG + Waste + Compliance + Materials + Stakeholder)	3	3	3	3	3	0	

Company: Abbey PLC

Case ID: 3 Size: Medium	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Energy Efficiency Measures (Energy)							
Reduction in energy use/savings	0	0	0	0	0	0	
Cost savings in energy use (Gas and electricity)	0	0	0	0	0	0	
Fuel savings for using light weight cars and plants	0	0	0	0	0	0	
Efficient use of energy/energy saving devices	0	0	0	0	0	0	
Improved use of alternative energy/Others	0	0	0	0	0	0	

Total	0	0	0	0	0	0	

	2016	2015	2014	2013	2012	2011	Notes/Page No
Greenhouse Gases (GHG)							
Reduction in emission	0	0	0	0	0	0	
Reduction in the use of toxic materials in place of non-toxic and reduction of dust	0	0	0	0	0	0	
Cost savings from reduced emissions	0	0	0	0	0	0	
Improved Chemical Handling	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	2015	2014	2013	2012	2011	Notes/Page No
Compliance							
Existence of Environmental Policy	1	1	1	1	1	1	p11/p11/p11/p11/p11/p11
Environmental Certification e.g. ISO, EMAS, Permits approval	0	0	0	0	0	0	
Absence of fines/penalties, benchmark, improvements	0	0	0	0	0	0	
Identification of Environmental Risk	1	0	0	0	0	0	p3
liaising with employees/other stakeholders on compliance issues/Others	0	0	0	0	0	0	
Total	2	1	1	1	1	1	

	2016	2015	2014	2013	2012	2011	Notes/Page No
Waste							
Reduction in waste generated	0	0	0	0	0	0	
Cost savings in waste disposal	0	0	0	0	0	0	
Proper waste disposal	0	0	0	0	0	0	
Creating market or increase revenue for waste products	0	0	0	0	0	0	
Reduction in disposal to landfills and/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	2015	2014	2013	2012	2011	Notes/Page No
Materials and Resource Efficiency							
Cost savings in material usage/resource efficiency/recycle	0	0	0	0	0	0	
Reduce material input (light weighing)	0	0	0	0	0	0	
Increased use of alternate raw material with lesser waste	0	0	0	0	0	0	

Improved product quality, packaging/reuse/design	0	0	0	0	0	0	
Improved raw material handling/shorter lead times Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Stakeholder Engagement							
Increased alliances with other firms or stakeholders to jointly work on environmental projects	1	1	1	1	1	1	p11/p11/11/p11/p11/p11
Improved communication of environmental quality with stakeholders including collection and use of feedbacks	0	0	0	0	0	0	
Increased collaboration with suppliers in terms of new product design, environmental standards for suppliers and environment audit of suppliers	0	0	0	0	0	0	
Collaborating with employees and customers on environmental issues	1	1	1	1	1	1	p11/p11/11/p11/p11/p11
Others	0	0	0	0	0	0	
Total	2	2	2	2	2	2	

EMP (Energy + GHG + Waste + Compliance + Materials + Stakeholder)	4	3	3	3	3	3	

Company: Active Energy

Case ID: 6 Size: Small	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Energy Efficiency Measures (Energy)							
Reduction in energy use/savings	0	0	0	0	0	0	
Cost savings in energy use (Gas and electricity)	0	0	0	0	0	0	
Fuel savings for using light weight cars and plants	0	0	0	0	0	0	
Efficient use of energy/energy saving devices	0	0	0	0	0	0	
Improved use of alternative energy/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Greenhouse Gases (GHG)							
Reduction in emission	0	0	0	0	0	0	

Reduction in the use of toxic materials in place of non-toxic and Reduction of dust	0	0	0	0	0	0	
Cost savings from reduced emissions	0	0	0	0	0	0	
Improved Chemical Handling	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Compliance							
Existence of Environmental Policy	1	1	1	1	0	0	p12/p13/p16/p13
Environmental Certification e.g. ISO, EMAS, Permits approval	0	0	0	0	0	0	
Absence of fines/penalties, benchmark, improvements	0	0	0	0	0	0	
Identification of Environmental Risk	1	1	1	1	0	0	p12/p13/p16/p13
liaising with employees/other stakeholders on compliance issues/Others	1	1	1	1	0	0	p12/p13/p16/p13
Total	3	3	3	3	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Waste							
Reduction in waste generated	0	0	0	0	0	0	
Cost savings in waste disposal	0	0	0	0	0	0	
Proper waste disposal	0	0	0	0	0	0	
Creating market or increase revenue for waste products	0	0	0	0	0	0	
Reduction in disposal to landfills and/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Materials and Resource Efficiency							
Cost savings in material usage/resource efficiency/recycle	0	0	0	0	0	0	
Reduce material input (light weighing)	0	0	0	0	0	0	
Increased use of alternate raw material with lesser waste	0	0	0	0	0	0	
Improved product quality, packaging/reuse/design	0	0	0	0	0	0	
Improved raw material handling/shorter lead times Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	2015	2014	2013	2012	2011	Notes/Page No
Stakeholder Engagement							
Increased alliances with other firms or stakeholders to jointly work on environmental projects	0	0	0	0	0	0	
Improved communication of environmental quality with stakeholders including collection and use of feedbacks	0	0	0	0	0	0	
Increased collaboration with suppliers in terms of new product design, environmental standards for suppliers and environment audit of suppliers	0	0	0	0	0	0	
Collaborating with employees and customers on environmental issues	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

EMP (Energy + GHG + Waste + Compliance + Materials + Stakeholder)	3	3	3	3	0	0	

Company: ASA Resources

Case ID: 14 Size: Large	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Energy Efficiency Measures (Energy)							
Reduction in energy use/savings	0	0	0	0	0	0	
Cost savings in energy use (Gas and electricity)	0	0	0	0	0	0	
Fuel savings for using light weight cars and plants	1	1	0	0	0	0	p33/p38/
Efficient use of energy/energy saving devices	1	1	1	1	1	1	p33/p38/25/20/17/19
Improved use of alternative energy/Others	0	0	0	0	0	0	
Total	2	2	1	1	1	1	

	2016	2015	2014	2013	2012	2011	Notes/Page No
Greenhouse Gases (GHG)							
Reduction in emission	1	1	1	1	1	1	p33/p38/p25/20/p17
Reduction in the use of toxic materials in place of non-toxic and Reduction of dust	1	1	1	1	1	1	p33/p38/26/p25/ p20
Cost savings from reduced emissions	1	1	0	0	0	1	p33/p38/p25/19
Procedures to monitor emissions	1	1	0	0	0		p33/p38

Others	1	0	0	0	0	1	p33/p38/p25/19
Total	5	4	2	2	2	4	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Compliance							
Existence of Environmental Policy	1	1	1	1	1	1	p33/p38/25/p20/p17/p19
Environmental Certification e.g. ISO, EMAS, Permits approval	1	1	1	1	1	1	p33/p38/25/p20/p17/p19
Absence of fines/penalties, benchmark, improvements	1	1	1	1	1	1	p33/p38/25/p20/p17/p19
Identification of Environmental Risk	1	1	1	1	1	1	p33/p38/4/p20/p17/p19
liaising with employees/other stakeholders on compliance issues/Others	1	1	1	1	1	1	p33/p38/25/p20/p17/p19
Total	5	5	5	5	5	5	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Waste							
Reduction in waste generated	0	0	1	1	1	1	p25/p20/p17/p19
Cost savings in waste disposal	0	0	0	0	0	0	
Proper waste disposal	0	1	1	1	1	1	p38/25/p20/p17/p19
Creating market or increase revenue for waste products	0	0	0	0	0	0	
Reduction in disposal to landfills/Others	0	0	0	0	0	0	
Total	0	1	2	2	2	2	38/25

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Materials and Resource Efficiency							
Cost savings in material usage/resource efficiency/recycle	1	0	0	0	0	0	p38
Reduce material input (light weighing)	1	0	0	0	0	0	p38
Increased use of alternate raw material with lesser waste	1	0	0	0	0	0	p38
Improved product quality, packaging/reuse/design	1	0	0	0	0	0	p38
Improved raw material handling/shorter lead times Others	1	0	0	0	0	0	p38
Total	5	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Stakeholder Engagement							

Increased alliances with other firms or stakeholders to jointly work on environmental projects	1	0	0	0	0	0	p38
Improved communication of environmental quality with stakeholders including collection and use of feedbacks	1	0	0	0	0	0	p38
Increased collaboration with suppliers in terms of new product design, environmental standards for suppliers and environment audit of suppliers	0	0	0	0	0	0	
Collaborating with employees and customers on environmental issues	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	2	0	0	0	0	0	

EMP (Energy + GHG + Waste + Compliance + Materials + Stakeholder)	19	12	10	10	10	12	

Company: Ascent Resources

Case ID: 15 Size: Small	**2016**	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Energy Efficiency Measures (Energy)							
Reduction in energy use/savings	0	0	0	0	0	0	
Cost savings in energy use (Gas and electricity)	0	0	0	0	0	0	
Fuel savings for using light weight cars and plants	0	0	0	0	0	0	
Efficient use of energy/energy saving devices	0	0	0	0	0	0	
Improved use of alternative energy/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Greenhouse Gases (GHG)							
Reduction in emission	0	0	0	0	0	0	
Reduction in the use of toxic materials in place of non-toxic/Reduction of dust	0	0	0	0	0	0	
Cost savings from reduced emissions	0	0	0	0	0	0	
Procedures to monitor emissions	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Compliance							

Existence of Environmental Policy	1	1	1	1	1	0	p20/p16/p19/p19/16/25
Environmental Certification e.g. ISO, EMAS, Permits approval	1	1	1	1	1	0	p10/p3/p5/p4/p6/25
Absence of fines/penalties, benchmark, improvements	1	1	1	1	1	0	p10/p16/p5/p19/p16/25
Identification of Environmental Risk	1	1	1	1	1	0	p20/p16/p19/p19/p125
liaising with employees/other stakeholders on compliance issues/Others	1	1	1	1	1	0	p10/p3/p19/p19/p16/25
Total	5	5	5	5	5	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Waste							
Reduction in waste generated	0	0	0	0	0	0	
Cost savings in waste disposal	0	0	0	0	0	0	
Proper waste disposal	0	0	0	0	0	0	
Creating market or increase revenue for waste products	0	0	0	0	0	0	
Reduction in disposal to landfills and/Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Materials and Resource Efficiency							
Cost savings in material usage/resource efficiency/recycle	0	0	0	0	0	0	
Reduce material input (light weighing)	0	0	0	0	0	0	
Increased use of alternate raw material with lesser waste	0	0	0	0	0	0	
Improved product quality, packaging/reuse/design	0	0	0	0	0	0	
Improved raw material handling/shorter lead times Others	0	0	0	0	0	0	
Total	0	0	0	0	0	0	

	2016	**2015**	**2014**	**2013**	**2012**	**2011**	Notes/Page No
Stakeholder Engagement							
Increased alliances with other firms or stakeholders to jointly work on environmental projects	0	0	0	0	0	0	
Improved communication of environmental quality with stakeholders including collection and use of feedbacks	1	1	1	1	1	1	p10/p16/p19/p19/p16/25

Increased collaboration with suppliers in terms of new product design, environmental standards for suppliers and environment audit of suppliers		0	0	0	0	0	
Collaborating with employees and customers on environmental issues	0	0	0	0	0	0	
Others	0	0	0	0	0	0	
Total	1	1	1	1	1	1	

EMP (Energy + GHG + Waste + Compliance + Materials + Stakeholder)	6	6	6	6	6	1	

Note: The sign " /" separate one year from the other on the page number/note section starting from 2016 to 2011

6.8 Panel Data Analysis

The econometric model used for the analysis is panel data. Panel or longitudinal data involves the use of multiple cases such as people, firms, countries etc. that are observed at two or more-time periods. Stock and Watson (2010) indicated that panel dataset contains observation on multiple entities where each entity is observed at two or more points in time. It is a form of multivariate analysis that permits a pool of observations over several periods. As shown by Hsiao (2007), panel data analysis offer several advantages than cross sectional or one-dimensional regression. First, the use of panel data provides greater consistency and explanatory power by considering several time periods (Martinez-Ferrero and Garcia-Sanchez 2017). Thus, it makes it possible to analyse the dynamics of cross-sectional population. Second, panel data technique allows us to control for unobserved heterogeneity, that is variation across the sample firms but are invariant over time. These characteristics although very difficult to measure because they cannot be observed but failure to consider them could cause bias in the results hence the need to be controlled (Baltagi 1996). In addition, Martinez-Ferrero and Garcia-Sanchez (2017) cited the advantage of using panel data technique over time series. They indicated that using panel data technique removes aggregation bias that arises when time series are applied to characterise the behaviour of firms.

However, notwithstanding the superiority of panel data over cross-sectional studies, it faces some limitations. Kasprzyk et al. (1989) enumerated some of the problems of using panel data as including coverage problem, non-response, and frequency of interviewing, as well as time in sample bias. Duncan and Hill (1985) also cited distortion due to measurement as another limitation of using panel data analysis. Measurement errors that may arise when using panel data include misreading of responses, faulty response due to unclear questions and inappropriate informants. However, as the study used secondary data notably annual reports of selected companies listed on AIM, most of the limitations outlined above which are more peculiar to primary data were avoided.

6.8.1 The Panel Regression Model

Basically, there are two main types of panel data: balanced and unbalanced panels. Stock and Watson (2013) indicted that in the case of balanced panels, all variables are observed for all entities and all-time periods with no missing observations. However, unbalanced panels have missing observations. However, as the study is based on secondary data some data from some companies were missing and therefore unbalanced panel was employed.

Williams (2012) identified that with panel data, the most commonly estimated models are fixed effects and random effect models.

The choice of model depends on whether the unobserved heterogeneity is constant and correlated with the independent variables or there is a random effect of individual cross section. This has been emphasised by Williams (2012) who argued that the decision as to whether to use fixed model or random model depends on several factors discussed below.

6.8.2 The Fixed Effect Model

With fixed effect model, the effects of variables whose value do not change across time are not estimated; instead, they are controlled or partial out. Williams (2012) believed that if there are omitted variables and these variables are correlated with other variables in the model, then it is likely the fixed effect model may provide means for controlling omitted variable bias. Thus, in the fixed effect model, the subjects serve as their own controls. In addition, whatever the effects of the omitted variable have on the subject at one time, they will also have the same effect at the later time and therefore the effects will be constant or fixed throughout. It has been argued that the fixed effect model is very important as in most cases data fall into categories such as industries, states, or families. Baltagi (2005) has also shown that the fixed effect model is appropriate when the intention is to focus on specific set of (N) firms or regions. However, if there is a little variability within the subjects, then the standard errors from fixed effect model may be too large to tolerate. It is believed that too many dummies in the fixed effect model may increase the problem of multicollinearity among the independent variables.

6.8.3 The Random Effect Model

The random effect (RE) model is considered appropriate where there are no omitted variables, or the omitted variables are not correlated with the explanatory variables that are in the model. In such a situation, the RE model is expected to produce unbiased estimates of the coefficients, use all the data available and produce the smallest standard error (Williams, 2012). Taylor (2015) also indicated that the effect is random if the levels that will be observed in a group are to be sampled from a large population.

In providing support for the use of RE model, Clark and Linzer (2012) argue that random effect forms a compromise between fixed effect model and pool models and thus brings the estimates of the regression coefficient away from less-stable fixed effects estimate and closer to more-stable pooled estimate. However, Williams (2012) has indicated that although random effect models estimate the effect of time-invariant variables, the estimates may be

biased, as the omitted variables are not controlled. Also, Hsiao (2007) emphasised that when using the RE model, the researcher needs to make important assumption about the pattern of the correlation between the effects and that are included in the explanatory variables.

6.8.4. Hausman Test

Aside the theoretical and practical consideration for making decision as to whether to use fixed effect (FE) or random effect (RE) model, Hausman (1978) has also provided statistical specification test in making decision between the two. In the Hausman test, the null hypothesis is that the preferred model is the random effect model (Greene 2008). According to Torres-(Reyna 2014), it tests whether the unique errors (μi) are correlated with the regressors. The null hypothesis is that they are not

Where the result of the Hausman test indicates a significant difference ($P<0.05$) then the two models are different enough to reject the random effect model in favour of the fixed effect model (Clark and Linzer, 2012). However, if the Hausman test does not give a significant difference ($P>0.05$), then the implication is that RE is not significantly different from FE and therefore the RE model is more consistent and efficient method to use. This study, apart from supporting the theoretical models for using FE or RE, also applied the Hausman statistics which indicated that the FE model was more appropriate. The Hausman test is shown in the analysis section in Chapter 7.

6.8.5 Generalised Methods of Moments (GMM)

Additional problem that is encountered in the accounting and finance studies is the occurrence of interrelationships among dependent and independent variables referred as endogeneity that can be found in the model. Endogeneity is the existence of correlation between the explanatory variable and the error term due to the existence of causality among the dependent and independent variables (Wooldridge 2010, Martínez-Ferrero and García-Sánchez 2017) . In this study, endogeneity problem is likely to occur as the explanatory variable; environmental management performance, and the dependent variable; financial performance, are determined simultaneously. It is argued that endogeneity problem is caused by three factors including errors in measurement of variables, the existence of causality among dependent and independent variables, and omission of important variables. Whilst the study intends to determine whether proactive environmental practices influence financial performance, others have argued that improved financial performance may also influence the adoption of proactive environmental practices (Waddock and Graves 1997, Elsayed and Paton, 2009). To address the issue of endogeneity that is likely to be encountered in the

study, GMM – dynamic panel regression model was employed as a robustness test to check the static – fixed effect model.

GMM model uses lagged values of the dependent variables included in the model as instruments. Arellano and Bond (1991) demonstrated that they are uncorrelated with the error term when deriving the estimator. Martinez-Ferrero and Garcia-Sanchez (2017) advised that the number of instruments should not be too large in relation to the number of the observations in order not to cause biased estimation. They indicated that the most adequate instruments are the closest lags, as furthest lags cannot contain information on the current value of the variables. Pindado and Requejo (2015) asserted that the closest lag is t-1 for endogenous variables.

The study adopted first difference GMM approach to control for firm-specific, time-invariant effects, and for the possible endogeneity of the regressors. For the GMM estimates to be valid, there should be no second-order serial autocorrelation in the residuals and on the validity of the instruments analysed. In view of that, the study reports both the first- (AR1) and the second-order (AR2) test for serial correlations, which are asymptotically distributed as a standard normal under the null of no serial correlation of the differenced residuals. Additionally, the study also reports Hansen test for over-identifying restrictions that confirms the validity of the selected instruments. All these conditions have been satisfied in all our estimations. The model is given below:

6.8.6 The Regression Model

The regression model adopted for objective 1, 2 and 3 are explained below:

$$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 EMQ2_{it} + \beta_3 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it} \quad (1)$$

$$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \beta_3 Cs_{it} + \beta_4 (EMQ_{it} \times Cs_{it}) + \mu_{it} + \lambda_{it} + \varepsilon_{it} \quad (2)$$

$$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \beta_3 G_{it} + \beta_4 (EMQ_{it} \times G_{it}) + \mu_{it} + \lambda_{it} + \varepsilon_{it} \quad (3)$$

*Where FP: Financial performance (ROA and Tobin's q), EMQ: Environmental Management Quality (independent variables) which is a composite of Energy Efficiency, Waste Control, Emission Control (GHG), Material and Resource Efficiency (MRE), and Stakeholder/Supply Chain Relationship (STAKE). EMP2 denotes the square term of EMQ. Controls denote control variables β: captures the regression coefficient. Cs: Cash and Cash equivalents. EMQ*Cs: Interactive term environmental performance and Cash and Cash equivalents. and G denotes firm growth and EMQ*G: Interactive term environmental performance and growth. Controls represent control variables (Firm Size (Size), Liquidity (Liquidity), Financial Leverage (Gearing), Board Size (BoardSize), Board Independence (NEDS) and CEO Remuneration (CEORem. The subscript i denotes the nth company (i = 1... 201), and the subscript t denotes the year (t=1...6). μi is the*

unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.

In the case of GMM as robustness test, the model below was adopted.

$$FP_{i,t} = \beta_0 + \beta_1\ FP_{it-1} + \beta_2\ EMQ_{it} + \beta_3 EMQ2_{it} + \beta_4 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it} \qquad (4)$$

Where $FP_{i,t-1}$ represents one-year lag of the dependent variable.

6.8.7 Constraint and Unconstraint Companies

Arslan et al. (2006) outlined the determinants of cash constraint firms and unconstraint firms based on size, age, dividend pay-out, and business group affiliations. Size, following Gilchrist and Himmelberg (1995) companies, below median were classified as cash constraint (proxies by log of total assets). The argument presented here is that smaller companies are constraints as they usually face greater information asymmetry and agency problems and therefore find it difficult to obtain external finance. In the case of age, arguing from the point of view of Berger and Udell (1995), Arslan et al. (2006) averred that due to the market reputation enjoyed by old firms, they are able to assess finance more easily.

In tune with the above argument, constrained firms were assign below the median age. In line with Fazzari et al. (1988), Arslan et al. (2006) used dividend pay out to segment constraint and unconstraint firms. They indicated that firms that pay dividends are unlikely to be cash constraint as they can cut dividends if their ability to obtain external financing is weakened. It is argued that business group affiliations with other companies is helpful in relieving financial constraints (Hoshi et al. 1991) . Therefore, unconstraint companies were classified as those belonging to a business group membership whereas constraints, as those not in any business group membership. Consequently, in line with many studies (Arslan et al. 2006, Tingbani 2015), this study classified constraint companies as those holding cash below the median and unconstraint companies as those with holding cash above the median.

6.9 Sensitivity Analysis/Robustness Test

For test results or interpretation to be credible depends on the validity or models of the analysis used. Sensitivity analysis is a method to determine the robustness of test results by examining the extent to which the results could be affected by changes in models, assumptions, or unmeasured variables (Schneeweiss 2006). For this study, the following measures would be applied to ensure the credibility results. First, different regression model, GMM which address endogeneity problem encountered under the fixed effect model was employed to analyse the relationship between environmental management and financial performance based on the initial financial performance measures ROA and Tobin's q, and

additional financial performance measures EPS and Market value. Second, Small, Medium, and large companies were analysed separately to determine whether there are performance differences among these types of companies for engaging in proactive environmental management initiatives. Finally, separate analysis for high polluting firms, medium polluting firms and less polluting under mining/construction, manufacturing, and services industries respectively was performed.

6.10 Reliability Assessment

Whether the study uses one or more sampling units and irrespective of the approach or scale used to develop it, assessment of reliability of disclosure is very important. If the measure is not reliable and valid, then the statistical inferences will also not be meaningful (Hassan and Marston 2010). Reliability is the extent to which an experiment or test yields the same results on repeated trials (Carmines and Zeller 1979) . It is about how a measurement instrument reproduces consistent results on repeated trials. Therefore, if initial measurement revealed high environmental score for certain companies, then a repeated trial should produce the same results when using the same environmental performance index.

Hassan and Marston (2010) identified three forms of reliability test: test-retest, inter-coder reliability, and internal consistency. Test-retest is used to test the stability by determining if the same coder can get the same results try after try. This approach has been used by Rogers and Grant (1997)) where one person coded all reports over four months period and again 80% of these reports were re-coded by the same person in order to determine the stability of the coding. Hussainey et al. (2003) also used Nudist Software for test and retest and recorded 100% stability.

The second test of reliability was given by Hasan and Marston (2010) as inter-coder reliability. This has been described by Rourke et al. (2000) as the primary test of objectivity. Inter-coder reliability shows the extent to which different coders, each coding the same content will reach the same decision. Stemler (2001) advised that one way to achieve inter-coder reliability is to measure percentage agreements between raters. Fahy et al. (2000), as well as Craig et al. (2000), used percentage agreement to assess reliability. However, the mere using of percentage agreements does not consider that fact some percentage agreement could be simply by chance. As a result, Haney et al. (1998) advised the use of Cohen's Kappa which when approaches 1 shows that coding is perfectly reliable, and 0 when there is no agreement other than those that would be expected by chance. Studies that have used Cohen's kappa to test reliability include McDonald and Gibson (1998) and Hillman (1999).

Other measure of reliability that also attempts to adjust for chance is Scott's pi. A Scott's pi of 0.8 is considered very good and below 0.5 is seen to be poor. Scott's pi has been used by many authors including Linsley and Shrives (2005), as well as Beattie et al. (2004) to assess inter-coders reliability. However, Milne and Adler (1999) indicated that for correlation co-efficient to be useful as a measure of reliability, any disagreement between raters must be few or any discrepancy among raters must be analysed and resolved.

The third form of reliability test which is considered as excellent technique by Hassan and Marston (2010) is internal consistency. Internal consistency is an indicator of how well different items measure the same issue (Litwin, 1995). Cronbach's alpha is usually used to test internal consistency. It is used to test for inter-item correlation. Litwin (1995) explained that it shows how well different items complement each other in the measurement of different aspects of the same variable. Higher alpha co-efficient indicates higher reliability with an alpha of 0.80, and widely accepted as having little random measurement error. Cronbach's alpha was used by Chithambo (2013) to test for internal consistency.

Three coders, including the researcher, undertook the content analysis. To ensure stability, accuracy, and reproducibility as argued by Kippendorf (2004) as features of reliability, the three raters were trained on how to conduct content analysis, particularly the scoring rules and the process. Before the main study, pilot study based on a sample of 151 companies listed on the AIMS was undertaken. The pilot study was based on the sustainability and standalone reports for a period of five years. The three raters were engaged in the coding for the pilot studies after the scoring rules and process had been agreed on. Once coding for the pilot study was completed, independent coders were engaged for the re-coding of the same items completed by the raters in order to check the reproducibility of the results. Any variations that occurred between the original coders and the independent coder were analysed and resolved as suggested by Milne and Alder (1999).

The three raters were also engaged in the main study. Additional three independent coders were engaged, and together with the researcher, reviewed the environmental performance index used for the pilot study. The essence of the review was to ensure that all important items that were ignored during the pilot study were included in the main study. Similarly, all unimportant items captured in the environmental performance index were taken out during the review. Cronbach's alpha was computed to determine if acceptable correlation co-efficient have been obtained and consistent with results from the correlation.

6.11 Validity Assessment

Wren and Phelan (2005) believed that although test of reliability is necessary, reliability alone is not sufficient; it also needs to be valid if the test is to be considered reliable. They define reliability as "how well a test measures what is purported to measure". This has also been complemented by Hassan and Marston (2010), who described validity as the extent to which a measuring instrument measures what it is intended to measure. Three main types of test of validity normally use are criterion validity, face (content) validity, and construct validity.

Criterion validity is used to correlate test result with another criterion of interest. It is assessed if there is a significant correlation between a measure and external criterion (Hasan and Marston, 2010). If the correlation between the established measure and a new measure is high, then the assessment tool is considered valid. Criterion validity was used by Hope and Waterman (2003) to compare their own scoring of accounting policy disclosures with that of Canadian Institute for Advance Research (CIFAR) for a sample of 21 firms. However, as shown by Hassan and Marston (2010), criterion validity is less likely to be used in social sciences, as there is generally no established criterion to be compared. Criterion validity was therefore not used for this study, as there was no established benchmark for environmental performance measures for SMEs. The only established measures of environmental metrics based on content analysis in the UK developed by Centre for Social Environmental and Applied Research (CSEAR) was based on only FTSE 100 (large listed) companies and therefore not applicable to SMEs.

Face or content validity, on the other hand, ascertains how well the instrument is measuring what it is intended to measure. It involves seeking subjective judgement from experts and non-experts on how well an instrument measures what it is intended to measure (Hasan and Marston, 2010). Although content validity has been criticised for being insufficient to conclude validity assessment, it has been used by many researchers to conduct validity assessment (Hail 2002, Hope and Waterman 2003) . This study engaged the opinion of three independent experts on the validity of the environmental performance index.

The other form of validity assessment is construct validity. Wren and Phelan (2005) indicated that construct validity is to ensure that an instrument is actually a measure of what it is supposed to measure. They indicated that using a panel of experts familiar with the construct is a means to assess this type of validity. Hassan and Marston (2010) also reiterated that the test of construct validity requires a pattern of consistent findings with the prior

studies. Studies that have used construct validity include (Cooke 1992) and Wallace et al. (1994). In this study, extensive analyses of environmental and financial performance have been done. This resulted in the identification of environmental performance measures such as energy efficiency, reduction in waste, reduction in GHG, material and resource efficiency, as well as financial performance measures such as ROA, EPS, Market Value, and Tobin's q as the main variables behind environmental and financial performance relationships.

6.12 Dealing with Outliers

Field (2013) defined outlier as a case that is considerably different from the main trend of the data. To ensure that the regression analysis is not distorted by the existence of outliers, the study carefully investigated for such cases. Standardised residuals are mostly used to detect outliers. Standardised residuals are residuals divided by the estimates of their standard errors and they have a mean of 0 and standard deviation of 1. Field (2013) suggested that standardized residual above 3 could be an outlier. Cook's distance and Mahalanobis' distance have also been suggested for detecting outliers. Cook's distance measures the overall influence of a case on the model and it has been suggested by Field (2013) that a value greater than 1 is a cause for concern. Mahalanobis' distance also measures the distance of a case from mean (s) of the independent variables. Field (2013) advised the critical values of the Mahalanobis distance as depending on the number of predictor variables and the sample size. He suggested that with a sample size of 500 with five predictor values above 25 were cause for concern, with sample of 100 with 3 predators, the value should not exceed 15 and with small sample of 30 with two predictors, a value greater than 11 is problematic. However, it has been argued that Cook's and Mahalanobis' distance can be effective in finding influential cases where a single outlier exists; they can fail if there are two or more outliers. The study employed Standardized residual and Cook's distance to check outliers and the result shown in the analysis section in Appendix 3 indicates that there were no outliers.

6.13 Multicollinearity

There is an existence of multicollinearity when two or more variables of the predictors in a regression model are positively or negatively correlated. The existence of multicollinearity can wreak havoc on analysis and limit the conclusions that can be drawn from the research. Many regression analysts often use variance inflation factors (VIF) to deal with multicollinearity. The VIF quantifies how much the variance is inflated. The variance of the estimated coefficients is inflated when multicollinearity exists. It has been suggested by Field (2013) that simple correlation between independent variables should not be considered

detrimental unless they exceed 0.80 or 0.90. However, a rule of thumb indication is that where VIF exceeds 10, there is the need for investigation as it indicates a sign of serious multicollinearity requiring correction. The VIF and the mean VIF revealed that there is no issue multicollinearity in the regression analysis. The VIF table is presented in chapter 7.

6.14 Summary and Conclusions

As shown by Dudovskiy (2014), identification of ontology at the start of the research is extremely important as it determines the choice of the research design. The choice of objectivism ontology, for instance, will lead to positivist's epistemology, which is also linked to deductive research approach and accordingly quantitative research would need to be employed. Alternatively, the choice of subjectivism ontology will lead to the selection of interpretivist epistemology, this will require inductive research approach, and accordingly, qualitative method of data collection and analysis will be adopted. This study takes the ontological position of objectivism and assumes the position that there is existence independent of the researcher. Only observable facts are employed in the study, consequently, no human interactions or feelings are incorporated into the study. Epistemological position, which has been explained as positivists will lead to the adoption of deductive methodology. General theories or studies on relationships between environmental and financial performance were explored and based on the outcome of the observation, a position that is more specific was taken. Quantitative data and analysis, which is strongly linked to ontological objectivism was used to analyse and interpret the results of the study

The secondary data used for the study was obtained from the annual and standalone reports of companies that are listed on the Alternative Investment Market (AIM) that met the selection criteria adopted. Apart from providing the most current available financial statement, the period from 2011 to 2016, which coincided with the period within which significant environmental milestone took place in the UK was the focussed of the study. The dependant variables employed captured both the accounting-based and market-based measures notably, return on assets (ROA) and Tobin's q. The environmental management performance measures (the independent variables) which include, waste reduction, energy efficiency measures, reducing emission to the environment (GHG), material and resource efficiency, compliance to environmental regulations, as well as stakeholders/supply chains relationships were employed based on DEFR (2013) guidelines which is considered comprehensive enough for SMEs. To be able to capture the environmental performance from the annual and standalone reports, content analysis was employed. To ensure objectivity,

reliability, validity, and replicability, statistical test, and Cronbach's alpha were computed. In addition, to ensure the data was appropriate for parametric test, various linearity assumption, independent observation, homoscedasticity and normality of the statistical test such as skewness, kurtosis and Woolbridge test were performed.

In meeting the objectives of the research, that is, to determine environmental and financial performance relationships of AIM listed companies in the UK, multivariate analysis which ensured that many environmental variables that concurrently influence financial performance are measured simultaneously were employed. The multivariate analysis involved the use of longitudinal or panel data where environmental and financial performance of 201 firms were observed. The panel data analysis considered both the fixed and random effect models and Hausman test was performed to determine the one which was appropriate for the study. Finally, in protecting against multicollinearity from distorting the conclusion, the test results of the correlation matrix were checked if any of the correlations among the independent variables did not exceed 0.80 and Variance Inflation Factor (VIF) was not more than 10 in accordance with guidance offered by Field (2013).

CHAPTER 7

PRESENTATION AND ANALYSIS OF RESULTS

7.1 Introduction

This chapter presents the descriptive statistics, Ordinary Least Squares (OLS) regression assumption, as well as results and analysis. The chapter is intended to achieve four objectives. First, the chapter presents the detailed descriptive statistics of the dependent variables, financial performance proxies by ROA and Tobin's q for accounting and market-based measures, respectively. Descriptive statistics for environmental management performance, the independent variables, and the control variables are also presented. Second, the study presents and explains bivariate correlation analysis and identifies any issue of multicollinearity as well as OLS regression assumptions of linearity, normality, multicollinearity, homoscedasticity and show how violations in any of the assumptions have been dealt with. Third, the study presents and discusses the main regression results, environmental management quality (EMQ) and financial performance (FP) as well as the subsidiary objectives, the impact of growth and cash resources on environmental and financial performance relationships. The fourth presents and discusses robustness tests involving the use of different econometric model, GMM, different financial performance variables, EMQ and FP relationships in small, medium, and large companies, and finally EMQ and FP relationships in high and low polluting sectors. The chapter is structured as follows. Section 7.1 reports detailed descriptive statistics, for dependent, independent, control, and other variables. Section 7.2 presents the bivariate correlation analysis and OLS regression assumptions. Section 7.3 deals with OLS regression results of environmental and financial performance relationships whereas 7.4 also presents the results of the impact of growth on EMQ and FP relationships. Section 7.5 addresses the impact of cash resources on EMQ and FP relationships whilst 7.6 concentrates on the discussions of the study. Finally, the robustness tests are presented in section 7.7 whilst the chapter summary is provided in section 7.8.

7.2 Descriptive Statistics

7.2.1 Descriptive Statistics of Dependent Variables

Panel A and B of table 5 reports summary statistics for the period, 2011 to 2016 for all sampled companies listed on the Alternative Investment Market (AIM) in the UK. The table gives mean ROA of 0.07 (7%) and standard deviation of 0.16 (16%). The minimum ROA of -0.92 (-92%) and maximum of 0.84 (84%) suggests that there is a wide variation in the accounting profit of AIM listed companies. Across the year, the mean ROA ranges from 6% to 8% with most years recording 7% which is the same as the panel mean of 7%. The median

value of 0.0657 (7%) is almost the same as the mean suggests that the distribution is symmetric as shown in the skewness and kurtosis which is within the range of 3 and 10 as suggested by Kline (2010). The lower profit margin recorded is also in line with prior studies by Afrifa (2013) , which documented negative profits for small and medium companies listed on AIM.

In the case of the Tobin's q, mean value of 1.83 was reported with the highest of 1.99 recorded in 2011. Similarly, to the ROA there is also a wide variation in the market performance of AIM listed proxy by Tobin's q as the study recorded a minimum of 0.12 and a maximum of 40.58. The mean value of 1.83 compared to the median 0.96 and confirmed by the skewness and kurtosis indicates that the distribution of the data is not symmetrical, and median offers a better interpretation in this case. Therefore, the Tobin's q of 0.96 is more representative for AIM listed companies in the UK. This is in line with recent studies by Ali et al. (2016) which also identified non-normal distribution of financial performance for AIM listed companies in the UK and used the median for descriptive analysis. The lower median value of 0.96, less than 1, suggests that the assets of most companies listed in the AIM are likely to be undervalued.

Table 5: Summary Statistics for All Continuous Variables

This table reports descriptive statistics for all continuous variables adopted in estimating the relationship between environmental management quality and financial performance on a sample of 201 listed companies on the Alternative Investment Market in the period 2011-2016. It is presented from panel A to O where each panel presents all year-observations (2011-2016) as well as individual years from 2011-2016. Panel A and B present the dependent variables; return on assets (ROA), and Tobin's q. This is followed by explanatory variables which are made up of the composite of environmental management quality (EMQ) presented in panel C, as well as the disaggregated environmental management quality variables in order of panel D Energy, panel E Greenhouse Gases (GHG), panel F Waste, pane G Materials and Resource Efficiency (Materials), panel H, compliance to environmental regulations (Compliance) and panel I stakeholder engagement (Stake). Finally, panel J to O presents the control variables: Panel J Size, Panel K Liquidity, Panel L Gearing, Panel M Board Size, Panel N number of non-executive directors (NEDS) and panel CEO Remuneration (CEORem).

Variables	Obs	Mean	Std Dev	Min	Max	Median	Skewness	Kurtosis
Panel A: ROA All	1044	0.07	0.16	-0.92	0.84	0.07	-0.82	6.77
2011	186	0.07	0.16	-0.75	0.40	0.06	-0.99	6.87
2012	183	0.07	0.16	-0.44	0.84	0.06	0.06	6.53
2013	180	0.08	0.15	-0.44	0.46	0.08	-0.32	4.08
2014	179	0.07	0.17	-0.92	0.44	0.08	-1.62	10.33
2015	174	0.07	0.16	-0.61	0.39	0.07	-0.90	4.97
2016	142	0.06	0.15	-0.54	0.42	0.06	-0.91	5.55
Panel B: Tobin's Q All	897	1.83	2.82	0.12	40.58	0.96	7.27	79.52
2011	154	1.99	3.70	0.12	37.00	1.07	6.69	57.59
2012	161	1.65	1.86	0.14	14.05	1.04	3.34	17.88
2013	162	1.97	3.68	0.18	40.58	1.16	7.82	77.75
2014	158	1.84	2.37	0.13	20.66	1.28	4.85	33.71
2015	150	1.72	1.85	0.15	13.61	1.22	3.14	16.15
2016	112	1.86	2.85	0.17	24.81	1.11	5.50	40.81
Panel C: EMP All	1184	7.31	5.60	0	28	6	1.24	4.17
2011	201	6.16	5.61	0	25	5	1.26	4.18
2012	201	6.76	5.64	0	28	5	1.22	4.21
2013	201	7.95	5.65	0	28	6	1.31	4.31
2014	201	8.10	5.64	1	28	6	1.28	4.13
2015	201	7.99	5.39	1	28	6	1.21	4.02
2016	179	7.59	5.46	0	26	6	1.14	3.74
Panel D: Energy All	1184	0.83	1.41	0	5	0	1.79	5.14
2011	201	0.63	1.25	0	5	0	2.21	7.15
2012	201	0.74	1.38	0	5	0	1.97	5.83
2013	201	0.92	1.47	0	5	0	1.60	4.38
2014	201	0.95	1.47	0	5	0	1.55	4.30
2015	201	0.97	1.45	0	5	0	1.50	4.19
2016	179	0.93	1.51	0	5	0	1.62	4.45
PANEL E: GHG ALL	1184	0.87	1.43	0	5	0	1.73	5.06
2011	200	0.69	1.29	0	5	0	2.03	6.38
2012	201	0.76	1.34	0	5	0	1.98	6.23
2013	201	0.93	1.44	0	5	0	1.61	4.73
2014	201	1.01	1.52	0	5	0	1.54	4.40
2015	201	0.95	1.45	0	5	0	1.59	4.63
2016	179	0.98	1.51	0	5	0	1.50	4.15

Table 5: Continuation

Variables	Obs	Mean	Std Dev	Min	Max	Median	Skewness	Kurtosis
Panel F: Waste ALL	1182	0.74	1.18	0	5	0	1.85	6.21
2011	200	0.73	1.24	0	5	0	1.96	6.49
2012	201	0.75	1.19	0	5	0	1.76	5.73
2013	200	0.90	1.30	0	5	0	1.58	4.89
2014	201	0.90	1.24	0	5	0	1.54	5.01
2015	201	0.84	1.18	0	5	0	1.47	4.67
2016	179	0.68	1.08	0	5	0	1.80	5.96
Panel G: Materials – All	1183	1.14	1.55	0	5	0	1.17	3.16
2011	200	1.03	1.52	0	5	0	1.03	3.44
2012	201	1.08	1.51	0	5	0	1.22	3.32
2013	201	1.24	1.60	0	5	0	1.08	2.94
2014	201	1.26	1.65	0	5	0	1.11	2.93
2015	201	1.26	1.60	0	5	1	1.09	2.97
2016	179	1.00	1.41	0	5	0	1.17	3.09
Panel H: Compliance All	1183	3.17	1.48	0	5	3	-0.37	2.31
2011	200	2.69	1.72	0	5	3	-0.18	1.91
2012	201	2.94	1.63	0	5	3	-0.32	2.09
2013	201	3.35	1.34	0	5	3	-0.19	2.07
2014	201	3.37	1.29	0	5	3	-0.18	2.12
2015	201	3.38	1.33	0	5	3	-0.27	2.09
2016	179	3.32	1.43	0	5	3	-0.38	2.32
Panel I: Stakeholders All	1183	0.55	0.88	0	5	0	1.17	3.16
2011	201	0.42	0.90	0	5	0	2.81	12.30
2012	201	0.51	0.94	0	5	0	2.41	9.77
2013	201	0.61	0.96	0	5	0	1.90	6.99
2014	201	0.61	0.95	0	5	0	1.87	6.99
2015	201	0.60	0.91	0	5	0	1.73	6.26
2016	178	0.68	1.00	0	5	0	1.83	6.80
Panel J: Size All	1090	460	795	1	5611	138	3.03	13.53
2011	187	388	675	1	4,836	115	3.28	16.28
2012	190	430	739	1	5,611	133	3.40	18.18
2013	190	421	674	3	3,762	140	2.66	10.65
2014	189	483	821	3	4,474	139	2.77	11.08
2015	187	521	902	1	4,894	145	2.74	10.60
2016	147	541	957	2	5,245	169	2.90	11.98

Table 5: Continuation

Variables	Obs	Mean	Std Dev	Min	Max	Median	Skewness	Kurtosis
Panel K: Liquidity All	1147	3.70	8.91	0.01	170.26	1.33	8.97	129.04
2011	198	4.27	7.85	0.03	50.5	1.45	3.36	15.24
2012	199	3.47	5.88	0.06	43.88	1.38	3.71	19.63
2013	199	3.90	9.70	0.039	93	1.38	6.48	51.93
2014	199	3.57	7.90	0.03	73.44	1.31	5.56	40.44
2015	198	3.01	5.68	0.01	54.42	1.28	5.21	39.33
2016	154	4.10	14.99	0.05	170.3	1.2185	9.42	101.02
Panel L: Gearing All	1122	47.29	70.42	0	844.34	25.85	4.57	35.68
2011	196	46.75	85.23	0	844.3	22.285	5.75	47.16
2012	197	42.84	53.49	0	358.1	23.88	2.54	11.66
2013	197	42.98	49.90	0	362.8	29.6	2.38	11.86
2014	195	51.74	73.35	0	583.8	28.69	3.74	23.17
2015	193	54.67	90.13	0	666.7	27.008	4.14	23.99
2016	144	44.06	57.17	0	326.6	27.211	2.62	11.22
Panel M Board Size: All	1107	6.03	1.94	0	13	6	0.33	3.44
2011	186	6.10	1.92	0	13	6	0.35	3.67
2012	187	6.10	1.97	0	12	6	0.40	3.49
2013	187	6.04	1.93	0	12	6	0.25	3.30
2014	188	5.92	1.99	0	12	6	0.48	3.46
2015	189	6.05	1.92	0	12	6	0.37	3.47
2016	170	6.01	1.90	0	11	6	0.12	3.25
Panel N: NEDS All	1107	3.33	1.49	0	11	3	0.75	4.20
2011	186	3.32	1.61	0	10	3	1.00	4.73
2012	187	3.32	1.48	0	8	3	0.62	3.56
2013	187	3.35	1.42	0	8	3	0.50	3.16
2014	188	3.34	1.59	0	11	3	1.13	5.84
2015	189	3.39	1.48	0	7	3	0.49	2.92
2016	170	3.29	1.39	0	8	3	0.48	3.55
Panel O: CEO Rem All	1064	336710	280220	12000	3731302	254447	3.77	31.78
2011	175	275,290	184,329	12,000	1034709	220000	1.50	5.40
2012	181	294,691	195,987	12,000	1303000	240000	1.70	7.15
2013	181	305,922	199,224	12,000	1169000	250289	1.55	5.81
2014	181	360,014	298,390	12,000	2420000	274605	3.02	17.42
2015	182	389,386	337,700	12,000	2634000	273814	2.81	14.84
2016	164	398,426	387,320	12,000	3731000	292000	4.42	35.14

Table 6: Summary Descriptive Statistics of Continuous Interacting Variables

This table reports descriptive statistics for interacting variables firm growth and Cash Resources which were used as interacting variables between environmental management quality (EMQ) and Financial Performance (FP). These are presented in Panel P and Q. Panel P firm growth (Growth) and Panel Q Cash and Cash Equivalents (Cash). Cash and Cash equivalents are in £000.

Variables		Obs	Mean	Std Dev	Min	Max	Median	Skewness	Kurtosis
Panel P: Growth All		1075	17.57	67.17	85.42	900.37	5.09	5.78	51.59
	2011	146	41.32	114.7	-45.22	900.40	7.96	4.54	27.98
	2012	193	17.17	68.67	-57.24	518.70	2.50	5.00	31.37
	2013	194	8.22	36.28	-85.42	287.60	4.71	2.82	21.44
	2014	192	18.8	65.44	-74.99	604.60	7.00	5.09	39.99
	2015	191	6.532	48.13	-69.05	346.70	2.09	4.02	26.33
	2016	159	19.43	50.05	-69.44	384.10	11.00	3.82	24.64
Panel Q: Cash All		1092	16501	43401	0	572778	4278	6.40	55.76
	2011	185	14,385	45,837	4	572778	3962	10.07	120.76
	2012	187	12,760	31,488	5	367001	3915	8.12	87.59
	2013	190	14,363	32,328	6	235761	3932	4.90	30.65
	2014	187	17,801	45,727	1	401789	5586	5.39	37.02
	2015	185	17,393	43,168	0	302800	4127	4.53	25.52
	2016	158	23,398	58,779	6	412000	4991	4.52	25.39

7.2.2 Descriptive Statistics of Independent Variables

The summary statistics for the independent variables, environmental management quality (EMQ) which is a composite of Energy, Greenhouse Gases, Waste, Materials and Resource Efficiency, Compliance to Environmental Regulations and Stakeholder engagement on environmental issues are presented from panel C to I on table 5. On the aggregate of environmental management quality proxy by EMQ, the summary statistics revealed mean of 7.31, standard deviation of 5.6, and median of 6. The mean value of 7.31 suggests that environmental management quality measures represented by quantitative disclosures are very low. The mean of 7.31 also suggests that less than 25% of the companies listed on AIM are likely to disclose environmental quality as the maximum disclosure item was 30. The minimum of 0 for the environmental management performance implies that there was no disclosure for some years by some companies.

Delving into different aspects of environmental management quality, the mean value for all the environmental quality measures were low except Environmental compliance that recorded a mean of 3.2 and median of 3 out of a maximum of 5. This indicates that about 64% of the companies listed on AIM are likely to put in place measures or policies to comply with environmental regulations. This is particularly high compared with the overall environmental management quality average of 25%. This finding is supported by Afagachie (2013) where environmental compliance was ranked highest among all the environmental quality measures employed. On the other hand, environmental practices with respect to other measures of performance tend to be low. Energy has mean value of 0.85 (17%), GHG 0.88 (17.6%), Waste 0.799 (16%), Stakeholder engagement 0.57 (11.4%) and Material and Resource Efficiency 1.5 (30%). The lower level of environmental engagement could be attributed to the fact that AIM listed companies are not mandatorily required to disclose their environmental quality in contrast to large companies listed on the main market. It is also in line with the findings of Thornton et al. (2009) that SMEs are mostly not convinced with the benefits that are connected to environmental management hence limited participation in the environmental management practices. This also probably explained why most studies on environmental management quality are concentrated on large listed companies where due to mandatory requirements by regulators to report their environmental quality, there is high level of data available for research.

7.2.3 Descriptive Statistics of Control and Interacting Variables

Panel J to O discusses the results of summary statistics of the control variables which consists of both company specific factors, and corporate governance factors that also affect financial performance and needs to be controlled. Panel J, size is a proxy of the number of employees. The size of AIM listed company's ranges from 1 employee to 5611 employees. The large spread between the numbers of employees suggests that there is a huge difference between the sizes of companies that are listed on the AIM. Over the year 2011 to 2016, the mean number of employees also increased from 344 to 551 representing an average increase of 39% within the six-year period. Panel K provides the summary statistics of liquidity represented by the current ratio. It revealed a mean liquidity of 3.7 and a median of 1.33 with a minimum range of 0.01 times to maximum of 50.5 times. The values given by the skewness and kurtosis indicated that the median value of 1.33 times better reflects the liquidity position of AIM listed companies. Both the mean and the median imply that most AIM listed companies have sufficient funds to meet their short-term obligations as they fall due. The average gearing also ranges between 42% - 54% with the overall mean for the sample period of 47%. These figures suggest that an average firm listed on the AIM is moderately geared.

Aside the company specific factors given by panel J to L, panel M to N provide corporate governance factors that may also influence financial performance. First, Board Size show in panel M indicates that an average AIM listed firm has a board size of 6. Almost similar figure is recorded throughout the years and the median is also represented by a similar value of 6. The average board size of 6 with maximum size of 13 is in line with suggestion by the London Stock Exchange (2012) that the board size should not be too large to inhibit efficient operations. The number of non-executive directors is also represented in panel N. Both the mean and the median is 3, similar to the board size which also revealed the same value for both the mean and the median and thereby suggesting highly symmetrical distribution of the data. The result also suggests that AIM listed companies are complying with the recommendations of London Stock Exchange that the board should consist of at least 2 independent non-executive directors (London Stock Exchange 2012). Finally, on the control variables, panel O provides the CEO remunerations, as empirical evidence suggests that CEO remuneration has influence on financial performance. CEO Remuneration also ranges from £12,000.00 to 3,731,302.00 with mean of £336,710.00. The minimum and maximum values, as well as the standard deviation of £280,000.00 and median, suggest great variability in CEO remuneration. The mean CEO remuneration increased from £275,000 in 2011 to 398,426 representing a growth of 44.7%. The growth in CEO remuneration is consistent growth in size, which also averaged about 39%.

The study also provided summary statistics for variables used as interactions, firm growth and Cash and Cash Equivalents (financial resources). These are presented in panel P and Q in table 6. There is a very wide variation in company's growth proxied by growth in assets with a minimum of -85% and maximum of 900%. The mean value was 17.57%, standard deviation was 67.17%, and the median was 5%. The higher variation between the mean and standard deviation and with skewness of 4.5 suggests that the median value 5% is more representative than the mean. The peak growth with a mean of 41.3 was recorded in 2011 although the median suggests that the growth for most AIM listed firms might have occurred in 2016. Panel Q also indicated that Cash and cash equivalent also have wide variability with a range of £0.00 to £572m with the peak cash balance recorded in 2016 in line with the growth.

7.3 Tests of OLS Assumptions and Bivariate Correlation Analyses

As indicated in chapter six, Ordinary Least Square (OLS), panel regression technique is used to test the study hypothesis. To employ OLS multivariate regression techniques, a test was conducted for the various OLS assumptions of normality, multicollinearity, homoscedasticity, and linearity. Where these assumptions are not met, then it is expected that non-parametric test should be conducted. However, as suggested by Field (2013) in the case of larger sample size it is assumed these assumption are met. Based on a central limit theory as a rule of thumb, a sample of ≥ 30 is considered as meeting these assumptions. However, despite the data meeting, these assumptions further tests were conducted.

The study employed skewness and kurtosis to check for normality assumptions. Although some of the variables notably, TBQ, Liquidity, Growth and Cash have higher skewness and Kurtosis above the normal range of 3 and 10 as suggested by (Kline 2010), natural log is applied to such variables to reduce the outliers. In addition, all tests conducted were subjected to robustness options in Stata which took care of outliers. It has also been argued by Tabachnick and Fidell (2007) that in the case of large samples, the effect of skewness and Kurtosis values from normality is controlled. Therefore, the impact of non-normal distribution is unlikely to affect the outcome of the test results. To test for multicollinearity, a situation where two or more of the independent variables in the regression model are highly correlated, variable inflation factor (VIF) was computed. The result presented in table 7 below indicates that the tolerance value for all the independent variables is greater than 0.1 and less than 1. All the VIF values are also less than 10, suggesting that multicollinearity was not an issue.

Table 7: Variable Inflation Factor of the Independent and Control Variables

This table reports the results of variable inflation factor (VIF) to check for the existence of multicollinearity of the independent variables. All independent variables, both continuous and ordinary variables are included. The variables are Greenhouse gases (GHG), Energy, Waste, Materials and Resource Efficiency (Materials), compliance to environmental regulations (Compliance) and Stakeholder engagement (Stake). Others are Firm Size (Size), Liquidity, Gearing, Board Size, Number on Non-Executive Directors (NEDs), CEO Remuneration (CEORem), Industry Effect and Year Effect.

Variable	VIF	1/VIF
GHG	2.12	0.471981
Energy	1.93	0.518668
Waste	1.73	0.577867
Material	1.86	0.536964
Compliance	1.31	0.762790
Stake	1.22	0.820532
Size	1.48	0.675873
Liquidity	1.25	0.798889
Gearing	1.16	0.864111
Board size	2.21	0.451672
NEDS	2.14	0.467415
CEO Rem	1.32	0.758819
Industry 2	3.05	0.327743
Industry 3	3.24	0.308910
Industry 4	1.71	0.584045
Industry 5	3.89	0.257252
Year 2012	1.74	0.574235
Year 2013	1.78	0.560969
Year 2014	1.80	0.556462
Year 2015	1.79	0.559923
Year 2016	1.58	0.632469
Mean VIF	1.92	

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model which produced chia2 of 0.00 indicated the presence of heteroskedasticity. The null hypothesis of homoscedasticity (or constant variance) is therefore rejected and concluded heteroskedasticity. The presence of heteroskedasticity and autocorrelation in the fixed effect models were controlled by using robust standard errors or Huber/White estimators in Stata 13. Employing robust standard error helps to control for both heteroskedasticity and autocorrelation which is considered problematic in panel data (Lei 2006). Finally, the linearity assumption was satisfied as indicated by the F statistics in all the regression models generated.

This section also presents the correlation matrix of the dependent and the independent variables as well as the control or other variables. Table 8 shows the detail correlation matrix. The financial performance measure ROA shows significant positive correlation with all measures of environmental management quality: energy efficiency, Greenhouse Gas, Waste

Management, Material and Resource Efficiency, Environmental Policy, Stakeholder/Supply Chain, as well as the total environmental performance measure. However, Tobin's q did not show a significant relationship with the total environmental management quality (EMQ) and the disaggregated aspects of environmental management performance except compliance which revealed significant negative relationship.

The control or other variables also revealed significant positive relationship with ROA except liquidity and gearing where the relationship was not significant. In relation to the Tobin's Q, none of the control variables was significant with exception of liquidity which revealed significant positive relationship. In the case of the moderating variables, Growth and Cash, whilst there was no significant relationship between Growth and ROA, there was a significant relationship between Cash and ROA. However, in the case of Tobin Q, none of the moderating variables was significant.

The correlation matrix also confirmed that multicollinearity was not a problem as Field (2013) suggested that correlation among the predictors is not considered problematic unless they exceed .90. As shown in table 8, the highest correlation among the predictor variables was Energy and GHG of 0.58. However, interpretation of results based on correlation analysis is limited, as additional explanatory variables which might also influence the test results cannot be controlled. Hence, the main analysis of this study is based on panel regression models where other explanatory variables are controlled.

Table 8: Correlation Matrix

This table reports the correlation coefficients for all continuous variables adopted in estimating the relationship between environmental management quality and financial performance. Variables are defined as follows: return on assets (ROA), Tobin's q (TBQ), Environmental Management Quality (EMQ), Energy Efficiency Practices (Energy), Greenhouse Gases (GHG), Waste Management (Waste), Stakeholder Engagement (Stake), Material and Resource Efficiency (Mat), Compliance to environmental regulations (COMP), Firm Size (Size), Liquidity (Liquidity) Board Size (B Size), Number on non-executive directors (NEDs) CEO Remuneration (CEO Rem), Firm Growth (Growth) and Cash and Cash Equivalents (Cash).

	ROA	TBQ	EMQ	Energy	GHG	Waste	Stake	Mat	Comp	Size	Liquidity	Gearing	B Size	NEDS	CEO Rem	Growth	Cash
ROA	1																
TBQ	0.116*	1															
EMQ	0.493*	-0.036	1														
Energy	0.372*	-0.032	0.748*	1													
GHG	0.396*	-0.017	0.797*	0.585*	1												
Waste	0.354*	-0.023	0.719*	0.443*	0.516*	1											
Stake	0.303*	0.019	0.546*	0.269*	0.534*	0.293*	1										
Mat	0.379*	0.009	0.780*	0.552*	0.537*	0.544*	0.285*	1									
Comp	0.240*	-0.09*	0.544*	0.190*	0.276*	0.214*	0.291*	0.227*	1								
Size	0.253*	-0.048	0.335*	0.242*	0.283*	0.223*	0.210*	0.212	0.184*	1							
Liquidity	-0.137	0.115*	-0.117	-0.14*	-0.11*	-0.11*	-0.003	-0.13*	0.018	-0.18*	1						
Gearing	0.05	0.046	0.054	0.054	0.047	0.001	-0.001	0.059*	0.044	0.163*	-0.14*	1					
B Size	0.167*	-0.026	0.138*	0.132*	0.119*	0.071*	0.148*	0.073*	0.044	0.125*	-0.12*	0.053*	1				
NEDS	0.092*	0.016	0.088*	0.047	0.026	0.061*	0.069*	0.034	0.129*	0.076*	0.03	-0.008	0.697*	1			
CEO Rem	0.175*	-0.026	0.222*	0.208*	0.259*	0.097*	0.117*	0.168*	0.048	0.334*	-0.07*	0.059	0.270*	0.196*	1		
Growth	-0.022	0.036	-0.024	-0.019	0.001	-0.214	-0.017	-0.012	-0.022	-0.018	0.074*	-0.04	0.026	0.034	0.046	1	
Cash	0.001*	-0.001	0.105*	0.104*	0.169*	0.025*	0.058	0.046	0.023	0.314*	0.036	0.019	0.124*	0.107*	0.230*	0.099*	1

Significance levels (*) are designated between 1% and 10%.

7.4 Regression Analysis

7.4.1 Environmental Management Quality (EMQ) and Financial Performance (FP)

As indicated in the methodology, fixed effect panel regression (OLS) was used to determine the environmental management quality and financial performance relationships. Lagged one year and two years were also used in the regression model as it is argued that it may take time for sustainable environmental practices to impact on financial performance. In controlling for firm-specific effects, standard OLS fixed effect, and a random effect was employed. The Hausman test which revealed Chia2 = 0.00 indicated that the fixed effect model was appropriate and therefore employed in the study. The fixed effect estimator controls for time invariant factors that are related to specific firms. Companies with good environmental and financial performance due to time-invariant are controlled by the fixed effect estimate and thus rely on intra-firm variation rather than cross-sectional variation (Earnhart and Lizal 2010). Wald Test for groupwise heteroscedasticity performed with an outcome of 0.000 indicated a lack of homoscedasticity and hence the need to control for heteroscedasticity. Robust fixed effect model was therefore employed to control for heteroscedasticity, as shown in the regression results.

The study employed two dependent variable Accounting-based measure of performance which (ROA) reflected the internal efficiency and organisational capabilities of adopting sustainable environmental practices to improve performance in line with the RBV (Trumpp and Guenther 2017). The other measure of performance Tobin's q, the market-based measure also measures the reputational effect that comes from stakeholder involvement in line with the stakeholder theory (Orlitzky et al. 2003, Endrikat et al. 2014, Trumpp and Guenther 2017).

The regression results presented in Table 9 implies F statistics has the overall good fit for the empirical models, the R squares demonstrates high explanatory power, especially, for empirical models using profitability (ROA) as a measure of Financial performance. This is in line with Trumpp and Guenther (2017) which also found high explanatory power for ROA than Tobin's q. When EMQ was lagged for one and two years as indicated in models the trend of the regression results did not change as ROA was significant under both 1 and 2-year lags, the Tobin's q was also consistent with the main results as both 1 and 2-year lags continued to be insignificant. The results from the lag EMQ, in the case of ROA, which helps to deal with problem with reverse causality and endogeneity, suggest that previous EMQ affects current profitability for the last year as well as the preceding year. The results

indicated that the regression co-efficient for the linear term of EMQ is significantly positive and the co-efficient for the quadratic term of EMQ is significantly negative. This suggests that there is evidence of inverted U-shaped relationship between environmental management performance and profitability of AIM listed companies. Similar results could not be identified for the Tobin's q, as there was no significant relationship with environmental management performance. Therefore, the result is partially supported by hypothesis 1. This is consistent with Trumpp and Guenther (2017), which found both U-shaped and inverted U-shaped relationship between EMQ and FP.

Table 9: OLS Regression Results of Environmental Management Quality and Financial Performance

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP): $FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 EMQ2_{it} + \beta_3 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using returns on assets presented and Tobin's q. EMQ is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. EMQ2 is the square term of the independent variable EMQ. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, β_2 and β_3 are the regression coefficients. *The subscript i denotes the nth company (i = 1... 201), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

VARIABLES	(ROA)	(ROA)	(ROA)	(Tobin's q)	(Tobin's q)	(Tobin's q)
EMQ	0.0240***			0.0083		
	(7.79)			(0.46)		
EMQ^2	-0.000538***			0.000447		
	(-3.91)			(0.52)		
EMQ_{t-1}		0.0212***			-0.0112	
		(6.74)			(-2.55)	
EMQ^2_{t-1}		-0.000461***			0.00120	
		(-3.32)			(2.58)	
EMQ_{t-2}			0.0150***			-0.0243
			(4.67)			(-1.08)
EMQ^2_{t-2}			-0.000222			0.00163*
			(-1.50)			(1.67)
Size	0.0840**	0.00923**	0.00814*	-0.00301	0.0173	0.0274
	(2.26)	(2.24)	(1.77)	(-0.12)	(0.65)	(0.93)
Liquidity	0.000262	0.00128	0.000156	0.162***	0.157***	0.158***
	(0.04)	(0.19)	(0.02)	(4.62)	(4.08)	(3.56)
Gearing	-0.0125***	-0.0125***	-0.0158***	-0.0533***	-0.0647***	-0.00618**
	(-3.68)	(-3.55)	(-3.79)	(-2.27)	(-2.59)	(-2.09)
Board Size	0.00993***	0.0104**	0.00843*	-0.0380	-0.0354	-0.0327
	(2.80)	(2.56)	(1.79)	(-1.37)	(-1.11)	(-0.94)
NEDS	-0.00840**	-0.00984**	-0.00666	0.0361	0.0216	0.0297
	(-2.00)	(-2.09)	(-1.30)	(1.14)	(0.60)	(0.80)
CEO Rem	0.0175*	0.00470	0.0120	0.0467	0.0358	0.0201
	(1.76)	(1.28)	(1.02)	(0.94)	(0.65)	(0.33)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	822	679	530	720	599	466
R Squared	0.3230	0.300	0.2766	0.1025	0.1134	0.1227
F Statistics	19.69	17.45	13.67	4.16	4.59	4.64
P Value	0.004	0.028	0.170	0.307	0.539	0.791

t statistics in parentheses
*p<0.10, **p<0.05, *** p<0.01

7.4.2 Results on the extent which EMQ influences FP

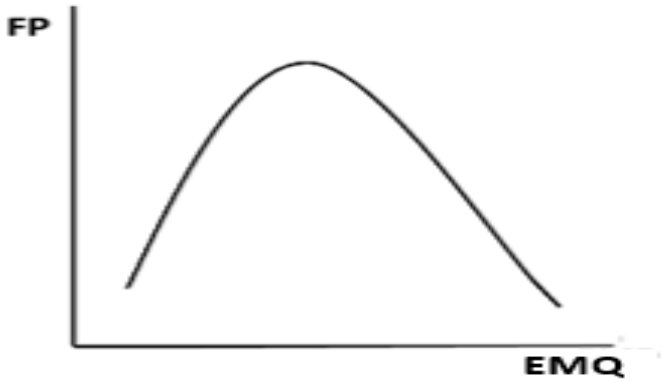
Aside identifying that non-linear relationship exists between environmental management quality and financial performance, this section also identifies the extent to which proactive environmental practices impact on financial performance. Although some existing studies (e.g. Nollet et al. 2016, Trumpp and Guenther 2017) documented that non-linear relationship exists between proactive environmental practices and financial performance, they did not indicate the actual level where the impact of proactive environmental quality on financial performance is expected to be optimised. This study provides additional evidence by establishing the maximum or minimum levels where it is more beneficial to engage in proactive environmental practices. Based on the results from the regression model, integral calculus is used to establish the maximum or minimum points.

$$\mathbf{ROA = \beta 1EMQ + \beta 2EMQ^2 + Controls}$$

$$EMP^* = \beta 1/[2*\beta 2]$$
$$=0.0240/\ [2*0.000538]$$
$$= 22\ (22.30)$$

As the β2 is negative, this involves establishing a maximum point, therefore, optimal point where further addition to environmental management quality falls is 22. The shape of the curve under the accounting-based measure of performance for the AIM listed firms is therefore inverted U-shaped.

Figure 2: EMQ and ROA – Inverted U-Shaped Relationship



The results which confirm our hypothesis 1, indicates that the optimum benefits for proactive environmental practices for AIM listed firms is derived at 22 out of the maximum of 30. Therefore, where excessive level of environmental engagement reduces financial performance, it is also expected that more than moderate level of environmental engagement is required to

derive optimum financial benefit. However, in the case of the Tobin's q, the optimum benefit could not be established, as the relationship was not significant.

7.4.3 Different Measures of Environmental Management Quality and Financial Performance

The environmental quality and financial performance relationships was also analysed by decomposing them into the various as aspect of environmental quality measures notably Energy, GHG, Waste, Stakeholder Engagement, Materials and Resource Efficiency and Compliance to Environmental Regulations. The result from the regression model is presented in in table 10 below. In relation to ROA, all the different aspects of environmental management quality indicated above revealed significant positive relationship between environmental and financial performance relationships. However, as represented in Table 10, when one and two years lagged of environmental management quality were incorporated into the model, waste did not identify any significant relationship on two-year lag, likewise, material and resources efficiency was also not significant under both one and two years lag. This suggests that whilst environmental performance with respect to energy, GHG, Stakeholder engagement and compliance for last year and preceding year impact on current profitability, in the case of waste and environmental compliance, whilst last year performance affect current year profitability, the preceding year performance has no effect on current profitability. In the case of material and resource efficiency, both the last and the preceding years' performance did not affect current profitability. In relation to market-based measures of performance (Tobin's q) the regression results identified that whilst GHG, Stakeholder engagement and compliance to regulation which were significant under ROA were also significant under Tobin's q, the other variables, Energy, GHG, Waste and Material and Resource Efficiency were not significant. These are further analysed below.

The regression results revealed that proactive energy efficient measures would lead to improved profitability (ROA). This was however not the case for Tobin's q which did not reveal any significant relationship with Energy efficiency measures. The results is therefore partially supported by H2 and in line with recent empirical findings by Fan et al. (2017) which found that energy efficiency is positively correlated to return on assets, return on equity and return on investment but has no significant relationship with Tobin's q. In hypothesis 3, the argument for positive correlation between compliance to environmental regulations and financial performance has been confirmed by the regression results based on ROA. Therefore, in line with studies such as (Aiyub et al. 2009, Hillary and Burr 2011), the study confirmed that organisations that adopt environmental compliance measures such as ISO 14001 lead to

increased efficiency and positively impact on financial performance. However, in the case of Tobin's q, the regression results revealed that higher-level environmental compliance might negatively affect market values. Although not supported by hypothesis 3, similar results was discovered by Ramanathan et al. (2018) which found that environmental regulations that are not flexible may not impact positively on financial performance. The study hypothesis 3 is therefore partially supported. The positive relationship between waste management and ROA is also supported by hypothesis 4. This is in line with the findings by (King and Lenox 2001) which also confirmed significant relationship between waste prevention and ROA. However, in relation to Tobin's q, no significant relationship was identified. Based on these evidences from the study, H4 is only partially supported.

GHG is supported by hypothesis 5 in relation to both accounting and market-based measure of performance and in line with Klassen and McLaughlin (1996) assertions that reduced emission impacts on both market gains and cost savings. In hypothesis 6 based on ROA, the result supports the hypothesis that material and resource efficiency practices such as recycling, improved packaging programs, and the use of lightweight materials would significantly impact on costs. The findings also confirmed the empirical results of Erfle and Fratantuono (1992) which concluded that the existence of environmental initiatives such as recycling, waste reduction and packaging programmes is positively and significantly correlated with return on equity, return on assets and return on investment. However, in relation to Tobin's q, the result did not identify any significant relationship with material and resource efficiency. Therefore, hypothesis 6 is only partially supported. Based on stakeholder engagement on proactive environmental practices on financial performance, the OLS regression results fully confirmed hypothesis 7, as both ROA and Tobin's q showed significant relationship with EMQ. In line with Carter et al. (2000), the study confirmed that proactive stakeholder engagement such as environmental purchasing and product stewardship are positively correlated with financial performance and this has also been confirmed by Bourlakis et al. (2014) where small firms benefited from sustainable supply chain measures.

Table 10: OLS Results of Disaggregated Measures of Environmental Management Quality and Financial Performance

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP): $FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using return on assets and Tobin's q. The independent variables are Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, and β_2 are the regression coefficients. *The subscript i denotes the nth company (i = 1... 201), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

VARIABLES	(ROA)	(ROA)	(ROA)	(Tobin's q)	(Tobin's q)	(Tobin's q)
Energy	0.0106***			-0.0240		
	(3.09)			(-0.95)	-0.0150	
$Energy_{t-1}$		0.0121***			(-0.0269)	
		(3.13)				
$Energy_{t-2}$			0.01149***			-0.0102
			(3.94)			(-.33)
GHG	0.01138***			0.0533*		
	(3.70)			(2.20)		
GHG_{t-1}		0.0963**			0.0386	
		(2.16)			(1.38)	
GHG_{t-2}			0.0136*			0.0361
			(2.84)			(1.14)
Waste	0.0144***			-0.00822		
	(2.93)			(-0.30)		
$Waste_{t-1}$		0.0142***			-0.00996	
		(2.80)			(-0.39)	
$Waste_{t-2}$			0.00580			-0.0169
			(2.80)			(-0.55)
Stake	0.0235***			0.178***		
	(4.54)			(6.56)		
$Stake_{t-1}$		0.0254***			0.181***	
		(4.14)			(6.15)	
$Stake_{t-2}$			0.0248***			0.192***
			(3.86)			(5.08)
Materials	0.00848**			0.0153		
	(2.49)			(0.66)		
$Materials_{t-1}$		0.00545	-		0.0196	
		(1.49)			(0.57)	
$Materials_{t-2}$						0.0247
			0.00632			(0.98)
Compliance	0.0100***		(1.01)	-0.0439*		
	(2.69)			(-1.96)		
$Compliance_{t-1}$		0.0103***			-0.06833**	
		(2.59)			(-3.28)	
$Compliance_{t-2}$			0.00632			-0.0829***
			(2.18)			(-3.11)
Size	0.00991***	0.0105**	0.00868*	-0.000436	0.0184	0.0251
	(2.58)	(2.46)	(1.72)	(-.02)	(-0.65)	(0.84))
Liquidity	0.000631	0.00252	0.000576	0.0149***	0.150***	0.0158***
	(0.10)	(0.36)	(-1.63)	(4.26)	(3.89)	(3.66)
Gearing	-0.0122***	-0.0125***	-0.0143**	-00481**	-0.0554**	-0.0498*
	(-3.56)	(-3.34)	(-2.61)	(-2.07)	(0.48)	(-1.67)
Board Size	0.00715*	0.00817*	0.00548	-0.0510*	-0.0424	-0.0398
	(1.90)	(1.94)	(0.86)	(-1.82)	(-1.05)	(-1.15)
NEDS	-0.00540	-0.00772	-0.0033	0.0496	0.0334	0.0470
	(-1.23)	(-1.57)	(0.01)	(1.53)	(1.35)	(1.25)
CEO Rem	0.0182*	0.0146	0.0114	0.0489	0.0338	0.0225
	(1.78)	(1.41)	(0.93)	(1.03)	(0.28)	(0.39)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	819	677	528	717	597	464
R Squared	0.3140	0.2963	0.2859	0.139	0.1562	0.1719
F Statistics	14.38	13.28	10.75	5.97	5.98	5.61
P Value	0.014	0.044	0.284	0.369	0.602	0.881

t statistics in parentheses

*p<0.10, **p<0.05, *** p<0.01

7.4.4 The Control Variables

7.4.4.1 Firm Specific Factors

In relation to control variables, the study control for firm specific factors and corporate governance variables. Firm specific factors that were controlled are size, industry, liquidity, and leverage. The study found significant positive association between size and ROA but no significant association with Tobin's q. The result is therefore partially supported under H10. This suggests that whilst company size is likely to influence internal efficiency through economy of scale, size is not relevant to investors. The study also showed that industry effect affects performance. This fully supports by H11. In addition, whereas liquidity has no influence on internal measure of performance (ROA), it revealed strong positive association with the market performance and thereby suggesting that investors are more concerned about the ability of the company to service its interest obligation and dividend when they are due. Hypothesis 13 is therefore partially supported. Gearing revealed significant negative relationship with both accounting and market-based measures of performance and therefore fully support H12. This supports the theoretical predictions from the study that whilst higher interest may impact on cost and negatively affect operational cost and profitability in the case of unprofitable firms, investors are also unlikely to invest in companies that are high geared due to risk of bankruptcy. The results on firm specific factors under the first and second regressions models (Composite EMQ and Disaggregated EMQ) were identical.

7.4.4.2 Corporate Governance Factors

In relation to corporate governance factors that affect performance, the study found significant positive association between ROA and size but not significant relationship based on Tobin's q. Thus, evidence from the study is partially supports H14. This implies that whereas large board might bring diversity of skills and strongly influence internal efficiency and performance, investors do not see any relevance of large board size. On the contrary whilst large board size tends to influence internal measure of performance positively, large proportion of non-executive negatively impact on performance. However, similar to large board size which supported H14 under accounting-based measure of performance, NEDs also support H15 under ROA and did not show support in relation to Tobin's q. CEO remunerations also has significant positive association with performance based ROA, but no significant association based on Tobin's q. H16 is therefore partially supported by the evidence from the study.

7.5 The Impact of Firm Growth on EMQ and FP Relationships

The objective two of the study intended to investigate whether firms with high growth are likely to invest in proactive environmental management practices or those that experience little or no growth. It further analysed the type of firm growth either organic or inorganic growth firms

which are likely to invest in proactive environmental management practices. The results from the models are presented in table 11 and 12 below.

The regression model shown in table 11 disclosed significant relationship between EMQ and FP for both ROA and Tobin's q and therefore provides full support to H1. However, whilst growth has significant positive influence on market-based measure of financial performance (Tobin's q), although positive, growth did not have any significant relation with ROA. Similarly, there was no moderating effect of growth on EMQ and FP relationship and therefore H8 is rejected.

Regarding control variables, firm size was significant under both ROA and Tobin's q. Similarly, gearing was also significant based on both ROA and Tobin's q. Liquidity also revealed significant positive relationship but based on only Tobin's q. Both industry and year effect also impacted on the model. However, none of the corporate governance variables was significant.

Table 11: OLS Regression Results of the impact of Firm Growth on EMQ and FP Relationship

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) moderated by firm growth:

$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \beta_3 G_{it} + \beta_4 (EMQ_{it} * G_{it}) + \mu_{it} + \lambda_{it} + \varepsilon_{it}$ Where *FPit* is the dependent variable which is measured using returns on assets (ROA) and Tobin's q. EMQ is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. G represents firm growth (Growth) where growth is measured as % increase or decrease in assets and EMQ*G represents the interacting variable environmental management quality and firm growth. Control variables indicated by controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, β_2, β_3 and β_4 are the regression coefficients. *The subscript i denotes the nth company (i = 1... 201), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

VARIABLES	(ROA)	(Tobin Q)
EMQ	0.00788***	0.0346**
	(3.73)	(2.51)
Growth	0.00107	0.169***
	(0.14)	(4.07)
EMQ*Growth	0.00061	-0.00616
	(0.68)	(-1.27)
Size	0.0162***	0.0558**
	(3.74)	(2.13)
Liquidity	0.00226	0.189***
	(0.35)	(4.46)
Gearing	-0.0148***	-0.0621**
	(-3.61)	(-2.35)
Board Size	0.00139	-0.0503
	(0.30)	(-1.58)
NEDS	-0.00103	0.0294
	(-0.21)	(0.78)
CEO Rem	0.0119	0.00264
	(0.97)	(-0.05)
Industry Effect	Yes	Yes
Year Effect	Yes	Yes
Observation	528	474
R Squared	0.3126	0.2021
F Statistics	9.66	6.69
P Value	0.154	0.275

t statistics in parentheses
*p<0.10, **p<0.05, *** p<0.01

7.5.1 OLS Regression results for EMQ and FP Relationship for Firms with Organic and Inorganic Growth

In terms of the impact of growth on EMQ and FP relationships for firms with organic growth and those with inorganic growths, EMQ and FP was significant for organic growth firms based on both ROA and Tobin's q as shown in Table 12. Firm growth has significant positive

influence on financial performance for firms with both organic and inorganic growth based on Tobin's q, but no significant relationship based on ROA. However, in relation to whether growth moderates environmental and financial relationship for companies with organic and inorganic growth, the model revealed that no significant relationship, except under market-based measure of performance for organic growth companies where significant negative relationship was found. Therefore, in line with Elsayed and Paton (2009), the result implies that AIM listed companies that are pursuing growth are less motivated to use limited resources on environmental investment instead of their own returns.

Table 12: OLS Regression Results of EMQ and FP for Organic and Inorganic Growth Firms

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) moderated by firm growth for organic and inorganic growth firms where organic growth means no acquisitions and mergers within the sample period and inorganic growth indicates the existence of acquisition and mergers within the sample period. $FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \beta_3 G_{it} + \beta_4 (EMQ_{it} * G_{it}) + \mu_{it} + \lambda_{it} + \varepsilon_{it}$ Where *FPit* is the dependent variable which is measured using returns on assets (ROA) and Tobin's q. EMQ is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. G represents firm growth (Growth), where growth is measured as % increase or decrease in assets. and EMP*G represents the interacting variable environmental management quality and firm growth. Control variables indicated by controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, β_2, β_3 and β_4 are the regression coefficients. *The subscript i denotes the nth company for Organic (i = 1... 80) and inorganic (i = 1... 121). The subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

VARIABLES	Organic ROA	Organic Tobin's q	Inorganic ROA	Inorganic Tobin's q
EMQ	0.0100***	0.0504***	0.00798**	0.00115
	(3.26)	(2.70)	(2.50)	(0.05)
Growth	0.0132	0.169***	-0.00635	0.133**
	(1.52)	(3.26)	(-0.51)	(2.38)
EMQ*Growth	0.000174	-0.0106*	0.000319	0.00626
	(0.14)	(-1.88)	(0.26)	(0.77)
Size	0.0205***	0.0158	0.0143**	0.0875**
	(2.80)	(0.37)	(2.19)	(2.29)
Liquidity	0.0105	0.0277	0.000533	0.254***
	(0.85)	(0.40)	(0.07)	(4.05)
Gearing	-0.0142**	-0.148***	-0.0179***	0.00235
	(-2.44)	(-4.52)	(-3.28)	(0.07)
Board size	0.00151	-0.0452	0.00636	-0.0491
	(0.31)	(-1.34)	(0.83)	(-0.95)
NEDS	0.00525	0.0956**	-0.00657	-0.0175
	(1.01)	(2.18)	(-0.85	(-0.30)
CEO Rem	-0.00377	0.174**	0.0135	-0.113
	(-0.32)	(1.99)	(0.70)	(-1.58)
Industry Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Observation	267	238	261	236
R Squares	0.3626	0.3044	0.3263	0.2603
F Statistics	7.15	7.68	5.01	5.93
P Value	0.623	0.005	0.261	0.254

t statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Similarly, to the model on table 12, size continued to be significant under both organic and inorganic, likewise gearing. Liquidity was only significant under Tobin's q for firms with inorganic growth whilst gearing continue to show significant negative relationship under both

organic and inorganic growth. The number of non-executive directors and CEO Remuneration has significant positive impact under the Tobin's q for organic growth firms.

7.6 The Impact of Cash Resources on EMQ and FP Relationship

Aside analysing whether firm growth affect environmental and financial performance relationship, further analysis was considered on whether existence of large cash balance (cash and cash equivalent) also influences environmental and financial performance relationships. The regression model presented in table 13 revealed a significant positive relation between EMQ and ROA, and EMP, as well as between cash resources and ROA. In the case of Tobin's q, the relationship was significant but negative with EMQ. Also, under Tobin's q cash was negative but not significant. More importantly, the study also revealed that cash resources moderate the relationship between environmental and financial performance and this is supported by hypothesis 11. However, whilst under ROA the cash reserves moderate EMQ negatively and in the case of Tobin's q, cash reserves moderate EMQ positively. The association between size and ROA was significantly positive but no significant relationship based on Tobin's q. Liquidity showed significant positive association with Tobin's q but no significant relationship with ROA. Gearing revealed significant negative relationship with both ROA and Tobin's q. The impact of industry effect was considered under both ROA and Tobin's q. Board sized also had a significant positive link with ROA, whereas NEDS had significant negative associations with ROA. None of the corporate governance variables were however significant based on Tobin's q.

Table 13: OLS Regression Results of the impact of Cash Resources on EMQ and FP Relationship

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMP) and financial performance (FP) moderated by cash resources:

$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \beta_3 C_{it} + \beta_4 (EMQ_{it} * C_{it}) + \mu_{it} + \lambda_{it} + \varepsilon_{it}$ Where *FPit* is the dependent variable which is measured using returns on assets (ROA) and Tobin's q. EMP is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. C represents cash resources (Cash) and EMP*C represents the interacting variable environmental management quality and cash resources. Control variables indicated by controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, β_2, β_3 and β_4 are the regression coefficients. *The subscript i denotes the nth company (i = 1... 201), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

	(1)	(2)
VARIABLES	ROA	Tobin's q
EMQ	0.0249***	-0.0853***
	(6.16)	(-2.63)
Cash	0.0152**	-0.0557
	(2.49)	(-1.31)
EMQ*Cash	-0.00154***	0.0118***
	(-3.33)	(3.26)
Size	0.0102**	-0.0127
	(2.49)	(-0.49)
Liquidity	-0.00414	0.156***
	(-0.62)	(3.91)
Gearing	-0.0139***	-0.0511**
	(-4.08)	(-2.22)
Board Size	0.00762**	-0.0431
	(2.22)	(-1.54)
NEDS	-0.00840**	0.0461
	(-2.0)	(1.40)
CEO Rem	0.0155	0.0250
	(1.29)	(0.47)
Industry Effect	Yes	Yes
Year Effect	Yes	Yes
Observation	789	710
R Squared	0.3201	0.1246
F Statistics	16.53	5.58
P Value	0.03	0.668

t statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.6.1 Regression Results for the Impact of Cash Reserves on EMQ and FP relationships for Cash Constraint and Unconstraint Firms

Delving further as to whether environmental and financial performance relationships are beneficial to cash constraint companies or unconstraint companies, regression model shown table 14 considered both cash constraint and unconstraint firms listed on the Alternative

Investment Markets in the UK. The model disclosed a significant positive relationship between EMQ and FP for both constraint and unconstraint companies based on ROA, but no significant relationship was identified in the case of the Tobin's Q. There was also no significant effect of cash balance on financial performance based on both ROA and the Tobin's Q. Also, whereas size had positive influence on financial performance based on RAO for constraint companies, the relationship was significantly negative for unconstraint companies under the Tobin's Q. Gearing also revealed significant negative relation for both constraint and unconstraint companies except for market based measure of performance under the unconstraint companies where the gearing was not significant. In addition, whereas board size was significant based ROA under constraint firms, it was not significant based on Tobin's q for both constraint and unconstraint firms. The NEDS only revealed significant negative relationship under ROA for constraint companies whereas CEO Remuneration did not record any significant relationship under both constraint and unconstraint firms.

Table 14: OLS Regression results for EMQ and FP Relationship for Cash Constraint and Unconstraint Firms

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) for cash constraint and unconstraint firms where constraint firms indicate firms with median cash balance of ≤ £4,278,000.00. $FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using returns on assets and Tobin's. EMQ is the independent variables which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. EMP2 is the square term of the independent variable EMQ. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, and β_2 are the regression coefficients. *The subscript i denotes the nth company, constraint, (i = 1... 100), and unconstraint (i = 1... 101), the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

VARIABLES	Unconstraint ROA	Unconstraint Tobin's q	Constraint ROA	Constraint Tobin's q
EMQ	0.0142***	0.00639	0.00908***	0.0103
	(9.49)	(0.67)	(7.92)	(1.28)
Cash	-0.00211	0.0237	-0.00186	0.0536
	(-0.29)	(0.46)	(-0.30)	(1.49)
Size	-0.0116	-0.117**	0.0242***	0.0836***
	(-1.43)	(-2.28)	(5.24)	(3.16)
Liquidity	-0.00818	0.199**	0.00580	0.0861**
	(-0.74)	(2.37)	(0.74)	(2.15)
Gearing	-0.0172***	0.0531	-0.0128***	-0.196***
	(-3.30)	(1.65)	(-2.86)	(-5.00)
Board Size	0.0137**	-0.0563	0.0583	-0.0265
	(2.19)	(-1.60)	(1.41)	(-0.69)
NEDS	-0.00635	0.0263	-0.0107**	0.0203
	(-0.77)	(0.62)	(-2.16)	(0.49)
CEO Rem	0.0136	0.0850	0.0201	0.00726
	(0.60)	(1.08)	(1.60)	(0.10)
Industry Effect	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
Observation	381	341	408	369
R Squared	0.3167	0.1153	0.3688	0.2648
F Statistics	10.67	2.90	13.61	6.49
P Value	0.507	0.389	0.007	0.530

t statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

7.7 Discussion of Results

7.7.1 Environmental Management Quality and Financial Performance

The significant positive relationship between EMQ and the ROA supports existing conjecture that proactive environmental measures would improve the bottom-line. As shown by Lopez-Gamero et al. (2009), proactive environmental measures provide cost-based competitive advantage which influences financial performance. Similarly, Earnhart and Lizal (2010) opined that improved measures of environmental performance reduce cost as regulatory scrutiny, emission charge, community pressure, and regulatory sanctions are reduced. The study, in line

with Trumpp and Guenther (2017) is align to the stakeholder theory by showing that the positive influence of environmental and financial performance is depicted by stakeholders' expectation as sustainable environmental practices beyond the mere compliance improved fulfillment of stakeholders' expectation. The significant positive relationship between environmental management performance and financial also reinforces the GRI and DEFRA (2013) guidelines which is intended to encourage organisations to embrace innovative practices to reduce their environmental foot print whilst at the same time enhancing their competitiveness. Similarly, the study upheld UNGC guidelines on sustainability, which argued for a business case for CSR, and environmental sustainability by demonstrating that businesses with strong social and environmental responsibility are more successful in generating economic value added.

Pollution is also considered as sign of inefficiency and ineffective use of resources, therefore, controlling pollution and adopting pollution prevention strategies allow organisations to make significant savings in cost (Albertini 2013) . Positive EMQ and FP relationships have also been highlighted by Hart (1995) under the Natural Resource Based View. Hart (1995) indicated that pollution prevention and product stewardship could result in competitive advantage through "first mover" strategy in emerging green oriented products. In the view of Hart (1997), whereas pollution prevention enables significant cost savings to be achieved in terms of pollution control, EMQ and FP relationship is also largely enhanced through efficient input and energy consumption, as well as reuse and recycling. Albertini (2013) also confirmed Porter's "win-win" hypothesis by arguing that product stewardship including eco-efficiency involves the production and delivering of goods but at the same time reduce the ecological impact and resource utilisation. A survey of 133 firms by Guimaraes and Liska (1995) found that environmental stewardship derive greater benefits than those that only aimed at complying with regulations. The benefits are derived through personnel benefits (higher staff morale, higher staff retention and improved communication), operating efficiency (avoidance of fines, reduce waste, lower insurance, higher energy efficiency) as well as external benefits such as improved corporate image, competitiveness, attraction of investors and customer loyalty (Cordiero and Sarkis, 1997).

Supporting the positive relationship between EMQ and FP also confirms the Porter (1980) views. He explained that one best way for organisations to achieve competitive advantage is pursuing a low-cost strategy. Thus, where environmental performance has significant impact on costs, it should result in increase in profitability realised through internal accounting-based performance measures such as ROA. Butler et al. (2011) emphasised that sustainable environmental practices may increase product differentiation in the marketplace thereby

enhancing organisational image to customers, and as a result increase profitability. Thus, the result is reflected in the theoretical predictions of the resource-based view that improved environmental performance is a unique resource that can enhance competitiveness and improve performance.

Gomez-Bezares (2016) explained how sustainability practices could impact positively on financial performance through lowering of risk. They indicated that when companies employ the concept of sustainable practices into their core strategies and decision-making processes, they are likely to benefit from relatively lower risk due to improved and stable relationship with the financial community and investors. In conformity with the signal theory, they averred that accurate disclosure of environmental practices reduces information asymmetry and enables the firm to attract additional shareholders and raise new equity. This is likely to impact positively on capital structure and therefore compared to other firms, companies that adopt sustainable environmental practices should have lower accounting based total risk, which should impact positively on cost of funding and improve profitability as a result.

In the case of the Tobin's Q, the lack of significant relationship between EMQ and FP suggests that the expected implication of the social consequences of a firm's environmental decision may not be clearly understood by the investors (Gilley et al. 2000). They reiterated that it shows lack of understanding on the part of the investors on the potential social consequences and may affect their reactions towards the environmental decision of the firm. The result of the study also suggests that investors may be interested in product driven environmental initiatives which directly impact on cost and profitability rather than embracing themselves with process driven initiatives which could be achieved through the spill over effect from the product driven initiatives. Proactive environmental measures may also take time for the benefits to be realised thereby increasing uncertainty about outcomes on the part of the investors (Khanna and Damon1999, Aiyub et al. 2009). Furthermore, Hart and Milstein, (1999) emphasised that the resulting impact of sustainable environmental practices on financial performance pertains in many cases to long-term competitiveness.

Aside the uncertainty that might be envisaged by stakeholders, Albertini (2013) argued that the lack of significant relationship between EMP and FP based on market-based indicators such as Tobin's Q represents theoretical inconsistencies (stakeholder mismatching). Emphasising Wood and Jones's (1995) study, Albertini (2013) contended that there is no theoretical underpinning that explains why stakeholders would reject or not invest in firms that are highly ranked in pollution control. Investors and shareholders may also face information asymmetry

as mangers that possess valuable information about the environmental practices of the firm may not be able to convey such information to the outsiders, particularly potential investors. Explaining how corporate environmental performance may not affect the market value, Bush and Hoffman (2011) stated that in relation to many environmental issues, information is not completely new to the market. They indicated that it is rather a gradual process and new information that would impact on the market may involve only sudden and unexpected event such as environmental accidents.

7.7.1.2 The Case for Non-Linear Relationship Argument

The rising portion of the inverted U-shaped curve whilst confirming stakeholder acceptance of sustainable environmental practices also supports the assertion of win-win situation (Lankoski 2000). It is argued that firms that can effectively organise their resources may be able to achieve higher returns than comparable less organised firms may. As shown by Barney (2001) differences in firm's performance comes from the heterogeneity of its resources. A firm that can develop innovative skills and other resources that are unique and difficult to imitate is likely to achieve higher financial performance resulting from the competitive advantage that it derived from those unique resources. Whereas reactive and moderate level of environmental engagement could provide a moderate improvement in financial performance, Hart (1995) identified three key sources of competitive advantage from environmental engagement that can help the firm to achieve superior performance. These are pollution prevention, product stewardship, and sustainable development. Pollution control measures are considered as simple end-of-pipes solutions, which are normally provided by third parties and can be easily implemented. Hart (1995) elucidated many instances in which pollution prevention may help firm to achieve superior performance. First, aside pollution prevention saving costs of installing and operating end-of-pipes technologies it may also improve productivity and efficiency. Hart (1995) indicated that pollution prevention reduces cycle times as unnecessary steps in the production process are removed. Similarly, pollution prevention strategy has the potential to reduce emission well below legal requirements thereby reducing a firm's compliance and liability costs. Whereas such pollution prevention action may result sustain competitive advantage and help the firm to achieve increasing returns, simply end-of-pipe environmental technologies may be quickly competed away and reach their maximum benefit thereby resulting in decreasing returns.

Ramanathan (2016) however argued that pollution prevention measures which may involve redesigning of the production process may result in less consumption of energy, less use of raw materials, and increase use of alternative energy which is likely to have a great impact on

financial performance than simply end-of-pipe technologies. Similarly, Endrikat et al. (2014) showed that strategic approach in dealing with environmental issues significantly determines EMP and FP relationships. Supporting King and Lennox's (2002) arguments, they confirmed that proactive approach to environmental issues is more likely to be associated with superior financial performance than end-of-pipe approaches.

Therefore, whereas proactive environmental performance measures such as pollution prevention might result in increasing returns from continuous improvements; reactive measures of environmental engagement may result in decreasing returns. Similarly, excessive investment in environmental practices would reduce efficiency and negatively impact on performance and thereby causing decreasing returns. A very recent empirical findings (Ramanathan et al. 2018) found that whilst flexible environmental regulations improved financial performance, inflexible environmental regulations may not be effective in improving financial performance with their innovative capabilities. For instance, REACH (EC1907/2006) has been criticised for being too demanding and less flexible for SMEs to innovate (Arfaoui 2017). Such regulation that is considered burdensome is likely to negatively affect performance and hence decreasing returns. These arguments have been supported by the empirical studies of Trumpp and Guenther (2017) where U-shaped and inverted U-shaped relationship were reported.

Hart (1995) also reported on how product stewardship could be used to create competitive advantage and improve financial performance. Firms could liaise with other partners in the lifespan of the product to take up a responsibility to reduce the environmental impact of the product. Significant cost savings could be achieved by manufacturers if the production process could be redesigned to use less toxic materials, and reusable/recycle materials. This has been confirmed by DEFRA (2013) which reported cost savings of 70% for recycle/reuse materials in contrast to virgin materials. Retailers and consumers on their part could be encouraged for proper disposal or recycling at the end of the product life or manufacturers could obtain the product back from the consumers after the lifespan of the product for recycling or proper disposal. Aside the benefits from cost savings that could be achieved from such actions, it also increases the reputation of the firm and consequently impacts the demand for its product and services. Ricoh, a UK logistic company through its product stewardship agenda intended to reduce the total life cycle of Co2 emission by 30% in 2020 and 87.5% by 2050 from 2000 base level. This has been reiterated in the empirical study by Vijfvinkel et al (2011) which indicated that the motivation for firms to engage in such sustainable practices are financial opportunities, the threat of financial loss, and intrinsic motivation to contribute to the sustainability. Vijfvinkel et al. (2011) indicated that sustainable practices are valued by the society and willing to pay a

premium for sustainable products thereby creating business opportunities. They, however, argued that the relationship between environmental sustainability is not expected to be linear as opportunities to enhance financial performance from sustainable environmental engagement should be limited to some point as becoming more sustainable may worsen the financial position of the firm.

Whilst in the case of ROA, inverted U-shaped relationship was identified suggesting that moderate level of environmental sustainability improves profitability; it is also possible to discover U-shaped relationship as demonstrated by Trumpp and Guenther (2017). Trumpp and Guenther suggested that firms that engaged in higher level of sustainability experience increasing returns whilst those with lower level of environmental engagement experienced decreasing returns. However, in confirming non-linear relationship, specifically U-shaped relationship, Nollet et al. (2016) argued from different perspective. Based on Bloomberg's Environmental Social Governance (ESG) disclosure score from S & P 500 firms, Nollet et al. (2016) concluded that corporate, social, and environmental engagement do not pay off immediately but only after investment in sustainability practices crossed certain point. Therefore, whilst at the initial stages the effect of sustainable engagement on profitability is negative, this changes at some point and ultimately return investment in sustainability to profitability. The above discussions, therefore, provide justification for the non-linear relationship discovered in the study.

7.7.3 Disaggregated Measures of Environmental Management Quality and Financial Performance

Similar to the finding of this study supported by hypothesis 2, many studies have also identified that proactive energy efficient measures improve financial performance. Conlon and Glavas (2012) found that green building is associated with lower costs and that cost of utilities of building with green facilities was $675.26 lower per annum than in non-green facilities. Positive relationship between higher energy efficient measures and financial performance has also been confirmed in many other studies (e.g. Groot et al., 2001: Sahu, 2014: US Depart of Energy, 2015). Trianni et al. (2014) study on 71 Italian manufacturing SMEs also found improved financial benefits and competitiveness as important drivers for SMEs to invest in proactive energy efficient practices. Sahu (2014) found that companies that use natural gas were more energy efficient and profitable than those using coal and petrol. Sahu's (2014) findings which attest to Porter's "win-win" hypothesis suggest that in the use of natural gas, there is the possibility of reducing Co2 emissions whilst at the same time improving profitability. Recent empirical findings from Bergmann et al. (2017) also urged managers to pay more attention to

the implementation of energy efficiency measures and to recognise that although it entails costs, the study which was based on multiple regression, revealed that the implementation of energy efficiency measures is directly related to improve financial performance.

Although there was no significant relationship between energy efficiency practices and market-based measure of performance, this could be attributed to the information asymmetry between the firm and investors. As suggested by Pavlinovic (2013), environmental information is difficult to be observe by investors, therefore firms could signal investors through environmental certification such as ISO 14001. It has also been argued that lack of significant relationship between environmental management practices such as energy efficiency measures could result from misperception of the stock market. Pavlinovic (2013) documented that return from environmental investment may be long-term but if it incurs short-term losses, the stock market may react negatively. European Commission (2007) also indicated that in spite of the fact that SMEs are dominated in the industrial sector and are large consumers of energy, only few SMEs undertake energy efficient practices. This has been confirmed in this study where disclosure of energy efficient practices by listed SMEs was less than 17%. Such a limited energy efficiency practices are unlikely to attract the attention of energy conscious investors hence the lack of significant relationship between EMQ and FP.

The study confirms that environmental compliance improves internal measure of financial performance. In line with the results obtain from most studies on environmental regulations and financial performance. Afagachie (2013) for instance, identified that the most highly ranked factor in sustainable environmental practices is compliance to environmental regulation. Compliance to environmental regulations helps to reduce legal risk and avoid payment of fines and penalties that consequently impact on profitability. Afagachie (2013) disclosed that the motivation for compliance with environmental regulations that was reduction in costs was achieved through improved corporate image and better co-operation with regulatory authorities. Afagachie (2013) study also found that environmental policy impacts positively on financial performance because of the possibility to save cost in the form of reduced use of raw materials, minimisation of waste, as well as energy consumption. In terms of how compliance to environmental regulations may impact positively on costs as revealed in the study, OECD (2007) indicated that compliance to environmental legislation is beneficial to listed SMEs. They explained that costs savings from efficient utilisation of materials, energy, waste reduction as a result of compliance to environmental regulations help attract new customers and business opportunities to SMEs due to positive reputation that it receives. Supporting OECD (2007) assertions, Mahenc (2008) also reiterated that, financial performance of listed SMEs could be

enhanced through higher prices by signalling their green products from environmental compliance. Finally, lack of environmental compliance could have huge negative implication on financial performance of the firm from both cost and revenue perspectives. As noted by Clark et al. (2015), lack of compliance could seriously undermine the financial performance of the firm. Citing environmental failures of BP and Andarko PLC as examples, they averred that environmental failures by these firms did not only result in billions of dollars fines but it also had strong negative impact on their reputations which affected their revenues and profits.

However, the negative or no significant relationship between environmental compliance and the Tobin's Q could be explained from the point of view of the signal theory. Many studies have shown that positive correlation between environmental compliance and financial performance is achieved through environmental management such as ISO and EMAS certification (Zhu et al. 2008, Aiyub et al. 2009, Hillary and Burr 2011, Mensah 2014). However, most companies listed on Alternative Investment Market do not employ ISO 14001 or EMAS and therefore it is likely that the environmental compliance measures put in place by such companies have not been observed by the market hence the negative relationship between environmental compliance and the Tobin's q. As argued by Rahman (2013) the main justification for investing in environmental initiatives is rooted in signalling theory. It is therefore important for firms to signal their positive environmental performances that are received and interpreted by stakeholders, and consequently impact on financial performance. Li et al. (2016) maintained that although the resource-based view proposed that good environmental practices would establish legitimacy with investors and other stakeholders, and help the firm to establish competitive edge, they indicated that such a preposition assumes that stakeholders will respond positively to good environmental practices. However, where there is information asymmetry, stakeholders may not be able to distinguish good environmental practices from the bad ones, and hence good environmental practices may not be recognised by investors.

In line with the findings of the study, it has been suggested that waste reduction measures play a key role in reducing pollution whilst at the same time saving costs. Therefore industrial waste prevention measures such as reuse and recycle allow new product to be made out of paper, plastic, glass, metals and wood with significant impact on costs (Cucchiella et al. 2014). It is argued that creation of waste depletes natural resources, uses water and energy, puts pressure on land, pollutes the environment and generates additional cost of managing waste (Zaman and Lehmann 2013). Therefore, corporations such as AIM listed firms that effectively manage waste are not only protecting the environment but also avoiding economic costs and improving

the bottom-line. Emphasising that waste is a symbol of inefficiency and representation of misallocated resources, in a research which employed zero waste index as innovative tool to assess waste management performance, Zaman and Lehmann (2013) recorded that improved waste management performance and material substitutions enhance economic performance. Consistent with the study, it has been emphasised that environmental friendly packaging and proper waste disposal have been found as one of the topmost environmental practices of firms due to social economic and economic benefits (Environment Agency 2003, Montabon et al. 2007, Ahinful 2017). Similarly, managing waste is expected to enhance efficiency in operational costs, as the costs of disposing materials, labour handling costs, as well as energy costs associated with waste, may be reduced and consequently enhance financial performance. Sroufe (2003), consistent with this study also confirmed that the waste reduction practices are positively correlated with financial performance in a study which also used SMEs as a sample frame.

However, on the contrary and line with the results from the Tobin's q which did not reveal any significance relationship with environmental management quality, King and Lenox (2002) confirmed that although waste prevention enhance financial performance, they did not find any evidence that pollution reduction through other means such as waste management enhance profits. Various instances have been cited on why waste management and waste prevention practices may not be captured by the market. For instance (Russo and Fouts 1997, Klassen and Whybark 1999) argued that waste prevention is underexploited because it provides hard to observe benefits. King and Lenox (2002) indicated that the associated benefits of waste prevention such as development of workers' skills are usually overlooked, and the contextual embeddedness associated with waste prevention and management makes it difficult for managers and other stakeholders to measure its full value. Thus, owing to the above issues surrounded with waste management and prevention, it becomes difficult for the market to capture the full value of waste management practices hence the lack of significant relationship between waste management and the market performance variable, the Tobin's q.

Results of the study which is supported by hypothesis 4 indicate that significant positive association exist between pollution control and financial performance has also been supported by many theoretical and empirical arguments. Filbeck and Gorman (2004) has argued that pollution prevention measures such as modifying existing production process or installing new production facilities to prevent pollution instead of treating it although may be riskier, such measures are likely to reduce pollution and lower costs. They further argue that re-evaluation of the firm's manufacturing process results in opportunities for firms to innovate and modify

their production such as recycling waste materials which otherwise would be discharged into the natural environment. Porter and van der Linde (1995) emphasised that this innovation may translate into competitive advantage and as a result improve financial performance. Pavlinovic (2013) view which aligns to the results of the study confirmed that voluntary environmental management systems enable firms to introduce cost effective emission reduction that might not be possible to achieve through environmental regulations which are in most cases uniform across heterogeneous producers.

In line with stakeholder theory, Klassen and McLaughlin (1996) also reiterated that pollution prevention and end-of-pipe treatment provide avenues for firms to increase their sales by marketing environmentally friendly products. They also reiterated that lowering pollution might reduce the costs associated with possible future third-party suits and hence improve financial performance. Similarly, McGuire et al. (1988) associated pollution with cost of lending. They argued that lower pollution levels might reduce financing costs because investors and lenders link lower financial risk with better environmental management practices and reduced financial cost would positively influence financial performance. Additional, regulations such as EU Directive 2003/87EC on greenhouse emission trading scheme encourages organisations to adopt innovative practices whilst at the same time enhancing value, as companies can generate additional revenues by selling surplus emission allowance. This has been confirmed by Chaabane et al. (2012) that where the level of the emission is more stringent carbon emissions are reduced due to replacement with recycle products by the firms and thereby enhancing their corporate image and competitiveness. Ramanathan et al. (2018) have also explained that where there is flexible regulations, it allows firms to introduce innovate practices to prevent or minimise pollution and at the same time enhance their profits.

Efficient management of materials and manufacturing resources is regarded one of the important areas that companies can save costs whilst at the same time reducing the harmful effect of its practices on the environment. Consistent with the finding of this study, Carter et al. (2000) averred that efficient management of resources notably recycling has been used by some industries in decades as it provides low cost materials to virgin materials. Additionally, Chadwick (2013) emphasised that raw materials and energy are significant cost of manufacturing, averaging up to 50% of total manufacturing cost, therefore, employing sustainable environmental practices such as reuse, recycle, lighter input into the production process can significantly enhance profitability and risk as wasted materials directly impact on profits. Li et al. (2016) emphasised that the current landfill tax in the UK makes recycle and reuse viable cost reduction alternative. They explained that mechanical recycling process, for

instance, result in significant net reduction in global warming. Packaging and the use of lightweight materials is also seen as efficient way of managing resources. Gray and Guthrie (1990) suggested that lightweight packaging does not only reduce material cost but can also reduce the transportation cost by increasing the volume of products that can be shipped. In conformity with Gray and Guthrie (1990), Erfle and Fratantuono (1992) examined 49 companies based on existence of environmental initiatives such as recycling, waste reduction and packaging programs concluded that environmental performance is positively and significantly correlated with return on equity, return on assets and return on investment.

However, Li et al. (2016) explained that in spite of the potential environmental benefits that are derived from proactive environmental management practices such as mechanical recycling, revenues from low-value recyclize end uses such as glass fibre, polymer filler is not enough to compensate for the recycling costs. Walley and Whitehead (1994) also questioned the optimism of environmental management practices such as recycling. Therefore, profit conscious investors are unlikely to react positively to environmental management practices such as recycling if they cannot identify the economic value of such practices. This is reflected in the findings of the study where there was no significant relationship between material and resource efficiency and the Tobin's q.

The significant positive relationship between stakeholder/supply chain management and EMP (both ROA and Tobin's Q) which is supported by hypothesis 6, has been explained by Carter et al. (2000). They indicated that purchasing managers, for instance, must look beyond the basic costs and assess the potential impact of manufacturing, customer satisfaction, relationship with external stakeholders including customers, and regulatory agencies. Proper integration of such stakeholders into an organisation's manufacturing and environmental practices would not only ensure support from them but also raise their image and competitiveness that may influence financial performance. Carter et al. (2000) also explained how purchasing can effectively be used to enhance environmental programs and improve profitability. They stated that a firm could ask suppliers to commit to waste reduction goals such as minimising packaging materials, use recyclable or reusable packaging (Stock, 1992). Such actions, apart from reducing the impact of material costs, would also enhance the firm's image at the market place.

Muposhi and Dhurup (2016) also identified how employee training on sustainable environmental practices could enhance corporate image and performance. They indicated that employee training that focuses on embedding value system that support green image would allow employees to communicate the environmental benefits of green products to customers.

This will not only improve the firm relationship with customers but also raise the corporate image, competitiveness, and financial performance. Moreover, a very recent study by Cheng et al. (2017) also supported the finding of the study that better stakeholder engagement in relation to environmental practices improves financial performance. Cheng et al. (2017) explained that better stakeholder engagement and transparency around CSR including sustainable environmental practices are important in reducing capital constraints and enhance performance. Lannelongue et al. (2015) indicated that allocating resources to report its environmental activities to stakeholders, informing them of their actions and keeping communication open to them to receive feedback on environmental matters, is a valuable input that can enhance the relationship between environmental management and financial performance.

7.7.4 The Control Variables

The study found that size has significant impact on performance in line with Dowell et al. (2000), which also found significant relationship and explain that size was controlled due to possible economic of scale in environmental practices. The finding of the study which is supported by hypothesis 11 has also been confirmed in many studies (e.g. Tarzija and Ramirez, 2010: Elsyed et al., 2009). Similar to Dowell et al. (2000), they argued that control of firm size is relevant due to possible existence of economic of scale inherent in socially and environmentally oriented investments. Lannelongue et al. (2015) argued that firm size is mentioned in many studies due to the possible effect on productivity. They reiterated that controlling economic of scale is important as greater resources are available to large companies and this has impact on profitability as confirmed by the finding of the study. For AIM listed companies, control of firm size is very important due to wide variation in size that existed between SMEs and large companies and that can significantly affect performance. Afrifa (2013) also found similar results for AIM listed companies in the UK and concluded that large companies improve their ROA as they benefit from economic of scale. Cheney and Mcmillan (1990) demonstrated that large market size, for instance, induces deeper division of labour which leads to increase in firm performance.

However, others have disputed the effect of firm size on financial performance, similar to this study which did not find any relationship between firm and the Tobin's q. Ha-Brookshire (2009) did not find any statistically significant effect between size and profitability and explained that in a buyer-driven market where prices are set by major retailers, all suppliers, regardless of size, may suffer. Israel and Moskowitz (2013) found that value premium decreases with firm size and it is weak among largest stocks.

Although liquidity did not reveal significant positive relationship with ROA, the regression results demonstrated significant association between liquidity and Tobin's q. As shown by Saleem and Rahman (2011) drawing from the theoretical underpinnings of Miller and Orr's (1966) that positive relationship between liquidity and profitability is up to a certain point beyond which holding of further liquidity diminishes profitability. In the summary statistics, the liquidity of the companies listed on AIM is very high with a mean value of 3.1 in contrast to general guidelines of 1:1 or 2:1 depending on the type of the industry. Thus, in line with Saleem and Rehman (2011), it is clear that the lack of significant link between liquidity and profitability for AIM listed firms might be attributable to the holding of excess liquidity beyond the maximum point.

However, whilst excess liquidity might not be prudent in improving accounting profit, Stakeholders, notably suppliers and shareholders, might react positively to companies with adequate liquidity, because the ability of the company to service its debt and pay dividends does not only depend on accounting profits but availability of cash to pay for the debt as well as service its dividends hence the significant positive relationship between liquidity and Tobin's Q. Consistent with this study, Fang et al. (2009) found that firms with high liquidity has better performance as measured by market-to-book ratio. They explained that liquidity increases the information content of market prices, as well as performance of sensitive managerial compensation.

The negative relationship between leverage and profitability was in line with the study by Kapopoulos and Lazaretou (2007). Xu (2012) explained that financial leverage could have a negative impact on unprofitable firms, which is typical of AIM listed companies, where most companies have negative returns or very low returns. Gómez-Bezares et al. 2017) reiterated that the existence of higher financial leverage increases the volatility of profit. Thus, higher interest payments may impact negatively on the profits of AIM listed companies. Similarly, based on 6 years panel data and OLS regression model, Ahmad et al. (2015) found that financial leverage has statistically inverse relationship with profitability. Supporting the findings of Xu (2012), they explained that financial leverage is unfavourable when earning capacity of the firm is below what is expected by the lender.

Similarly, investors may see high gearing as risk to their investment hence negative reaction between high gearing and market value recorded by the study. It has been argued that debt makes it difficult for firms to get new financing to finance growth strategies in areas such as customer service which lead to increase in creation of intangible assets which is a significant

component of market value (Gupta 2009, Malshe and Agarwal 2015). Ozdagli (2012) explained that lenders might limit the amount of debt in order to ensure that market value of equity is always non-negative, and bankruptcy is suboptimal to the firm. Similar view is also shared by investors who may consider higher leverage as risk to their investment and may react negatively as confirmed by Francesco (2006) that risk rises with gearing levels.

Consistent with the results of the study which found industry effect impact positively or negatively on performance, Victer (2006) also documented that industry effect account for about 10% to 20% variations in profits. Similarly, Spanos et al. (2004) documented that industries are characterised by high entry barriers and high growth industries usually enjoy higher profitability whilst Porter (1980) also asserted that where firms position themselves in attractive industries, they are likely to earn more than average profits. However, in line with the study, other studies have also confirmed that some industries may not have any impact on profitability. Karim et al. (2010), for instance, found that profitability departure from perfect competitive industries structures might not be significant. Schiefer and Hartmann (2013) also emphasised strategic positioning within industry rather account for deviation of average profit and not just membership of the industry. Based on the resourced-based view, they indicated that factors responsible for superior profits are more associated with resource heterogeneity of the firm. Schiefer and Hartmann (2013) study also supports the earlier findings of Hawawini et al. (2003) which found that on the average, firm effect on profitability is more important than industry effect on profitability.

The results from the study that confirmed significant positive relationship between large board size and profitability are supported by many empirical and theoretical predictions. Dalton and Dalton (2005) presented that where large board size is in place, a pool of experts with diversity of specialisation are brought together. This enhances decision-making process and improves profitability. It has also been argued that where large board exist, the possibility of CEO dominance is reduced and fair representation from various stakeholder groups reduce information asymmetry thereby enhancing effective decision making with expected consequence on profitability (Klein 1998).

However, others see large board size as being problematic than being beneficial. Aside coordination and communication challenges that are encountered with large board size, it also brings other cost challenges such as members remuneration which may be detrimental to profitability (Eisenberg et al. 1998, Raheja 2005). Bathula (2008) also emphasised that for conflict resolution purposes, smaller board size is more preferable as aside being costly to

resolve conflicts, it also delays decision making and affect profitability. Also In line with this study, which did not find any significant relationship between large board size and the market value, Nguyen and Faff (2006) found that smaller board size appear to be more effective in the interest of shareholders as smaller board size are associated with higher market value. In a sample of 452 large US industrial corporations from 1984-1991, Yermack (1996) found an inverse relationship between large board size and the Tobin's q. Thus, whilst large board size might be appropriate for AIM listed companies in improving accounting profit, it is not relevant in meeting the expectations of investors.

It has been argued that in minimising the principal agency problem, the inclusion of non-executive directors in the board is considered essential. Hardwick et al. (2011) which found positive correlation between NEDS and profitability, similar to this study, averred that the inclusion of independent non-executive directors in the board ensures decision-making is balanced to prevent management opportunistic behaviour which may affect profitability. Similarly, Tanna et al. (2011) found significant positive link between independent non-executive directors and performance of banks in the UK. However, some studies confirm that the existence of independent non-executives do not enhance performance as revealed in the study in the case of Tobin's q. Contrary to the findings from many empirical studies, Mangena et al. (2012) documented that independent non-executives on boards affect financial performance negatively. Although Nguyen and Nielsen (2010) found that independent non-executive directors provide valuable service to shareholders and impact on the market value, the findings of the study based on the market value does not support their findings.

It has been argued that the size of director's remuneration could impact on financial performance. Consistent with this study, Hillman and Dalziel (2003) argued that the provision of adequate incentives would impact on directors' role and improve performance. Tatton (2014) also emphasised that generous rewards to executives are justified when the firm has evidence of long-term performance. Doucouliagos et al. (2007) explained that the past performance is the main factor in determining directors' remuneration in a study of Australian banks which documented significant positive association between directors' compensation and earnings per share. This has also been supported by Miyienda et al. (2013) which also reported that director's remuneration has impact on both accounting and market-based measures of performance.

However, contrary views supported by empirical evidence have been provided. Bruce and Skovorada (2015) argued that the determination of CEO's remuneration is based on complex set of factors including talents, experience, and size of the firm, nature and complexity of the

firm business and reiterated that performance-based remuneration is less relevant when performance measures are less reliable. Similar observation was made by Fernandes (2008) who also concluded that firm size is the main determinant of directors' remuneration and that there is no link between directors' pay and firm performance. Although Fernandes (2008) argument is in line with this study where CEO of larger companies listed on AIM are highly rewarded than smaller firms, the evidence from the study also indicated that larger companies performed better than smaller companies. Therefore, based on the evidence from the study, it is suggested that both size and CEO remuneration are positively correlated with performance and the impact is greater on internal measures of performance than market-based measures of performance.

7.7.5 The Impact of Firm Growth on EMQ and FP Relationships

The objective of this section is to determine whether firm growth impact positively or negatively on environmental quality and financial performance relationships. Although high growth rate impact on the market value of AIM listed companies, there was no moderating impact on EMQ and FP relationships. In hypothesis 8, it is argued that a firm in the initial growth stage has clear incentive to invest in environmental capital as they can acquire new assets which do not breach environmental legislation and can also use energy efficiently (Winn and Angell 2000) . However, that argument is not supported by the result of the study. The ability of AIM listed firms to allocate resources towards social and environmental capital is limited by the resource constraint. It is believed that resource constraint is likely to weaken the firm's abilities to expand its social and environmental activities (Waddock and Graves, 1997). Elsayed and Paton (2009) highlighted that this is applicable during the growth stage of the firm when it is not well established and more likely to have difficulties accessing external funding. In contrast, firms at the maturity stage have more access to external and internal funding, less competition, limited investment opportunities and high potential margins and as a result likely to invest in sustainable environmental practices. Consistent with management opportunism hypothesis, Preston and O'Bannon (1997) reiterated that management is likely to make an effort to justify their unsatisfactory results from limited investment alternatives by engaging more on social and environmental practices.

The results of the study reflect the nature of AIM listed companies where most of the small and medium enterprises listed are new and growing. It is also consistent with the findings of Elsayed and Paton where no significance relationship was identified for firms at initial growth stage. They explained that at growth stage firms are unlikely to allocate limited financial resources to social and environmental initiatives. Firms at the growth stage also have more investment

opportunities, face more competition and tend to pursue low cost leadership strategy to face the intense competition instead of pursuing enhance environmental practices to create differentiation to deal with competition. Cainelli et al. (2015) also confirmed that lower emission practices do not pay off for high growth firms as the study found high growth firms as responsible for higher levels of emissions intensity and less carbon intensive firms faced setbacks as they recorded lower growth over the period. Recent study by Gomez-Bezares et al. (2016) also found strong evidence that firms with good environmental practices had significantly lower assets growth. This suggests that it is rather companies with lower growth that are likely to pursue sustainable environmental practices to establish competitiveness and consequently improve their financial performance.

The result also shows consistency with both organic and inorganic firms except under Tobin's q, where the weak significant negative relationship of the moderating variable EMQ and Growth was recorded. This may imply that the market may react negatively towards organic growth companies that are using their limited resources to focus on environmental sustainability practices instead of their core objectives.

7.7.6 The Impact of Cash Resources on EMQ and FP Relationships

The results of the study support the research hypothesis that cash resources moderate environmental and financial performance relationships. Endrikat et al. (2014) argued that redesigning of production process and substitution of polluting inputs requires financial resources. Basing their argument on slack resource hypothesis, their study confirmed that availability of financial resources influences environmental performance. Waddock and Grave (1997) reiterated that when company financial performance such as cash resources improves, slack resources is likely to be available to allow the company to pursue proactive environmental practices in order to achieve superior financial performance. Fauzi and Idris (2009), basing their argument on slack resource theory and good management theory explained that the implementation of socially responsible and good environmental practices is more driven by availability of firm resources. Firms with slack resources can undertake strategic environmental practices to achieve superior financial gains.

However, whereas the above argument is reflected on the Tobin's q, based on the ROA although the results indicated both EMQ and Cash resources individually positively influence performance, the moderating effect of EMQ and cash on environmental and financial performance relationship is negative. This might suggest that excessive investment of cash in environmental practices could cause disruption as the impact of EMQ on FP could reach

optimal level and thereby resulting in decreasing financial performance. Consistent with this study Vijfvinkel et al. (2011) argued that although the society is increasing willing to pay premium for most sustainable products, the increasing market for sustainable products does not imply that firms with huge investment in sustainable practices will perform better financially. Supporting the argument of the study, they reiterated that as becoming sustainable involved huge costs, different degree of sustainability might be preferred to a firm that is fully sustainable.

Regarding constraint and unconstraint firms, the study found that both constraint and unconstraint firms are likely to take advantage of the growing market for sustainable products to enhance their financial performance. Whilst this confirmed the assertions by Fazzari et al. (1988) that greater cash holding has more impact on investment with constraints firms which requires more hedging needs than unconstraint firms, it is also in line with Allayannis and Mozumdar (2004) study which argued that the impact on unconstraint firms will be greater as they have the resources to undertake those investment. This is evident from the regression model in in table 14 where the impact of EMQ on ROA for unconstraint firms is greater than that of constraints firms. Aiyub et al. (2009) found that larger companies with more resources benefited more from proactive environmental practices than smaller companies that are resource strapped. This is consistent with theoretical and empirical predications that resources moderate environmental and financial performance relationships ((Russo and Fouts 1997)

7.8 Robustness Test/Sensitivity Analysis

As indicated in chapter 6 the study employed sensitivity analysis by examining the extent to which the results could be affected by changes in models, assumptions, or unmeasured variables (Schneeweiss 2006). The sensitivity analysis helps to demonstrate the reliability of the models adopted (Ahenfo, 2017). To check the robustness of the main model of the study environmental management performance and financial performance relationships, four types of robustness were conducted. First, Generalised Methods of Moments (GMM), which address endogeneity and reverse causality problems that are likely to occur under OLS model, was employed. Second, the study adopted different financial performance variables earnings per share and market value as internal measures and market-based measures of performance respectively GMM was employed to model the relationship. Third, the study analysed heterogeneity that exist among small, medium and large firms' environmental performance and financial performance relationships, and fourth how environmental management performance and financial performance differs among less polluting and high polluting firms. This is consistent

with suggestions by Lucas and Wilson (2008) that differences in characteristics and sectors have impact on environmental and financial performance relationships.

7.8.1 GMM Regression of Environmental and Financial Performance Relationships

This section examines the impact which proactive environmental practices have on financial performance by employing both accounting and market-based measures similarly to the main model. The objective is find out whether by employing dynamic panel model which addresses the issue of reverse causality and endogeneity problems, consistent results will be achieved with the fixed model. The results for the relationship between environmental management practices and financial performance is presented in Table 1

Both model 1(ROA) and 2 (Tobin's q) confirmed H1 that improved environmental practice is value enhancing, as it revealed significant positive relationship between environmental management practices and financial performance. However, unlike the main model presented in Table 9 based on OLS model where no significant relationship was identified between EMP and Tobin's q, the GMM model revealed a significant positive relationship between EMP and the Tobin's q. This suggests the OLS results might have been affected by the endogenous issues hence the differences in the results. The model, also indicated that the relationship between EMP and FP based on both accounting measures of performance and market based measure of performance are non-linear, specifically, inverted u-shaped relationships. This suggests that the deployment of efficient environmental practices initially increases financial performance but only up to a certain point beyond which any further increase would negatively affect performance.

The findings are consistent with the results of Bosch et al. (1998) which argued that excessive level of environment engagement or complex pollution-reducing devices and processes may reduce overall production efficiency and thus raise costs and thereby experiencing decreasing returns. Supporting the views expressed by Bosch et al. (1998) and also consistent with the outcome of the study Vijfvinkel et al. (2011) demonstrated that the association between EMQ and FP is not expected to be linear. In support their assertions, they indicated that where there are opportunities for firms to become sustainable to enhance their performance, it does not imply that the firms should become sustainable as possible as at some point becoming more sustainable may worsen the financial performance of the firm. They advised that determining the extent that it is desirable to undertake environmental activities is therefore very essential. The above suggestion was incorporated into this study, which found that moderate level of environmental engagement generates the optimum benefits for AIM listed firms as

demonstrated in fig 2. These arguments have also been supported by recent empirical finding by Trumpp and Guenther (2017) which also found inverted u-shaped on environmental and financial performance relationships.

Regarding the control variables, whereas size negatively impacts on ROA, it has significant positive impact on the Tobin's q. Also, whilst higher liquidity did not reveal any significant influence with ROA, it found that investors are very interested in firms with good liquidity hence significant impact with the Tobin's q. Large board size also has significant positive impact on internal measure of performance ROA but seemed to have no significant influence on the market value. NEDS and CEO Remuneration also did not show any significant relationship with both ROA and Tobin's q.

Table 15: Dynamic (GMM) Panel Regression of Environmental Management Quality and Financial Performance

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) based on dynamic panel regression model – GMM:

$FP_{i,t} = \beta_0 + \beta_1\ FP_{it-1} + \beta_2\ EMQ_{it} + \beta_3 EMQ2_{it} + \beta_4 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where FPit is the dependent variable which is measured using returns on assets and Tobin's q. $FP_{i,t-1}$ represents one-year lag of the dependent variable (L.ROA and L.Tobin's q). EMQ is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. EMQ2 represented (EMQ^2) is the square term of the independent variable EMQ. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem). β1, β2, β3 and β4 are the regression coefficients. The subscript i denotes the nth company (i = 1... 201), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term. The GMM regressions are robust.

VARIABLES	(ROA)	(Tobin's q)
EMQ	0.0182*	0.301*
	(1.94)	(1.93)
EMQ^2	-0.000711*	-0.0118*
	(-1.72)	(-1.83)
L.ROA	0.253***	
	(3.28)	
L.Tobin's q		-0.132
		(-0.92)
Size	-0.0569*	0.430*
	(-1.97)	(-1.79)
Liquidity	-0.000174	0.00826**
	(-0.29)	(2.37)
Gearing	0.0696	0.145
	(0.69)	(0.74)
Board Size	0.0237*	0.0121
	(1.73)	(0.74)
NEDS	-0.0165	0.0600
	(-0.89)	(0.37)
CEO Rem	-0.00921	0.755
	(-0.29)	(131)
AR (1) test (p-value)	0.000	0.000
AR (2) test (p-value)	0.943	0.110
Hansen Test of Overidentification (p-value)	0.229	0.935
Number of Observations	503	622

The AR (1) and AR(2) tests for first-order and second-order serial correlation in the first differenced residuals. The null hypothesis is no serial correlation. The Hansen test of over-identifying restrictions is a test with the joint null hypothesis that instrumental variables are valid, i.e. uncorrelated with error terms. Robust z-statistics are used. * Denote significance at the 10% level, ** Denote significance at the 5% level, ***Denote significance at the 1% level.

7.8.2 GMM Regression of EMQ and FP Relationships based on Different Measures of FP

Aside the use of ROA and Tobin's q as a measure of accounting and market-based measures respectively by this study, other studies have also used different measures of financial performance such as EPS and Market Value (Moskowitz 1972, Cordeiro and Sarkis 1997,

Konar and Cohen 2001). This study also employed EPS and market value as financial performance measures in order to confirm validity of the previous models that employed ROA and Tobin's q. The results which are presented in table 16 confirmed the previous models that there is a significant positive relationship between environmental management and financial performance of AIM listed firms in the UK. Thus, the study is in line with empirical findings such as Leonidou et al. (2016) which confirmed significant positive relationship between environmental and financial performance relationship of SMEs and emphasised that the link between the two become stronger when the firm possess adequate resources and capabilities. In line with Moneva and Ortas (2010a), the study indicated that firms that employ sustainable environmental practices improved their internal efficiency and corporate financial performance. Makrinou et al. (2008) also confirmed that similar to large companies, smaller and medium-sized firms could gain competitive advantage if they employ proactive environmental practices. The result of the study is also confirmatory to those studies that have argued from stakeholder perspective. The positive reaction towards the market measure of performance is an indication that firms that exhibit responsible behaviour toward the natural environment meet stakeholders' expectation (Endrikat et al. 2014). They averred that through proper stakeholder management, firms might gain many sources of competitive advantage including enhanced reputation, loyal relationship with customers and suppliers, as well as positive reaction from the investors.

Similar to regression model presented in table 15 that employed ROA and Tobin's q, the regression model presented in table 16 using the GMM panel regression also revealed that the relationship between environmental and financial performance are not linear as suggested by some authors that have also argued for non-linear relationships (Vijfvinkel et al. 2011, Nollet et al. 2016, Ramanathan 2016, Trumpp and Guenther 2017). It specifically revealed inverted U-shaped relationship, suggesting that environmental and financial performance relationship is limited to certain level and that growing market for sustainable products is not an indication that the most sustainable firms is better off financially (Vijfvinkel et al. 2011). Ramanathan (2016) however, argued that pollution prevention measures that may involve redesigning the production process might result in less consumption of energy that may impact on financial performance than simply end-of-pipe technologies. Thus, the nature of environmental proactive measures is more important in determining the extent to which proactive environmental practices may impact on financial performance and not necessarily excessive environmental practices that may only involve end-of-pipe technologies. In this regard, Endrikat et al. (2014) also emphasised that strategic approach in dealing with environmental issues significantly determines EMQ and FP relationships. In line with King and Lennox (2002), they recognised

that proactive approach to environmental issues is more likely to be associated with superior financial performance than end-of-pipe approaches.

In terms of the control variables, no relationship was established between size and financial performance. This implies that whereas size has significant influence on ROA, based on both EPS and Market Value, size has no material influence for AIM listed firms. This is in line with Niresh and Velnampy (2014) where the results of their study confirmed that firm size has no profound impact on the profitability of listed manufacturing firms. However, whereas high level of liquidity has negative impact on EPS, it has significant positive association with the market value. This implies that whereas excess liquidity is considered as waste of resources and negatively impact on internal measures of performance, the market reacts positively towards firms that have adequate liquidity as the ability of the firm to service its interest depends mostly on the liquidity position of the business and not necessarily accounting profit. Similar to the other models, gearing continue to show negative significant relationship with the market-based values. Regarding the corporate governance variables, with exception of CEO's remunerations, which revealed significant positive relationship with EPS, none of the other corporate governance variables was significant, implying that both board size and the number of non-executive directors have no significant impact on EPS and Market values of AIM listed companies in the UK.

Table 16: Dynamic (GMM) Panel Regression of Environmental Management Quality and Different Financial Performance Measures

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) based on dynamic panel regression model – GMM using different measures of financial performance, earnings per share (EPS) and market value (Mkt Value):

$FP_{i,t} = \beta_0 + \beta_1\ FP_{it-1} + \beta_2\ EMQ_{it} + \beta_3 EMQ2_{it} + \beta_4 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where FPit is the dependent variable which is measured using earnings per share and market value. $FP_{i,t-1}$ represents one-year lag of the dependent variable (L.EPS and L.Mkt.value). EMP is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. EMQ2 represented (EMQ^2) is the square term of the independent variable EMQ. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem). β1, β2, β3 and β4 are the regression coefficients. The subscript i denotes the nth company (i = 1... 201), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term. The GMM Regressions are robust.

VARIABLES	(EPS)	(Mkt Value)
EMQ	0.134**	0.145**
	(2.34)	(2.34)
EMQ^2	-0.00456**	-0.00513*
	(-2.18)	(-1.74)
L.EPS	-0.0675	
	(-0.50)	
L.Mkt Value		0.0358
		(0.38)
Size	-0.422	0.490
	(-1.12)	(1.62)
Liquidity	-0.00839***	0.292***
	(-3.84)	(3.31)
Gearing	0.0206	-0.166*
	(0.29)	(-1.72)
Board Size	0.0940	0.0558
	(0.90)	(0.52)
NEDS	0.0868	-0.0926
	(0.85)	(-0.67)
CEO Rem	0.779***	-0.0658
	(2.80)	(-0.23)
AR (1) test (p-value)	0.003	0.006
AR (2) test (p-value)	0.767	0.809
Hansen Test of Overidentification (p-value)	0.992	0.453
Number of Observations	212	444

The AR(1) and AR(2) tests for first-order and second-order serial correlation in the first differenced residuals. The null hypothesis is no serial correlation. The Hansen test of over-identifying restrictions is a test with the joint null hypothesis that instrumental variables are valid, i.e. uncorrelated with error terms. Robust z-statistics are used. * Denote significance at the 10% level, ** Denote significance at the 5% level, ***Denote significance at the 1% level.

7.8.3 EMQ and FP Relationship based on Small, Medium, and Large Companies Listed AIM in the UK.

The study also pays particular attention to SMEs which are dominated in the alternative investment market. Therefore, as a robustness test to check the environmental and financial performance for all companies listed on AIM, further analysis that decomposed the companies into small, medium and large were undertaken. As indicated in Table 17 below, there is a significant positive relationship between environmental management quality and financial performance for small companies listed on AIM based on ROA. The regression model also identifies inverted U-shaped relationship under ROA for small listed companies. As indicated on the computation below, the maximum level where environmental engagement by small listed companies is expected to generate maximum financial benefit is 18. This is lower than 22 obtained for all companies listed on AIM. This reflects the fact that small company's strength to engage in proactive environmental engagement is expected to be lower than larger companies are due to resource constraint (Aiyub et al. 2009). Aside, one and two years lag identifying significant positive relationship; it also confirmed the inverted U-shaped relationship under the main model.

On the contrary, environmental and financial performance relationship for small companies based on Tobin's Q is negative. The model also established non-linear U-shaped relationship where EMQ is expected to fall until it reaches the minimum level of 9 (8.77) before having positive effect on the Tobin's Q. Therefore, in the case of ROA where lower level of environmental engagement is expected to influence financial performance, higher level, more than average is needed for AIM investors to react positively towards proactive environmental engagement. This is in line with Trumpp and Guenther (2017) study where significant negative relationship was recorded for firms with lower level of environmental engagement. Guenster et al. (2011) also found the existence of significant and non-linear relationship between EMP and the Tobin's Q.

Regarding the control variables, both size and the risk tolerance represented by the number of employees and gearing, respectively, revealed significant negative relationship under ROA. However, whilst the model established that large board size has significant positive influence on the market-based measure of performance, Tobin's Q, higher proportion of non-executive directors (NEDs) has significant negative effect on the Tobin's Q. CEO Remuneration has no significant impact on both the ROA and the Tobin's q.

Table 17: OLS Regression of EMQ and FP for Small Companies Listed on AIM in the UK

This table presents the results of the following panel data regression on the relationship between environmental management performance (EMP) and financial performance (FP) for small companies which is defined as firms with ≤ 50 employees:

$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 EMQ2_{it} + \beta_3 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using returns on assets and Tobin's q. EMQ is the independent variables which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. EMQ2 is the square term of the independent variable EMQ. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, β_2 and β_3 are the regression coefficients. *The subscript i denotes the nth company (i = 1... 58), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term*. Regressions are estimated with robust fixed effects

VARIABLES	(ROA)	(ROA)	(ROA)	(Tobin's q)	(Tobin's q)	(Tobin's q)
EMQ	0.0431***			-0.173***		
	(5.18)			(-3.73)		
EMQ^2	-0.00118***			0.00986***		
	(-3.17)			(4.68)		
EMQ_{t-1}		0.0506***			-0.139***	
		(6.28)			(-2.81)	
EMQ^2_{t-1}		-0.00154***			0.00859***	
		(-3.83)			(3.97)	
EMQ_{t-2}			0.0407***			-0.125*
			(4.12)			(-2.28)
EMQ^2_{t-2}			-0.000929*			0.00816**
			(-1.75)			(3.21)
Size	-0.0665**	-0.0721**	-0.0832**	-0.0738	-0.0797	-0.0898
	(-2.46)	(2.58)	(-2.62)	(-0.78)	(-0.79)	(-0.79)
Liquidity	0.00718	0.00946	0.0104	0.199**	0.113*	0.133*
	(0.72)	(0.90)	(0.91)	(2.13)	(1.74)	(1.79)
Gearing	-0.0134	-0.0105	-0.00265	-0.0385	-0.0363	0.0460
	(-1.51)	(-1.17)	(-0.28)	(-0.97)	(-0.88)	(2.27)
Board Size	0.00480	0.00545	-0.0144	0.166*	0.143*	0.143
	(0.28)	(0.29)	(-0.66)	(1.77)	(1.97)	(1.57)
NEDS	0.0198	0.0137	0.0206	-0.192**	-0.221**	-0.211*
	(1.12)	(0.76)	(1.00)	(-2.59)	(-2.64)	(-1.93)
CEO Rem	0.0285	0.00584	0.0154	0.00641	-0.0462	-0.0853
	(1.09)	(0.33)	(0.49)	(0.08)	(-0.54)	(-0.87)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	189	152	130	193	159	123
R Squared	0.4058	0.4701	0.4456	0.2740	0.2941	0.2846
F Statistics	10.18	10.18	8.74	6.01	7.53	4.38
P Value	0.259	0.735	0.758	0.051	0.019	0.044

t statistics in parentheses

*p<0.10, **p<0.05, *** p<0.01

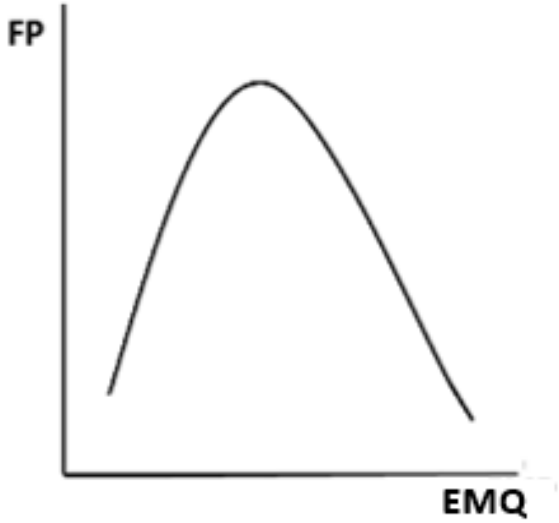
Maximum and Minimum Points for Small Companies

1. **Small Companies:**
   ROA = ϐ1EMP + ϐ2EMPP² + Controls

   EMPS = ϐ1/[2*ϐ2]*
   *=0.0431/ [2*0.00118]*
   = 18.26

   As the β2 is negative, this involves establishing a maximum point. Therefore, the optimal point where further addition to environmental management quality fall is 18.26. The shape of the curve under the accounting-based measure of performance for all companies listed on AIM is inverted U shaped.

Figure 3: EMQ and ROA – Inverted U-Shaped Relationship

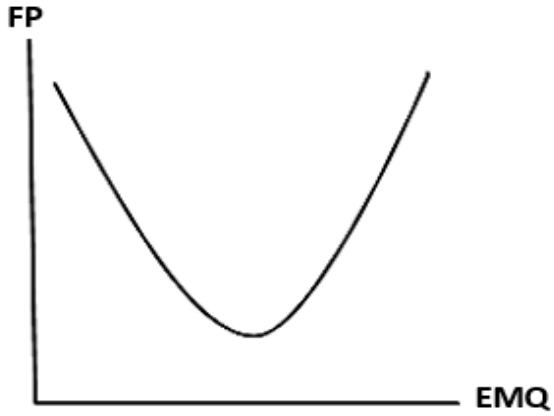


Tobin Q = ϐ1EMQ + ϐ2EMQ² + Controls

EMPS = ϐ1/[2*ϐ2]*
*=0.173/ [2*0.0986]*
= 8.77

As β2 is positive, the minimum point under Tobin Q for smaller companies listed on AIM 8.77 The shape of the curve is, therefore, U shaped.

Figure 4: EMQ and Tobin's q – U-shaped Relationship



Unlike the smaller companies where significant positive relationship was recorded between EMQ only ROA and significant negative relationship between EMQ and Tobin's q, in the case of the medium-sized companies, significant positive relationship between EMQ and financial performance were recorded for both accounting-based measure of performance, ROA and market-based measure of performance, Tobin's q. However, non-linear relationship could not be established under both ROA and the Tobin's q as the square term of EMQ (EMQ^2) was not significant. Although positive relationship based on one and two years lag of EMQ, they were not significant under both ROA and Tobin's q. This might suggest that environmental management and financial performance relationships for medium-sized companies are more of a short-term than a long-term. However, unlike the smaller companies where non-linear relationship was discovered for both financial performance measures, in relation to the medium-sized firm, non-linear relationship could not be established. Specifically, only significant positive relationship was discovered for both ROA and the Tobin's q. Similar to smaller companies Size, liquidity, and large board size positively influence financial performance and gearing, and NEDs has detrimental effect on performance. The impact of CEO Remuneration was not significant for both small and medium-sized companies

Table 18: OLS Regression of EMQ and FP for Medium Companies Listed on AIM in the UK

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) for medium-sized companies which is defined as firms with >50 employees ≤ 250 employees: $FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 EMQ2_{it} + \beta_3 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using returns on assets and Tobin's q. EMQ is the independent variables which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. EMQ2 is the square term of the independent variable EMQ. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, β_2 and β_3 are the regression coefficients. *The subscript i denotes the nth company (i = 1... 72), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term*. Regressions are estimated with robust fixed effects.

VARIABLES	(ROA)	(ROA)	(ROA)	(Tobin's q)	(Tobin's q)	(Tobin's q)
EMQ	0.0102**			0.0448*		
	(2.53)			(1.74)		
EMQ^2	-0.000016			-0.0018		
	(-0.09)			(-1.64)		
EMQ_{t-1}		0.0512			0.0292	
		(1.25)			(0.98)	
EMQ^2_{t-1}		0.00169			-0.0137	
		(0.90)			(-1.07)	
EMQ_{t-2}			0.0009			0.0137
			(0.21)			(0.40)
EMQ^2_{t-2}			0.0003			-0.00098
			(1.54)			(-0.67)
Size	-0.096	-0.00799	-0.0078	-0.0098	-0.0103	-0.0166
	(-0.96)	(-0.77)	(-0.67)	(-0.12)	(-.10)	(-0.15)
Liquidity	-00963	-0.00795	-0.0043	0.257***	0.256***	0.247***
	(-0.78)	(-0.59)	(-0.26)	(4.05)	(3.51)	(2.91)
Gearing	-0.0137***	-0.0165***	-0.0191***	-0.0608**	-0.0562*	0.0571*
	(-3.33)	(-3.66)	(3.96)	(-2.19)	(-1.86)	(1.68)
Board Size	0.0153**	0.0130	0.0130	-0.0288	-0.0388	-0.0658
	(2.19)	(1.63)	(0.98)	(-0.66)	(-0.79)	(-0.12)
NEDS	-0.0280***	-0.0269***	-0.0185*	0.0295	0.021	-0.0149
	(-3.54)	-(2.88)	(-1.89)	(0.69)	(0.42)	(0.26)
CEO Rem	0.0113	0.00157	0.00177	0.093	0.088	0.096
	(0.57)	(0.74)	(0.70)	(0.87)	(0.72)	(0.71)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	325	271	211	265	220	171
R Squared	0.2301	0.2323	0.2212	0.2447	0.2528	0.2676
F Statistics	6.10	5.56	5.22	8.98	8.46	7.08
P Value	0.652	0.602	0.792	0.257	0.421	0.432

t statistics in parentheses
*p<0.10, **p<0.05, *** p<0.01

Figure 5: EMQ and ROA - Positive Linear Relationship

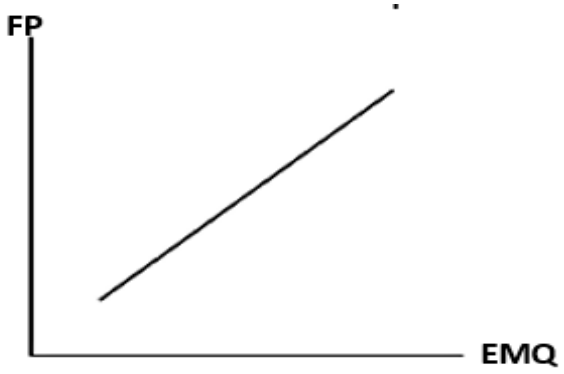
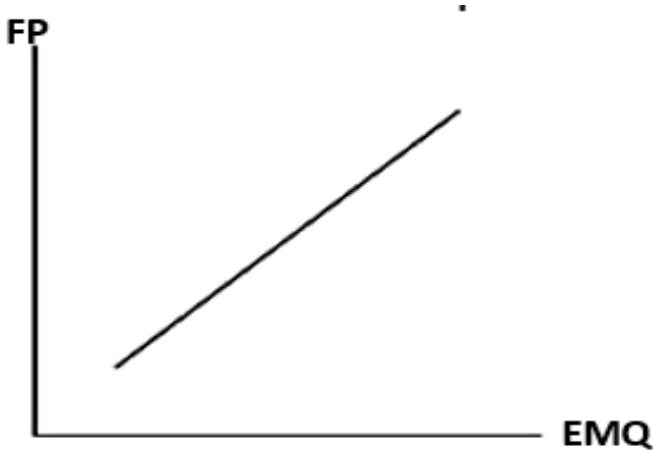


Figure 6: EMQ and Tobin's q - Positive Linear Relationship



Identical to all companies listed on AIM, large companies also revealed significant positive relationship with ROA. As shown by the computations below, large companies listed on AIM that engage sustainable environmental management practices experienced positive financial returns (based on ROA) until it reaches the peak at 23 before it declines, hence the inverted U-shaped relationship. The peak level of EMQ which is higher than that of smaller companies also reflects the capacity of larger companies to undertake higher level of environmental engagements than SMEs. This also confirms the assertions by Aiyub et al. (2009) that the larger the company, the larger the financial savings. However, although both the one and two years lag revealed significant positive relationship, non-linear relationship could not be established. Concerning the Tobin Q, the main model disclosed significant positive relationship on EMQ and FP relationships but not under one and two years lag. Non-linear relationship was also not detected. About the control variables, gearing continues to disclose significant negative relationships. Like the small and medium-sized companies,

company size, board size and liquidity revealed significant positive relationship with financial performance, whereas NEDs showed the reverse. CEO remuneration also has stronger positive relationship with financial performance, unlike the small and medium-sized companies where no significant relationship was recorded.

Table 19: OLS Regression of EMQ and FP for Large Companies Listed on AIM in the UK

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) for large companies which is defined as firms with >250 employees:

$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 EMQ2_{it} + \beta_3 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using returns on assets presented in Model 1, 2 and 3 and Tobin's q presented 4,5 and 6. EMQ is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. EMQ2 is the square term of the independent variable EMQ. Control variables indicated by controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, β_2 and β_3 are the regression coefficients. *The subscript i denotes the nth company (i = 1... 71), and the subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

VARIABLES	(ROA)	(ROA)	(ROA)	(Tobin's q)	(Tobin's q)	(Tobin's q)
EMQ	0.0224**			0.0755**		
	(5.39)			(2.51)		
EMQ^2	-0.000493***			-0.00130		
	(-2.56)			(-105)		
EMQ_{t-1}		0.0176***			0.0350	
		(3.76)			(1.14)	
EMQ^2_{t-1}		-0.000335			0.000209	
		(-1.55)			(0.17)	
EMQ_{t-2}			0.0100***			0.0108
			(2.67)			(0.33)
EMQ^2_{t-2}			-0.00005			0.0107
			(-0.29)			(0.83)
Size	0.0119**	0.0111*	0.0171**	0.0888**	0.120***	0.144***
	(2.15)	(1.79)	(2.42)	(2.00)	(2.62)	(2.95)
Liquidity	0.0239**	0.0341***	0.0316**	0.0583	0.0296	0.0517
	(2.32)	(2.78)	(2.55)	(0.84)	(0.44)	(0.71)
Gearing	-0.00137	0.0589	0.00712	-0.139***	-0.165***	-0.124***
	(-0.21)	(0.83)	(0.99)	(-2.82)	(-4.37)	(-2.88)
Board Size	0.0138***	0.0167***	0.0186***	0.0436	0.0768*	0.0607
	(3.37)	(3.72)	(3.73)	(1.18)	(1.79)	(1.38)
NEDS	-0.008	-0.0113**	-0.00994*	0.0209	-0.065	-0.0272
	(-1.60)	-(2.88)	(-1.87)	(0.37)	(-0.12)	(0.59)
CEO Rem	0.0300***	0.0511***	0.00221*	0.0956	0.117	0.106
	(2.98)	(2.46)	(1.70)	(1.27)	(1.49)	(1.34)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	308	256	202	262	220	172
R Squared	0.3979	0.3511	0.3623	0.2883	0.3317	0.3153
F Statistics	15.25	11.66	8.61	6.84	9.77	7.85
P Value	0.000	0.001	0.005	0.005	0.002	0.3153

t statistics in parentheses
*p<0.10, **p<0.05, *** p<0.01

Maximum Points for Larger Companies

$ROA = \beta 1EMQ + \beta 2EMQ^2 + Controls$

$EMQ^* = \beta 1/[2*\beta 2]$

$=0.0224/ [2*0.000493]$

$= 22.72$

As β2 is negative, the maximum point under ROA for large companies listed on AIM 22.72, the shape of the curve is therefore inverted U shaped.

Figure 7: EMQ and ROA – Inverted U-shaped Relationship

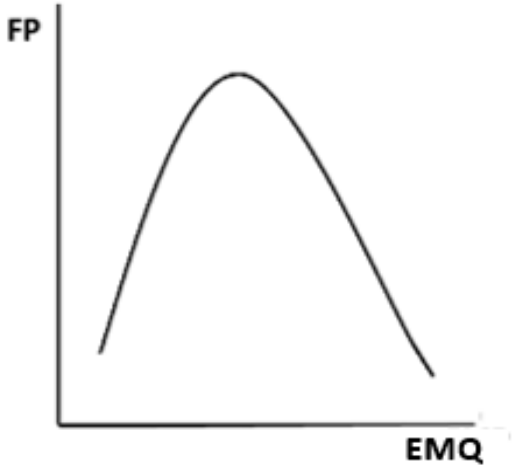
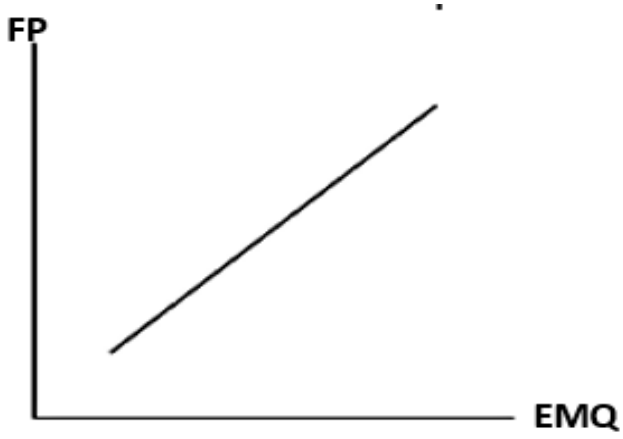


Figure 8: EMQ and Tobin's q Positive Linear Relationship



The findings of the study, although support the conventional arguments from the extant literature that SMEs lack resources to pursue proactive environmental practices and unlikely to benefit financially, (Aragon-Correa et al. 2008) this may not be particularly true in all areas of performance. As shown by the findings of the study, although the relationship between EMQ and Tobin's q is negative, the relationship between EMQ and ROA is positive. Therefore, SMEs that embrace superior environmental practices may also achieve superior financial performance through strategic characteristics of SMEs (Aragon-Correa et

al. 2008). Clemens (2006) also found that higher levels of environmental performance are linked to improved financial performance of small firms. Similarly, Clemens (2006) documented that smaller firms could achieve competitive advantage by seeking out improvements that could result other spin-off benefits to their operations. He reiterated that whilst decreasing waste could generate many cost savings, in line with stakeholder theory, he echoed that marketing of greener products might improve relationship with larger customers and improve profit as well.

In line with the findings of Aragon-Correa et al. (2008), the study provides support to the resource-based view by showing that SMEs can also use environmental proactive practices as a unique resource to improve their financial performance and therefore organizational capabilities are censorious for both small and large firm's strategies. Hamann et al. (2017) also indicated that SMEs are able to translate their personal environmental proclivities as they have direct control on operations and as a result able to employ sustainable environmental practices to improve performance.

The analysis of environmental management quality and financial performance relationship based on the size of the companies also show that for smaller firms, the strength of the relationship is weak compared to larger companies. Regarding the Tobin Q, negative significant relationship was identified between environmental management quality and financial performance of smaller firms although medium and larger companies recorded significant positive relationship. The explanation for this result may be understood from both the theoretical and empirical point view. Barney (2001) arguing from the resource-based view emphasized that the differences in firms' performance emanates from the heterogeneity of firms' resources. As larger companies possess different assets with unique features, they are able to exploit the financial benefits of environmental proactive measures in contrast to smaller companies which are normally resource strapped. As recorded by Leonidou et al. (2016), apart from showing a positive relationship between environmental performance and financial performance of SMEs, they also emphasized that the link between EMQ and FP become stronger when the firm possesses adequate resources and capabilities. On the study of SMEs' environmental management practices and financial performance, Aiyub et al. (2009) found that although smaller companies achieved financial savings similarly to medium and larger companies, the smaller the company: the lesser the financial savings.

Rasi et al. (2010) have cited instances where environmental practices by SMEs may not have significant effect on financial performance. They indicated that although most SMEs are

involved in environmental management practices including the adoption of ISO 14001, these environmental practices are not translated into operations. They noted that both product-based and process-based approaches are lower than, and not fully reflected in their operations. Outsiders notably investors, therefore, do not see the financial benefits of such environmental actions and therefore may not react positively.

The negative significant relationship between EMQ and Tobin's q for smaller companies and positive relationship between EMQ and Tobin's Q for medium and large companies could also be explained based on the signal theory. Pavlinovic (2013) explained that good environmental practices are difficult to observe by other parties, and therefore represent a significant information asymmetry. Therefore, to convey this information to other parties, firms may decide to certify an environmental management system such as ISO 14 001. Whereas most medium and large companies are certified to environmental management practices such as ISO 14001, the number of small companies certified to ISO or other environmental management systems is very limited. Hence, medium and large companies are able to reduce information asymmetry by adopting environmental certification that are more observable and send good signal to the market. Higher demand for shares through environmental proactive signal will drive the share prices up and consequently impact on the market value. Dowell et at. (2000) also summarised from the resourced-based view and explained that higher quality firms have the resources to invest in higher level of environmental practices. Large and medium-sized companies may, therefore, use proactive environmental practices as a competitive weapon against the smaller firms with fewer resources.

The initial fall of EMQ and FP curve, as shown in the case of Tobin's Q for smaller companies, also supports Porter's (1980) low cost view point which may suggest that at the period of decreasing returns, costs of environmental practices exceeds the benefits. This is in line with Friedman's (1970) position that proactive environmental practices are detrimental to financial performance. Bush and Hoffman (2011) have also argued strongly on how EMP and FP relationship may initially produce negative results. They explained that proactive environmental management practices such as carbon management is a risk management activity similarly to hedging or insurance activity which initially involves costs but helps the firm in future to reduce or eliminate negative consequences. Therefore, proactive environmental management initially creates costs but model the organisation towards more carbon constraint business environment in the future. Consistent with this study in the case of smaller companies, Freedman and Jaggi (1992) also concluded that there

is a negative association between pollution performance and economic performance, as the market ignores the expected better performance in the long-run resulting from the effects of pollution reduction activities.

7.8.4 EMQ and FP Relationship based on Service, Manufacturing, and Mining Industries Listed at AIM in the UK.

Various studies have shown that environmental and financial performance relationships differ by the industry or sector (e.g. Jeppesen et al. 2012, Trumpp and Guenther 2017). This study, therefore, provides analysis of environmental and financial performance relationships of the three main sectors of AIM listed companies in UK. Existing literature has shown that industry variable is categorised differently. For instance, whilst Prado-Lorenzo et al. (2009) used 9 industry variables, Freedman and Jaggi (2005) used 5 industry variables, and Chithambo (2013) also used 9 variables. Although 26 industries based on Companies House were identified, these were amalgamated into three main sectors due to limited number of some industries included in the sample. The regression model for Service, Manufacturing, and Mining Sectors/Construction Sectors is represented in Table 20 and Table 21 for ROA and Tobin's Q, respectively.

Based on the ROA, the model disclosed a significant positive relationship between, EMQ and FP for all the sectors. Applying one-year lag of EMQ also confirms the positive relationship in all the three sectors employed in the analysis. Size is positive and significantly correlated to EMP for both Service and Manufacturing sectors but was not significant under the mining sector. Liquidity is negatively related to performance in the service and mining sectors but not significant. Gearing is negatively related to performance but only significant under mining sector. The influence of the board size although significant in the mining sector, the relationship was not significant at both the service and the manufacturing sectors. Higher number of non-executive directors also showed significant negative association in both the service and the mining sectors but no significant impact in the manufacturing sector. CEO remuneration has strong positive association with performance in both service manufacturing sectors but no significant relationship under the mining sector was discovered. Industry effect and Year effect were also reflected in all the models.

Table 20: OLS Regression of EMQ and FP for Service, Manufacturing, and Mining Industries of AIM listed Companies in the UK based on ROA

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) for service, manufacturing and mining/construction sectors:

$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using returns on assets. EMQ is the independent variable which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, and β_2 are the regression coefficients. *The subscript i denotes the nth company: service (i = 1... 65), manufacturing (i = 1... 74) and Mining (i = 1... 62), The subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term.* Regressions are estimated with robust fixed effects.

VARIABLES	ROA (Service)	ROA (Service)	ROA (Manufact.)	ROA (Manufact.)	ROA (Mining)	ROA (Mining)
EMQ	0.0106***		0.0122***		0.0174***	
	(9.53)		(8.21)		(6.42)	
EMQ_{t-1}		0.00967***		0.00991***		0.0168***
		(8.41)		(6.31)		(6.41)
Size	0.0102**	0.0101**	0.0209***	0.00184**	-0.00028	0.0118
	(257)	(2.29)	(2.61)	(2.02)	(-0.03)	(01.10)
Liquidity	-0.00268	-0.0001	0.0109	0.0144	-0.0011	-0.0009
	(-0.30)	(-0.01)	(0.92)	(1.05)	(-.10)	(-0.09)
Gearing	-0.00725	-0.0066	-0.00713	-0.0074	-0.0179**	-0.0205**
	(-0.1.24)	(-1.04)	(-1.62)	(-1.55)	(-2.21)	(-2.41)
Board Size	0.00682	0.00395	-0.00326	0.00105	0.0280**	0.0329**
	(1.44)	(0.74)	(-0.64)	(0.17)	(2.31)	(2.59)
NEDS	-0.0138***	-0.0115**	0.00638	0.00316	-0.0204	-0.0295**
	(-2.73)	(-2.03)	(1.12)	(0.47)	(-1.51)	(-2.13)
CEO Rem	0.0274**	0.0301**	0.0252*	0.0291*	0.00327	-0.0323
	(2.40)	(2.37)	(1.85)	(1.95)	(0.13)	(-0.140)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	293	243	312	257	217	179
R Squared	0.3461	0.3297	0.2867	0.2385	0.2786	0.2876
F Statistics	10.20	9.70	9.11	5.98	6.92	8.02
P Value	0.005	0.010	0.008	0.011	0.525	0.403

t statistics in parentheses
*p<0.10, **p<0.05, *** p<0.01

Regarding the analysis of the various sectors based on the Tobin's Q, only the mining sector showed significant positive relationship between environmental and financial performance. Both the R square and the F statistics also indicated that the regression models based on ROA provide better prediction than the regression models under the Tobin's Q. Like the ROA, size is also significant under service and manufacturing but no significant impact on mining. However, whilst the model under ROA did not establish any positive relationship between liquidity and financial performance, based on the Tobin's q, significant positive relationship was discovered under mining/construction. Gearing also revealed significant positive relationship with Tobin's Q for the service sector but no significant relationship was established in the case of manufacturing and the mining sector. Board size also revealed significant negative relationship under the mining industry with no significant relationship established under both manufacturing and service sectors. Also, whilst the number of non-executive directors disclosed significant positive impact with Tobin's Q under service and manufacturing, CEO remuneration was only significant under the manufacturing industry.

Table 21: OLS Regression of EMQ and FP for Service, Manufacturing, and Mining Industries of AIM listed Companies in the UK based on Tobin q

This table presents the results of the following panel data regression on the relationship between environmental management quality (EMQ) and financial performance (FP) for service, manufacturing and mining/construction sectors:

$FP_{it} = \beta_0 + \beta_1 EMQ_{it} + \beta_2 Controls_{it} + \mu_{it} + \lambda_{it} + \varepsilon_{it}$. Where *FPit* is the dependent variable which is measured using Tobin's q. EMQ is the independent variables which is the composite of Energy, GHG, Waste, Compliance, Materials and Resource Efficiency and Stakeholder. Control variables indicated by Controls are firm size (Size), Liquidity, Gearing, Board Size, Number on non-executive directors (NEDs), CEO Remuneration (CEO Rem), Industry Effect and Year Effect. β_1, and β_2 are the regression coefficients. *The subscript i denotes the nth company: service (i = 1... 65), manufacturing (i = 1... 74) and Mining (i = 1... 62), The subscript t denotes the year (t=1,..6). μi is the unobservable heterogeneity (individual effects) which is specific for each firm, λt is the parameters of time dummy variables and εit is the error term. Model 2,4 and 6* represent 1-year lag of EMP for service, manufacturing and mining/construction respectively. Regressions are estimated with robust fixed effects.

VARIABLES	(Service)	(Service)	(Manufact.)	(Manufact.)	(Mining)	(Mining)
EMQ	0.0157		0.0108		0.0286*	
	(1.83)		(1.05)		(2.01)	
EMQ_{t-1}		0.00615		0.00379		0.0448**
		(0.68)		(0.37)		(3.26)
Size	0.0390	0.0704*	-0.160***	- 0.159**	-0.00932	-0.0163
	(1.26)	(2.15)	(-3.36)	(-2.91)	(-0.22)	(-0.33)
Liquidity	0.0372	0.0295	0.0263	0.0281	0.0241**	0.0267*
	(1.07)	(0.79)	(1.53)	(1.65)	(2.68)	(2.57)
Gearing	0.00220**	0.00186*	-0.0351	-0.0360	-0.00180	-0.00145
	(3.11)	(2.49)	(-1.15)	(-1.17)	(1.24)	(-0.97)
Board Size	-0.0928*	-0.113**	0.00335	0.0180	0.0529	0.0944
	(2.38)	(-2.67)	(0.09)	(0.44)	(0.92)	(1.39)
NEDS	0.228	0.303*	0.402*	0.286	-0.346	-0.511
	(1.59)	(2.00)	(2.37)	(1.54)	(-1.49)	(-1.86)
CEO Rem	-0.0540	-0.0242	0.319**	0.280**	-0.0833	-0.133
	(-0.62)	(-0.26)	(3.23)	(2.80)	(-1.07)	(-1.56)
Industry Effect	Yes	Yes	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes	Yes	Yes
Observation	265	223	262	220	216	178
R Squared	0.1625	0.1512	0.1584	0.1593	0.1467	0.1496
F Statistics	3.93	3.66	4.71	3.95	3.54	3.61
P Value	0.924	0.0978	0.003	0.015	0.130	0.172

t statistics errors parentheses
*p<0.10, **p<0.05, *** p<0.01

Unlike many studies that concentrate on one or few industries and therefore sacrificed the degree of generalisability, this study apart from showing EMQ and FP relationship for all companies listed on AIM, also focussed on specific industries/sectors. Such distinction is very important for accuracy as shown by Clemens (2006) that environmental and financial performance relationships may be effective in some industry than others. This is also useful in identifying the EMQ and FP relationships for those industries or sectors that are relevant to the natural environment. Environmental and financial performance relationships in different industries have been varied and complex, although, in line with this study, most studies have revealed that the relationship is more significant in higher polluting industries. Christmann (2000) study in the chemical industry in the US found that companies that employed innovative pollution prevention measures differently from the industry general practice achieved significant cost savings than those that utilised the general industry best practice. Christmann (2000) findings depicted that the resource-based view argument advocated by Barney (1991) that unique resources which can create competitive advantage and improve financial performance must be specific to the firm and not widely available to the industry.

Showing consistency with this study, Nehrt (1996) also identified that companies in the pulp and paper industry that were early adopters of environmentally friendly technologies achieved competitive edge, and their profit growth exceeded the other firms that did not employ pollution prevention technologies. Nehrt (1996) ideas have been supported by Lopez-Gamero et al. (2009) that firms that can develop innovative technology that involve low manufacturing emission with respect to other competitors may be able to obtain first-mover advantages after improving their green image in emerging green product market and enhance their profitability. Arguing from the resource-based view, Russo and Fouts (1997) also emphasised that when firms go beyond compliance by employing energy efficient measures that concentrate on process innovation, it improves their ability to generate profit.

The significant positive relationship for both ROA and Tobin's Q under the mining and construction sector also confirms the assertions by Bush and Hoffman (2011) that carbon-constraint environment for high polluting firms appear to be already reflecting in financial market's expectations. They also provided explanation as to why EMQ and FP relationship for low emission organisations such as the service sector may not be significant. They emphasised that low emission firms might be already efficient and profitable and may not require any environmental investments or capabilities. Investors, therefore, are not likely to

react to information relating to environmental practices of such organisations, as they do not think it has any significance impact on profitability.

Similarly, the results of the study also confirmed the findings of Darnall and Ytherthus (2005) which also found more polluting firms such as mining and chemical industries achieved significant savings from sustainable environmental practices than less polluting firms. They averred that higher polluting firms could reduce their impact on the natural environment at a lower cost as they have many areas where they can engage in sustainable environmental practices and save costs. However, they reiterated that it is difficult for companies operating in cleaner industries to achieve the same environmental improvements, as the cost would be significantly high because unlike the high polluting industries, they have less "low hanging fruits" that can be picked easily. Therefore, financial savings from sustainable environmental practices from less polluting firms is likely to be low than those from high polluting firms as revealed by the study.

7.9 Summary of the Chapter

This chapter deals with the presentation and discussion of empirical results relating to the main and subsidiary objectives. It commenced with the presentation of summary descriptive statistics, bivariate correlation analysis and OLS regression assumptions. The summary statistics revealed that financial performance measured by ROA and Tobin's q are generally low. Similarly, environmental disclosures by AIM listed companies were also very low. In relation to OLS regression assumptions, no serious violations were encountered and in circumstances where violations occurred, they were addressed.

The OLS regression results for the main objective revealed that there is a significant positive and non-linear relationship with internal measures of performance ROA and no significant relationship was identified with market-based measure of performance, the Tobin's q. Also, whilst there was no moderating impact of growth on the relationship between EMP and FP, it was discovered that cash resources significantly impact on EMQ and FP relationships. In terms of the different measures of environmental management quality, it was discovered that the various strengths of environmental management quality and financial performance relationships were stronger toward internal measures of performance ROA, than the market-based measures of performance, Tobin's q. These results have been discussed in relation to theoretical and empirical literatures as well as the legal, regulatory, and other voluntary guidance that underpins environmental management and financial performance relationships.

Robustness tests conducted using GMM, which addresses the problem of reverse causality and endogeneity problems also supports the main model that there is a significant positive relationship between environmental management performance and financial performance relationships. In addressing the heterogeneity of EMQ and FP relationships that exist among small, medium and large firms, it was discovered that the relationship tends to be stronger for larger firms than SMEs as suggested by earlier findings of Aiyub et al. (2009). Finally, drawing consistency with Darnall and Ytherthus (2005), the study found that high polluting firms performed better than less and medium polluting firms.

CHAPTER EIGHT

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

8.1 Introduction

This chapter presents the conclusions of the study and intends to address five objectives. First, it presents the summary of the research findings. It summarises the findings based on the research objectives which are: environmental management quality and financial performance relationships of AIM listed firms in the UK, the impact of growth on environmental management quality and financial performance relationships and the impact of cash resources on environmental and financial performance relationships. The summary of sensitivity analysis or the robustness tests are also provided. Second, it presents the practical, social and policy implication. Third, the chapter provides the contributions of the study. Fourth, the chapter identifies the study limitations and finally proposed possible avenues for future research. The rest of the chapter is structured as follows. Section 8.1 summarises the findings followed by section 8.2 which presents the contributions of the study. Section 8.3 identifies the limitations of the study and suggestions for future studies, whilst Section 8.4 highlights the implications of the study. Section 8.5 finally concludes the chapter.

8.2 Summary of the Research Findings

It has been argued that the existing research on environmental management performance and financial performance have been concentrated on large firms listed on the main market although evidence exist that most environmental pollutions are caused by the SMEs (Hillary and Burr 2011). This study is therefore directed towards the Alternative Investment Market which is dominated by SMEs and represents another major regulated market in the UK. This is to ensure that the evidence obtain is specific to AIM listed companies which mainly consists of SMEs as existing research indicates that the way SMEs handle social and environment issues are different from large companies and therefore the results obtained from SMEs are likely to be different from large listed companies (Fassin 2008). Therefore, this study provides unique evidence which is specific to the AIM listed firms and which has not been considered by the existing empirical studies.

8.2.1 Findings Based on EMQ and FP of AIM Listed Companies in the UK

The study examined Environmental Management Quality and Financial Performance based on aggregate level of environmental performance and revealed that significant positive relationship exists between environmental management quality and financial performance based on internal measures of performance (ROA). This reinforces Porter (1980) argument

that pursuing proactive environmental practices may allow a firm to pursue low cost strategy as enhanced environmental practices reduce regulatory scrutiny, compliance cost, lower emissions and community pressure is also reduced. Similarly, Hart (1997) also emphasised that pollution prevention results in efficient input into the production process, reduce energy consumption, recycle and reuse is also enhanced. In terms of the market-based measure of performance, although positive association between EMQ and FP was discovered it was not significant. However, robustness test based on dynamic panel model, GMM revealed significant positive relationship. This might suggest that the lack of significance relationship under the OLS model might have been caused by the existence of endogeneity and reverse causality. Further analysis based on the internal measures of performance revealed that relationship between EMQ and FP is non-linear in line with few studies that have tested for non-linear relationship between EMQ and FP ((Ramanathan 2016, Trumpp and Guenther 2017). Specifically, inverted U-shaped relationship was identified implying that the positive relationship between EMQ and FP is limited to certain level of environmental performance in line with the suggestions offered by (Vijfvinkel et al. 2011). It was also discovered that moderate level of environmental engagement is likely to achieve the optimal financial benefits whereas excessive level of environmental management practices could negatively impact on performance. Also, unlike the few studies that employed non-linear relationship (Nollet et al. 2016, Ramanathan et al. 2016, Trumpp and Guenther 2017), this study did not only discover u-shaped or inverted u-shaped but also established the actual point where it is more beneficial to maximise or minimise financial benefits from proactive environmental practices.

Delving further into the various components of environmental management quality, energy efficiency practices, pollution prevention and control, waste management, compliance to environmental regulations, materials and resource efficiency and stakeholder engagement and their impact on financial performance, it was found that all the performance measures indicated have significant positive association with internal measures of performance (ROA). However, regarding the market-based measure of performance, only GHG (pollution control and prevention measures), and stakeholder engagement on environmental issues revealed significant positive relationship with the market-based measure of performance. Complementing the result from composite model suggests that environmental management measures for AIM listed firms are more effective towards improving internal measures of performance than market-based measures of performance. This also point to the fact that shareholders and investors are more interested in product driven environmental initiatives

which directly enhance profitability, rather than process-based initiatives to attract environmental conscious investors.

8.2.2 Findings Based on Impact of Firm Growth on EMQ and FP Relationships

The results obtain on the extent to which firm growth impact on EMQ and FP relationship revealed that there is no moderating impact of growth on EMQ and FP relationships. This is consistent with Elsayed and Paton (2009) study which did not find any significant effect of firm growth on EMQ and FP relationships. In line with argument from Elsayed and Paton (2009), it is clear that AIM listed firms which are mostly new and at the growth stage of their life cycle are unlikely to allocate their limited resources to environmental practices instead of concentrating their core objectives to enhance performance. However, separating growth into organic and inorganic, it was found that firm growth negatively moderates the market values of AIM listed firms with organic growth. This might suggest that organic growth firms that invest their limited resources on proactive environmental practices are punished by the market. This is in line with recent study by Gomez-Bezares et al. (2016) which also found strong evidence that firms with good environmental practices had significantly lower growth.

8.2.3 Findings Based on Impact of Cash Resources on EMQ and FP Relationships

Test was also conducted to determine whether availability of financial resources impact on EMQ and FP relationships. It was discovered that whilst individually, growth and EMQ positively impact on internal measures of performance, excessive investment of financial resources on sustainable environmental practices yields negative returns. The disruption caused by the excessive investment of cash resources could be attributed to the fact EMP and EP relationship could reach the optimal point and thereby resulting in decreasing performance. This is in line with the assertions by Vijfvinkel et al. (2011) that increasing market for sustainable products does not imply that the most sustainable firm will perform better financially. It also confirmed the theoretical predictions by Trumpp and Guenther (2017) that enhanced environmental performance for the satisfaction of stakeholders can generate extra costs, as it is not likely to economically internalise all benefits from sustainable environmental practices and negatively affect the link between environmental and financial performance.

On the contrary, it was discovered that high financial resources have no impact on the market values. However, when idle cash resource is invested in proactive environmental practices, it moderates positively on EMQ and FP relationship as the market reacts positively. Related to cash constraint and unconstraint firms, it was discovered that both types are likely to take

opportunities that exist in the green market to enhance their financial performance. The positive relationship between EMQ and FP was significant under internal measure of performance (ROA) thereby confirming the earlier results that EMQ and FP relationships tend to be stronger for internal measures of performance than market-based measure of performance.

8.2.4 Findings Based on the Robustness Test of EMQ and FP Relationships

Different robustness tests were conducted to confirm the validity of the main results. First, EMQ and FP relationship was modelled by employing GMM – panel regression model which addresses the problem of endogeneity that are usually encountered under OLS regressions. Confirming the results from the main model, positive association was discovered between EMQ and FP. However, unlike the OLS model where there was no significant relationship between EMQ and the market-based measure of performance, based on the GMM model, significant relationship between EMQ and FP was discovered for internal and market-based measures of performance. This suggests that the regression model based on OLS under the Tobin's q might have been affected by the existence of endogenous variables hence the lack of significant relationship between EMQ and FP. The discovery of significant positive relationship between EMQ and both internal measures of performance and market-based measures of performance confirms the theoretical predictions from the stakeholder view that environmental engagement practices that extend beyond compliance results in both improved operational efficiency and market values. (Cordeiro and Sarkis 1997). Similarly, based on different measures of financial performance, EPS and Market values as proxies for accounting and market-based measures respectively, the GMM model also revealed significant positive relationship, consistent with ROA and Tobin's q.

To identify the heterogeneity that exists between EMQ and FP relationships for small, medium and large companies, the data for the study was separated to reflect the firm size which was defined based on the number of employees in line with the recommendations of the European Commission (2015) . Whilst significant positive relationship and inverted U-shaped relationship between EMQ and FP was discovered based with accounting-based measure of performance for small firms, in the case of market-based measure of performance, it identified significant negative relationship and U-shaped relationship. This suggests that for smaller firms, whilst moderate level of environmental engagement is likely to enhance internal measures of performance, in the case of market-based measures of performance, high level of environmental engagement might be required to signal environmental conscious investors. In relation to medium-sized and larger firms, significant

positive relationship was identified for both accounting and market-based measures of performance. However, whilst inverted U-shaped relationship was identified based on accounting-based measures, significant linear positive relationship was discovered based on the market values in the case of larger firms. The significant positive relationship between EMQ and FP for both ROA and Tobin's q in the case of medium and larger firms unlike smaller firms where only ROA was significant suggests that medium and large size firms achieve higher benefits than smaller firms do. This is in line with empirical findings by Aiyub et al. (2009) that the larger the firm, higher the financial benefits that are obtained. Consistent with the theoretical predictions of the resource-based view that resources impact positively on EMQ and FP relationships, which seems to be the case of this study, as medium-sized and large firms which possess more resources benefited more financially than smaller firms.

Finally, further robustness test was conducted on EMQ and FP on low polluting and high polluting firms. Data was categorised into services - less polluting firms, manufacturing - medium polluting firms, and mining and construction - high polluting firms. The result showed that all categories of firms improved their internal measures of performance with improved level of environmental performance. However, in the case of market-based measures, only the mining sectors recorded significant positive relationships between EMQ and FP. The significant positive relationship for both ROA and Tobin's Q under the mining and construction sectors also confirmed the assertions by Bush and Hoffman (2011) that carbon-constraint environment for high polluting firms appear to be already reflecting in financial market's expectations. They emphasised that the relationship for less polluting organisations such as the service sector may not be significant as they might be already efficient and profitable and therefore not require any environmental investments or capabilities to enhance their financial performance. Investors, therefore, are not likely to react to information relating to improved environmental performance of such organisations, as they do not consider it as having any significant impact on profitability.

8.1.5 Research Hypothesis Test and Outcome

Research Hypothesis	Outcome Accounting-Based	Outcome Market Based
H1: The relationship between environmental management and financial performance could be non-linear	Supported	Not supported
H2: There is a significant relationship between proactive energy efficient practices and financial performance	Supported	Not supported
H3: Compliance to environmental regulation will significantly impact on financial performance	Supported	Supported
H4: There is significant relationship between environmental waste management practices and financial performance	Supported	Not supported
H5: There is a significance association between pollution control and financial performance	Supported	Supported
H6. Efficient management of materials and other resources is positively related to financial performance	Supported	Supported
H7: A proactive stakeholder engagement in adopting environmental proactive measures will have significant influence on financial performance	Supported	Supported
H8: Firm growth moderate's environmental management quality and financial performance relationships	Not supported	Not supported
H9(a): Cash resources moderates environmental and financial performance relationships	Supported	Supported
Hypothesis (10): There is a significant influence between firm size and profitability	Supported	Not supported
H11: Membership of an industry has significance impact on the profitability the firms	Supported	Supported
H12: Financial leverage has significant influence on profitability.	Supported	Supported
H13: There is a significant relationship between liquidity and profitability	Not supported	Supported
H14: There is a significant relationship between board size and profitability	Supported	Not supported
H15: There is a significant relationship between the number of non-executive director and financial performance.	Supported	Not supported
H16: There is a significant relationship between CEO remuneration and financial performance	Supported	Not supported

8.3 Contributions of the Study

The study offers several contributions to existing research. First, the study is mainly focussed on SMEs, unlike the existing studies which mostly concentrated on large listed companies (Hayward et al. 2013, Clark et al. 2015, Muhammad et al. 2015). Fassin (2008) explained that the way large companies deal with social and environmental issues cannot be simply

transposed to SMEs as they are less bureaucratic, and most cases solve problems on a day-to-day basis. Others have also argued that SMEs are less motivated to engage in sustainable environmental practices due availability of concrete data on financial benefits of pursuing environmental proactive activities. Hillary and Burr (2011) emphasised that the low occurrence of SMEs with environmental management practices could be attributed to lack of concrete data on financial benefits of environmental management systems (EMS) for SMEs. SMEs also face resource constraint in an attempt to manage the environment and therefore the results obtained from the large listed companies cannot be a representative of SMEs. The result of this study is therefore expected to add evidence specific to the AIMs listed companies, which are dominated by SMEs, and to help address the market failure to provide concrete data on financial benefits of sustainability practices by SMEs.

Second, the study demonstrates that the relationship between environmental management performance and financial performance could be non-linear. Given that, the existing literature has both reported potential benefits and cost of proactive environmental engagement on firm performance, the study argue that the relationship may be complicated than just reporting positive and negative association according to extant studies (Vijfvynkel et al. 2011). Like, Trumpp and Guenther (2017), this study complements existing studies by providing a possible explanation for the contradictory results on the relationship between proactive environmental practices and firm performance. Ramanathan (2016) for instance emphasised that pollution prevention measures which may involve redesigning of the production process may result in less consumption of energy, use of less raw materials, and alternative energy is likely to have a great impact on financial performance than simply end-of-pipe technologies. This has been confirmed by the empirical findings of Trumpp and Guenther (2017) that the relationship between environmental and financial performance could be positive or negative (non-linear) based on the level of environmental engagement. However, unlike Trump and Guenther (2017) findings which related to only large listed companies in manufacturing and service industries, this study extends the non-linear relationship argument to SMEs engaged in different industries. To the best of my knowledge, there is no study that has demonstrated such a relationship among SMEs. Also relating to the non-linear relationship argument, the study for the first time established the level of environmental engagement that is most financially beneficial for AIM listed firms that pursue proactive environmental practices. Although Trumpp and Guenther (2007) recognised that companies that engaged in higher level of environmental practices experienced increased returns, they did not establish the extent to which higher level of

environmental engagement may impact on financial performance, that is, the optimal level that it is most beneficial to engage in proactive environmental practices. However, it is unlikely that continuous improvement in sustainable environmental practices will generate increasing returns in perpetuity. Therefore, establishing the point where it will be most beneficial to engage in proactive environmental practices will assist policy makers and business practitioners to determine the extent to which resources could be deployed in pursuance of sustainability to enhance value.

Third, the study also demonstrates how firm growth structure impacts on EMP and FP relationships. Russo and Fouts (1997) indicated it is more beneficial for firms in high growth industries to improve their environmental performance than those that are in low growth industries. In line with the theoretical underpinnings of discounted cash flow techniques, they explained that the level of industry growth moderates the expected probabilities of return as the expected payoff of any investment risk is higher in high growth industries. Consistent with earlier empirical evidence of Hofer (1975), they argued that low growth industries are likely to consist of mature firms with hierarchical, inflexible and bureaucratic organisational structure and therefore unlikely to accommodate efficient proactive environmental management practices. It has also been argued that high growth industries have more organic rather than bureaucratic management style and therefore more likely to capture additional financial benefits by pursuing environmental measures beyond compliance because of their innovative culture (Darnall and Ytherthus, 2005). However, the growth structure of a firm, which could be organic or inorganic, and how it affects environmental and financial performance relationships have not been tested by the existing empirical studies. This study, therefore, provides additional evidence in environmental and financial performance relationship studies by demonstrating the impact of firm's growth and growth structure on environmental and financial performance relationships.

Fourth, many studies have documented that availability of financial and other resources affect SMEs ability to implement proactive environmental practices. Gilchrist and Himmelberg (1995) explained that availability of cash resources directly impacts on fund available for investment and it is expected that companies with high cash resources are more likely to undertake more investment. Increase in cash resources impacts on the net worth and premium on external funding falls. This creates an opportunity for businesses to invest through external financing. However, the moderating effect of cash resource on environmental and financial performance relationships has not been considered by the existing studies particularly in the Alternative Investment Market. This study, therefore,

provides new evidence to the studies in this area by showing the impact of cash resources on environmental and financial performance relationships.

Fifth, this study employed objective research methodology, unlike many empirical studies on the relationship between environmental and financial performance, particularly for SMEs that have used perception-based studies (Blackburn 2004, Aiyub et al. 2009, López-Gamero et al. 2009, Hillary and Burr 2011). However, the use of perception-based studies on environmental and financial performance relationships has been criticised in many studies. Vijfvinkel et al. (2011) for instance emphasised that obtaining sustainable activities based on perception of individuals is subjective, as it can be interpreted differently per firm. It has also been argued that perception-based studies lack reliability as it is likely participants may produce false information and self-reported environmental and financial performance by mangers may lack objectivity (Darnall and Ytherthus 2005). This study is however based on published annual reports and financial statements in an attempt provide alternative methodology of studies on SMEs' environmental and financial relationships in the UK, which have been dominated by perception, based study.

Sixth, this study provide evidence of the level of heterogeneity that exist between small and medium-sized environmental and financial performance relationships unlike the most of the existing studies which fail to capture such differences (Christmann 2000, López-Gamero et al. 2009, Molina-Azorín et al. 2009). Jeppesen et al. (2012) however, indicated that medium-sized firms have higher levels of corporate, social, and environmental responsibilities compared to smaller firms. Medium-sized firms are also more formalised than small firms in terms of following regulations and procedures. Hoejmose et al. (2012) found that medium-sized firms engaged both their internal and external stakeholders. This is in contrast to smaller firms which are only embedded in their local community. Similarly, Afrifa and Tauringana (2015) have shown that there are differences in how corporate governance affect small and medium-sized firms. It has also been argued that drawn from larger firms cannot be representative for smaller firms which have different structures and in most cases are not aware of their environmental impact. It is therefore likely that the evidence obtained on the relationship between environmental and financial performance of small and medium-sized enterprises would differ and this study establish such differences

Seventh, the study also makes important contribution from theoretical point of view. The study was mainly build on the resource-based view and the stakeholder theory. The findings of the study confirm that resources are relevant in developing sustainable environmental

management practices that enhance financial performance. This is based on the argument from resource-based view that resources that are unique, valuable, and inimitable such as cleaner environment should establish legitimacy with the society, improve competitiveness due to high patronage of products and services, and consequently impact on financial performance (Russo and Fouts 1997). However, to develop such unique environmental resources may depend on the availability of other resources. Aiyub et al. (2009) averred that financial constraints could be a major obstacle for SMEs to engage in sustainable environmental practices although not empirically tested. This study has therefore confirmed the resource-based view that efficient utilisation of financial resources on proactive environmental practices could impact positively on financial performance of a firm.

Finally, the study also demonstrates that the application of stakeholder theory on EMP and FP relationships may not be relevant for smaller firms. Theoretical and empirical evidence suggest that improved environmental performance may improve financial performance as it enhances the firm relationship with important stakeholders such as investors who may increase their level of investment and enhance the market values of the firm (Trumpp and Guenther 2017). Although this has been confirmed by the study in relation to medium and larger firms, that link could not be established in the case of smaller firms that recorded negative relationship between EMP and the market value. This finding is in line with theoretical arguments by Hoejmose et al. (2012) that SMEs are heterogeneous community of firms and suggest that the differences in environmental engagements between small and medium, and large firms are significant. They reiterated that large firms significantly engage more with environmental initiatives particularly with respect to corporate PR and marketing. Also, medium firms, to greater extent promote their environmental practices both internally and externally whilst smaller firms are only embedded with their local community. Therefore, whilst it is possible for medium and larger firms to signal their environmental efforts to investors due to enhanced communication, this may not be the case for smaller firms whose environmental efforts may only be recognised by the local community which is unlikely to participate in the stock market. Therefore, it is more appropriate for smaller firms to maximise the benefits of proactive environmental practices through social capital theory, which addresses the benefits of networks of SMEs than attempt to enhance their corporate image through stakeholder theory.

8.4 Implications of the Research Findings and Recommendations

8.4.1 Social Implication

The results of the study have social, practical, as well as policy implications. The confirmation that improved measures of environmental performance improve financial performance will establish business case for SMEs to improve their environmental practices, and as a result, reduce the environmental hazards on the society that are created by businesses. Evidence suggests that SMEs are crucial part of the UK's economy, accounting for about 99% of all enterprise and due to their sheer number exert pressure on the environment (Hillary and Burr 2011). However, Hillary and Burr (2011) argued that in spite of the fact that there are vast numbers of SMEs in the UK, only limited numbers are engaged in environmental management practices including the adoption of environmental certification, EMS or ISO 14001. The low level of SMEs attitude towards environmental management practices have been in part attributable to market failure to provide concrete data on the benefits of sustainable environmental management practices on financial performance. Trumpp and Guenther (2017) also documented that establishing a positive correlation between EMP and FP would establish a business case and encourage businesses to engage in sustainable environmental practices. This is likely because SMEs, similar to larger firms are motivated in many ways to engage proactive environmental practices if business case for environmental sustainability is established. Dey and Ghosh (2013) for instance indicated that firm image and market opportunities are key factors. Janson et al. (2017) also emphasised that customer and stakeholder pressure could compel SMEs to undertake sustainable environmental practices. Therefore, it is expected that this study, which establishes a business case for SMEs which are dominant in the UK economy and causes most of the environmental pollution would improve their participation in environmental practices and reduce the harmful impact of pollution on the society.

8.4.2 Policy Implication

The study also offered implication on the extent to which regulations impact on environmental disclosure and financial performance. The study revealed that environmental reporting by AIM listed firms is very limited. With over 1000 firms listed on the AIM in the UK, less than 20% disclose information on their environmental management practices. Even, those reporting on their environmental management practices, the information provided is very scanty, which makes it difficult to assess how UK companies are cooperating with the government to deal with the environmental challenges confronting the country. The limited disclosure on environmental management could be attributed to the fact that disclosure of environmental management practices, particularly reporting on GHG emissions in the UK is

only mandatory for companies listed on the main market and the European Economic Area. However, evidence exist that regulations seem to be one of the most important drivers of SMEs environmental practices (Rutherfoord et al. 2000, Williamson et al. 2006, Spence et al. 2012). Williamson et al. (2006) documented that voluntary actions will not alter the behavior of SMEs significantly because environmental proactive practices will be regarded as optional and extra costly activity that will be affecting the core business activity. They indicated that the use and development of regulations, and the provision of minimum standards for many activities covered by CSR such as minimum environmental reporting, remains the most effective way to change the behavior of SMEs. Taylor (2003) also highlighted that voluntary regulations are effective only when external demands to comply exist. Ramanathan et al. (2018) suggested that regulations that provide economic incentives or disincentives might bring innovation and influence financial performance. Whilst it is argued that excessive and rule-centered regulations stifle innovations, policy makers could introduce flexible regulations that could encourage AIM listed firms similar to firms listed on the main market to disclose their environmental practices without creating any extra burden for them.

The study also provides evidence that resource constraint, particularly, financial resources could affect SMEs ability to engage in environmental management practices. The study revealed that whereas medium and larger firms which possess higher resources are able to enhance the market value of the firms through sustainable environmental practices, smaller firms were able to improve their internal measures of performance which only required moderate level of environmental engagement. This confirms the various assertions that have been made the resource constraints affect SMEs ability to undertake sustainable environmental practices (Aiyub et al. 2009, Hillary and Burr 2011, Spence et al. 2012). Hillary and Burr (2011) for instance recorded that SMEs participation in environmental certification is low due to lack of financial resources. However, studies have shown that green economic incentives encourage small firms to improve their environmental management practices. Clemens (2006) found that green incentives moderate the environmental and financial performance relationship of small firms. Similar studies have also shown how financial incentives impact on various environmental practices. For instance, Heberlein and Warriner (1983) identified positive impact of green economic incentives on environmental performance for energy consumption whilst (Brisson 1993) also demonstrated positive correlation between green economic incentives and waste packaging. Others including Pearce and Turner (1993), Kahle and Beatty (1987) as well as Nwaeze and

Mereba (1997) have also demonstrated significant positive correlation between environmental economic incentives and improved green practices in waste management, recycling, and electric utilities respectively. Therefore, it is recommended that policy makers consider ways of rewarding SMEs with economic incentives to encourage them to improve their behavior towards environmental practices.

8.4.3 Practical/Managerial Implication

The study offered several practical implications for managers. First, as suggested by Nath and Ramanathan (2016), firms are often in dilemma, which environmental management practices they need to adopt to improve their financial performance as well as areas of financial performance that could be improved with the adoption of environmental management practices. The results from the study show that whereas environmental management practices, energy efficient practices, pollution abatement (GHG), waste management, material and resource efficiency, compliance with environmental engagement as well as stakeholder engagement significantly improve profitability, only GHG and stakeholder engagement have significant impact on the market values. Similarly, whilst the composite of environmental management practices significantly improves profitability, it has no significant relationship with the market values. This suggests that whereas operational environmental practices directed towards improving profitability is effective, similar approach to enhance the market value is not effective and therefore it is recommended that managers of AIM listed firms focus on environmental management practices that enhance profitability rather than attempting to attract investors through enhanced environmental practices.

Similarly, the study also shows the level of environmental engagement that is expected to achieve optimal financial benefit on EMP and FP relationships. The inverted U-shaped relationship between EMP and ROA recorded by the study implies that moderate level of environmental engagement is required to establish optimum financial benefits. Therefore, excess allocation of resources to become the most sustainable firm may not yield the expected financial benefits. As suggested by Vijfvinkel et al. (2011), the existence of market for sustainable firms does not imply that the most sustainable firms will be better off financially. Ramanathan (2016) in line with Hart (1995) also reiterated that pollution prevention measures that necessitate redesigning of the manufacturing operation may involve less consumption of raw materials and energy is likely to have significant financial impact than simply-end-of-pipes strategy which are also available to third parties. Similarly, Endrikat et al. (2014) also explained that strategic approach to environmental management

practices is more closely linked with superior financial performance. Therefore, in terms of resources allocation, the study offered guidance on the extent to which resources should be allocated to environmental management practices to derive optimum financial benefits.

Finally, the study further provides implication for managers in relation to how their sectors are affected by the EMP and FP relationships. Whilst, the service sectors and manufacturing sector which was considered as less and medium polluting industries only establish significant positive relationship with the ROA, in the case of high polluting firms, mining and construction, the significant positive impact was recorded for both internal measure of performance and market values. In line with the suggestions offered by Russo and Fouts (1997), investors reaction towards less and medium polluting sectors is low because they believe that unlike the high polluting firms which have many "low hanging fruits" and can save significant costs with higher level of environmental engagement, on the contrary, it is more costly for less polluting firms which may be already environmentally efficient to attract investors with improved level of environmental practices. Therefore, it is recommended that less and medium polluting firms engage in moderate level of environmental sustainability practices to enhance their internal measures of financial performance as they have less "low hanging fruits" and may not be financially beneficial to engage in high-level environmental practices with the intention of wooing investors. Similarly, Nehrt (1996) confirmed from pulp and paper industry that firms that adopted environmentally friendly technologies achieved competitive edge and their financial performance were elevated in contrast to other firms in the pulp and paper industry that did not adopt pollution abatement strategies. This also reinforces the revisionist arguments notably Porter and Linde (1995) the introduction of proactive environmental practices may trigger innovation which may impact on costs and enhance financial performance. Thus, as confirmed by Ramanathan et al. (2018), flexible environmental regulations allow firms to redesign their production process and enhance their performance and these benefits are greater in high polluting firms where there are many opportunities to save costs through sustainable environmental practices.

8.5 Limitations of the Study and Suggestions for Future Research

This study like any other empirical research is likely to have limitations. First, the content analysis used to obtain the information was restricted to the annual reports and other sustainability reports that are disclosed on the companies' websites. This implies that other environmental management practices that are not contained in the annual report or the companies' website were not captured by the study. Furthermore, no attempts were made to compare the environmental information obtained from the annual reports and other

sustainability reports with other environmental projects that the firms are engaged such as Carbon Disclosure Project (CDP) or primary data such as face-to-face interviews or questionnaire. Zeghal and Ahmed (1990) also indicated that exclusive use of annual reports results in incomplete representation of quantum of environmental practices. In support Unerman (2000) also averred that annual report is not the only medium through which companies report environmental and social information and recommended that in addition to annual reports, the use of other standalone environmental reports should be considered. However, Ntim (2009) strongly argued why the annual reports should be relied upon. He explained that aside being consistent with the prior studies and therefore offered direct comparison, only company annual reports were consistently available where the information could be drawn. Besides, Guthrie et al. (2008) also emphasised that it is impossible to identify all sustainable environmental activities of an organisation under one study and there it is reasonable to use annual reports. Nevertheless, to ensure consistency with other environmental data, it will be appropriate if future studies are directed to include all other environmental information or projects that the firms are involved so that other useful lessons could be drawn.

Second, the six-year panel is also considered short compared with other econometric studies that use period of over ten years. Notwithstanding the limited panel period, the study still shows consistency with most studies on EMP and FP relationships that have also employed panel data. For instance, Earnhart and Lizal (2010) employed panel data from 1996 to 1998, Hart and Ahuja (1996), 1980-1990, Horváthová (2012), 2004 to 2008 and Trumpp and Guenther (2017) 2008-2012. Moreover, most studies on environmental management and financial performance have also used cross-sectional data (e.g. Christmann 2000, López-Gamero et al. 2009, Conlon and Glavas 2012, Chithambo and Tauringana 2014) which is restricted to only one-year data hence limited data points for comparison. However, for more reliable and robust results, future studies could still extend the panel period from six to at least ten years.

Third, another limitation of the study is that it relied on quantitative disclosure instead of qualitative data. Due to the limited disclosure by AIM listed firms on environmental management performance, the study relies on quantitative disclosure, which was more available than qualitative data. However, quantitative data may not necessarily reflect the true state of affairs regarding the environmental practices of the firm as indicated by Chithambo (2013). It has been argued that using qualitative data is very important as prior studies have demonstrated that firms may disclose their environmental performance for the

purpose of obtaining legitimacy from the society but not necessarily to reflect what is actually happening. Hrasky (2011) for instance revealed from the study of top Australian listed firms that whilst the pollution intensive industries seemed to embark on moral legitimisation strategy that is supported by substantive actions, the less carbon intensive sectors were only relying on symbolic disclosures. Therefore, it is recommended that future studies that will look at the quality of environmental disclosure with evidence of substantive action will be a step in the right direction.

Last but not the least, the study was only limited to AIM listed firms in the UK. The reliability of the study in making generalisation about the impact of environmental management and financial performance could be enhanced if comparative analysis has been made with other AIM markets outside the UK. Such comparison is important as it has been noted that although environmental pollution is a global challenge, different experiences may be encountered by different countries as regulatory frameworks, institutional framework, and other policy guidelines may present different challenges for business in different countries (Kolk and Pinkse 2010, Prado-Lorenzo and Garcia-Sanchez 2010, Chithambo 2013). Other studies have also confirmed that country of origin has huge influence on the level of environmental engagement and disclosure (Gray et al. 1995, Adams 2002). For instance, whilst in some countries, mandatory disclosures are required, other countries only encourage voluntary disclosures, and this could account for differences in the results of EMQ and FP relationships. Therefore, it is recommended that in future, similar studies should draw comparison from different countries rather than focussing on just one country, as it makes generalisation of the result difficult.

8.6 Chapter Summary

Although much evidence suggests the important interrelations exist between environmental and financial performance, little empirical evidence exists on SMEs which dominate the Alternative Investment Market. Trumpp and Guenther (2017) indicated that establishing a positive correlation between environmental and financial performance would provide a business case for environmental engagement. This is very important for SMEs, as evidence suggests that most environmental pollution originates from SMEs (Environment Agency 2003, Hillary and Burr 2011). Therefore, this study which provides evidence and data on the benefits of improved environmental practices of SMEs and likely to encourage them to reduce their environmental footprint is worthwhile. The main objective of the study is to determine the environmental and financial performance of AIM listed firms in the UK, which mainly consists of SMEs. Evidence from the study overall support the theoretical

assumptions that improved environmental management practices is a unique resource that could enhance financial performance. Further, the evidence suggests that for AIM listed firms, stronger relationship exist between environmental quality and internal measure of financial performance than market-based measures of financial performance. Also, in terms of the subsidiary objectives, whilst we discovered that there was no moderating impact of growth on environmental quality and financial performance, it was discovered, growth negatively moderates EMQ and FP relationships in terms of the Tobin's q and thereby suggesting that the market punishes organic growth firm that pursue sustainable environmental practices. It was also discovered that the relationship between EMQ and FP is stronger in unconstraint firms than constraints firms in line with the resource-based theory. Social, policy and practical implications as well as limitations and recommendations for future studies were also discussed. In conclusion, although improved environmental management practices are financially beneficial to both SMEs and larger firms, the benefits that accrue to larger firms are greater than smaller firms.

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APPENDICES

Appendix 1: Results of Content Analysis from Environmental Management Quality of AIM listed in the UK

Case ID	Year	Size	Industry	Energy	GHG	Waste	Stake	Materials	Comp	EMQ
1	2011	1	3	0	0	0	0	3	4	7
1	2012	1	3	0	0	0	0	3	4	7
1	2013	1	3	0	0	0	0	3	4	7
1	2014	1	3	0	0	0	0	3	4	7
1	2015	1	3	0	0	0	0	3	4	7
1	2016	1	3	0	0	0	0	0	3	3
2	2011	2	2	0	0	0	0	0	3	3
2	2012	2	2	0	0	0	0	0	3	3
2	2013	2	2	0	0	0	0	0	3	3
2	2014	2	2	0	0	0	0	0	3	3
2	2015	2	2	0	0	0	0	0	3	3
2	2016	2	2	0	0	0	0	0	3	3
3	2011	2	4	0	0	0	2	0	1	3
3	2012	2	4	0	0	0	2	0	1	3
3	2013	2	4	0	0	0	2	0	1	3
3	2014	2	4	0	0	0	2	0	1	3
3	2015	2	4	0	0	0	2	0	1	3
3	2016	2	4	0	0	0	2	0	2	4
4	2011	2	3	0	0	0	0	0	3	3
4	2012	2	3	0	0	0	0	0	3	3
4	2013	2	3	0	0	0	0	0	3	3
4	2014	2	3	0	0	0	0	0	3	3
4	2015	2	3	0	0	0	0	0	3	3
4	2016	2	3	0	0	0	0	0	3	3
5	2011	2	5	1	5	1	2	3	3	15
5	2012	2	5	1	5	1	2	3	3	15
5	2013	2	5	1	5	1	2	3	3	15
5	2014	2	5	1	5	1	2	3	3	15
5	2015	2	5	1	5	1	2	3	3	15
5	2016	2	5	1	5	1	2	3	3	15
6	2011	3	5	0	0	0	0	0	0	0
6	2012	3	5	0	0	0	0	0	0	0
6	2013	3	5	0	0	0	1	0	2	3
6	2014	3	5	0	0	0	1	0	2	3
6	2015	3	5	0	0	0	1	0	2	3
6	2016	3	5	0	0	0	1	0	2	3
7	2011	2	1	0	0	0	0	0	0	0
7	2012	2	1	0	0	0	0	0	0	0

7	2013	2	1	2	3	2	2	1	5	15
7	2014	2	1	2	3	2	2	1	5	15
7	2015	2	1	2	3	2	2	1	5	15
7	2016	2	1	4	0	3	2	1	5	15
8	2011	1	1	4	1	2	1	3	1	12
8	2012	1	1	3	1	2	1	3	1	11
8	2013	1	1	4	1	2	1	3	2	13
8	2014	1	1	4	2	2	1	3	2	14
8	2015	1	1	4	2	1	1	3	2	13
8	2016	1	1	5	3	1	0	3	5	17
9	2011	2	2	0	0	1	0	1	1	3
9	2012	2	2	0	0	1	0	1	1	3
9	2013	2	2	0	0	1	0	1	1	3
9	2014	2	2	0	0	1	0	1	1	3
9	2015	2	2	0	0	1	0	1	1	3
9	2016	2	2	0	0	1	0	1	1	3
10	2011	2	3	0	0	0	0	0	0	0
10	2012	2	3	0	0	0	0	0	0	0
10	2013	2	3	3	1	1	0	3	5	13
10	2014	2	3	3	1	1	0	3	5	13
10	2015	2	3	3	1	1	0	3	5	13
10	2016	2	3	3	1	1	0	3	5	13
11	2011	3	5	0	0	0	2	0	3	5
11	2012	3	5	0	0	0	2	0	3	5
11	2013	3	5	0	0	0	1	0	1	2
11	2014	3	5	0	0	0	1	0	1	2
11	2015	3	5	0	0	0	1	0	1	2
11	2016	3	5	0	0	0	1	0	1	2
12	2011	3	5	0	1	1	2	0	5	9
12	2012	3	5	0	1	1	2	0	5	9
12	2013	3	5	0	1	1	2	0	5	9
12	2014	3	5	0	1	1	2	0	5	9
12	2015	3	5	0	1	1	2	0	5	9
12	2016	3	5	0	0	0	0	0	2	2
13	2011	2	4	0	0	0	0	0	0	0
13	2012	2	4	0	0	0	0	0	0	0
13	2013	2	4	0	0	0	0	0	2	2
13	2014	2	4	0	0	0	0	0	2	2
13	2015	2	4	0	0	0	0	0	2	2
13	2016	2	4	0	0	0	0	0	2	2
14	2011	1	5	1	4	2	0	0	5	12
14	2012	1	5	1	2	2	0	0	5	10
14	2013	1	5	1	2	2	0	0	5	10
14	2014	1	5	1	2	2	0	0	5	10
14	2015	1	5	2	4	1	0	0	5	12

14	2016	1	5	2	5	0	2	5	5	19
15	2011	3	5	0	0	0	1	0	5	6
15	2012	3	5	0	0	0	1	0	5	6
15	2013	3	5	0	0	0	1	0	5	6
15	2014	3	5	0	0	0	1	0	5	6
15	2015	3	5	0	0	0	1	0	5	6
15	2016	3	5	0	0	0	1	0	5	6
16	2011	1	2	0	0	0	0	0	0	0
16	2012	1	2	0	0	0	0	0	0	0
16	2013	1	2	3	5	3	3	5	2	21
16	2014	1	2	3	5	2	3	5	1	19
16	2015	1	2	3	5	3	4	5	1	21
16	2016	1	2	5	5	5	2	4	5	26
17	2011	1	2	1	3	5	2	4	5	20
17	2012	1	2	1	2	4	2	3	5	17
17	2013	1	2	1	2	4	2	2	5	16
17	2014	1	2	1	2	4	2	1	5	15
17	2015	1	2	1	2	4	2	1	5	15
17	2016	1	2	0	0	1	5	0	5	11
18	2011	2	1	0	0	0	0	0	0	0
18	2012	2	1	0	0	0	0	0	0	0
18	2013	2	1	3	2		2	1	4	12
18	2014	2	1	3	2	1	2	1	4	13
18	2015	2	1	3	1	1	2	1	4	12
18	2016	2	1	2	2	1	4	0	3	12
19	2011	1	1	0	0	0	0	0	0	0
19	2012	1	1	0	0	0	0	0	2	2
19	2013	1	1	0	0	0	0	0	2	2
19	2014	1	1	0	0	0	0	0	2	2
19	2015	1	1	0	0	0	0	0	2	2
19	2016	1	1							
20	2011	2	3	0	0	0	0	0	0	0
20	2012	2	3	0	0	0	0	0	0	0
20	2013	2	3	0	0	0	0	0	0	0
20	2014	2	3	0	0	0	0	0	3	3
20	2015	2	3	0	0	0	0	0	3	3
20	2016	2	3	0	0	0	0	0	3	3
21	2011	3	5	0	0	0	0	0	5	5
21	2012	3	5	0	0	0	0	0	5	5
21	2013	3	5	0	1	1	1	0	5	8
21	2014	3	5	0	0	0	2	0	5	7
21	2015	3	5	0	0	0	2	0	5	7
21	2016	3	5	0	0	0	2	0	5	7
22	2011	2	3	0	0	0	0	0	1	1
22	2012	2	3	0	0	0	0	0	1	1

22	2013	2	3	0	0	0	0	0	1	1
22	2014	2	3	0	0	0	0	0	1	1
22	2015	2	3	0	0	0	0	0	1	1
22	2016	2	3	0	0	0	0	0	1	1
23	2011	3	5	0	0	0	1	0	2	3
23	2012	3	5	0	0	0	1	0	2	3
23	2013	3	5	0	0	0	1	0	2	3
23	2014	3	5	0	0	0	1	0	2	3
23	2015	3	5	0	0	0	1	0	2	3
23	2016	3	5	0	0	0	1	0	2	3
24	2011	2	3	0	1	0	0	2	2	5
24	2012	2	3	0	1	0	0	2	2	5
24	2013	2	3	0	1	0	0	2	2	5
24	2014	2	3	0	1	0	0	2	2	5
24	2015	2	3	0	1	0	0	2	2	5
24	2016	2	3	0	1	0	0	2	2	5
25	2011	2	5	0	0	1	0	0	5	6
25	2012	2	5	0	0	1	0	0	5	6
25	2013	2	5	0	1	0	1	0	5	7
25	2014	2	5	0	0	0	0	0	5	5
25	2015	2	5	0	0	0	0	0	5	5
25	2016	2	5	0	1	0	1	0	5	7
26	2011	3	5	0	0	0	0	0	4	4
26	2012	3	5	0	2	0	3	1	5	11
26	2013	3	5	0	2	0	3	1	5	11
26	2014	3	5	0	2	0	3	1	5	11
26	2015	3	5	0	0	0	0	0	5	5
26	2016	3	5	1	0	0	0	2	3	6
27	2011	3	3	0	2	1	0	0	3	6
27	2012	3	3	0	2	1	0	0	3	6
27	2013	3	3	0	2	1	0	0	3	6
27	2014	3	3	0	2	1	0	0	3	6
27	2015	3	3	0	2	1	0	0	3	6
27	2016	3	3	0	2	1	0	0	3	6
28	2011	3	5	0	0	0	0	0	0	0
28	2012	3	5	0	0	0	0	0	0	0
28	2013	3	5	0	2	1	1	1	4	9
28	2014	3	5	0	2	1	1	1	4	9
28	2015	3	5	0	2	1	1	1	4	9
28	2016	3	5	0	2	1	1	0	5	9
29	2011	2	5	0	0	0	0	0	2	2
29	2012	2	5	0	0	0	0	0	2	2
29	2013	2	5	0	0	0	0	0	2	2
29	2014	2	5	0	0	2	2	0	5	9
29	2015	2	5	0	0	2	2	0	2	6

29	2016	2	5	0	0	0	2	0	2	4
30	2011	3	2	0	0	0	0	1	1	2
30	2012	3	2	0	0	0	0	1	1	2
30	2013	3	2	0	0	0	0	1	1	2
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30	2015	3	2	0	0	0	0	1	1	2
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31	2013	2	3	1	0	1	0	0	1	3
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32	2013	2	3	0	0	0	0	0	3	3
32	2014	2	3	0	0	0	0	0	3	3
32	2015	2	3	0	0	0	0	0	3	3
32	2016	2	3	0	0	0	0	0	3	3
33	2011	1	5	5	5	0	2	5	3	20
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33	2013	1	5	5	5	1	2	5	5	23
33	2014	1	5	5	5	1	1	5	3	20
33	2015	1	5	5	5	1	0	3	3	17
33	2016	1	5	5	5	2	3	2	5	22
34	2011	3	2	3	0	1	0	3	1	8
34	2012	3	2	3	0	1	0	3	1	8
34	2013	3	2	3	0	1	0	3	1	8
34	2014	3	2	3	5	1	0	3	2	14
34	2015	3	2	3	5	1	0	3	1	13
34	2016	3	2							
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35	2012	3	3	0	1	1	0	0	5	7
35	2013	3	3	0	1	1	0	0	5	7
35	2014	3	3	0	1	1	0	0	5	7
35	2015	3	3	0	1	1	0	0	5	7
35	2016	3	3	0	1	1	0	0	5	7
36	2011	1	3	0	0	0	0	0	2	2
36	2012	1	3	0	0	0	0	0	2	2
36	2013	1	3	3	2	2	1	1	3	12
36	2014	1	3	3	2	2	1	1	3	12
36	2015	1	3	3	2	2	1	1	3	12
36	2016	1	3	3	3	2	1	1	3	13
37	2011	2	2	1	0	1	0	1	3	6
37	2012	2	2	1	0	1	0	1	3	6

37	2013	2	2	1	0	1	0	1	3	6
37	2014	2	2	1	0	1	0	1	3	6
37	2015	2	2	1	0	1	0	1	3	6
37	2016	2	2							
38	2011	1	1	0	0	1	0	1	2	4
38	2012	1	1	0	0	1	0	1	2	4
38	2013	1	1	0	0	1	0	1	2	4
38	2014	1	1	0	0	1	0	1	2	4
38	2015	1	1	0	0	1	0	1	2	4
38	2016	1	1	0	0	1	0	1	2	4
39	2011	1	2	1	0	1	0	2	0	4
39	2012	1	2	1	0	1	0	2	0	4
39	2013	1	2	1	0	1	0	2	0	4
39	2014	1	2	1	0	1	0	2	0	4
39	2015	1	2	1	0	1	0	2	0	4
39	2016	1	2	1	0	1	0	2	0	4
40	2011	1	5	0	1	0	0	0	5	6
40	2012	1	5	0	0	0	0	0	5	5
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40	2014	1	5	0	0	3	3	2	5	13
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40	2016	1	5	0	0	0	5	1	5	11
41	2011	2	5	0	2	0	0	0	4	6
41	2012	2	5	0	2	0	0	0	4	6
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41	2014	2	5	5	5	5	0	5	5	25
41	2015	2	5	0	2	0	1	5	5	13
41	2016	2	5							
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42	2014	1	3	2	1	1	1	3	5	13
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42	2016	1	3	2	3	1	1	3	5	15
43	2011	2	2	0	0	0	0	2	3	5
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43	2013	2	2	0	0	0	0	2	3	5
43	2014	2	2	0	0	0	0	2	3	5
43	2015	2	2	0	0	0	0	2	3	5
43	2016	2	2	0	0	0		2	3	5
44	2011	3	5	0	0	0	0	0	5	5
44	2012	3	5	0	0	0	0	0	5	5
44	2013	3	5	0	0	0	0	0	5	5
44	2014	3	5	0	0	0	0	0	5	5
44	2015	3	5	0	0	0	0	0	5	5

44	2016	3	5	0	0	0	1	0	5	6
45	2011	3	5	0	0	0	0	0	0	0
45	2012	3	5	0	0	0	0	0	0	0
45	2013	3	5	0	0	0	0	0	0	0
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45	2015	3	5	0	0	0	0	0	3	3
45	2016	3	5	0	0	0	0	0	3	3
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46	2015	1	2	0	0	0	0	0	3	3
46	2016	1	2	0	0	0	0	0	3	3
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47	2012	1	4	3	0	2	0	1	2	8
47	2013	1	4	3	0	2	0	1	2	8
47	2014	1	4	3	0	2	0	1	2	8
47	2015	1	4	3	0	2	0	1	2	8
47	2016	1	4	3	0	3	2	2	3	13
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48	2013	1	3	3	0	3	2	1	2	11
48	2014	1	3	3	0	3	2	1	2	11
48	2015	1	3	3	0	3	2	1	2	11
48	2016	1	3							
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49	2013	2	5	5	3	0	0	5	5	18
49	2014	2	5	5	3	0	0	5	5	18
49	2015	2	5	5	3	0	3	5	5	21
49	2016	2	5	3	0	0	1	1	5	10
50	2011	2	3	0	0	0	0	2	3	5
50	2012	2	3	0	0	0	0	2	4	6
50	2013	2	3	0	0	0	0	2	3	5
50	2014	2	3	0	0	0	0	2	3	5
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51	2016	2	5	0	0	0	1	0	3	4
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52	2016	2	4	1	0	1	0	0	2	4
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53	2014	2	3	0	1	2	0	2	3	8
53	2015	2	3	0	1	2	0	2	3	8
53	2016	2	3	0	1	2	0	2	3	8
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54	2015	1	2	0	0	0	0	0	3	3
54	2016	1	2	0	0	0	0	0	3	3
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55	2012	1	4	5	2	0	3	0	2	12
55	2013	1	4	5	2	0	3	0	5	15
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55	2015	1	4	4	0	0	0	5	5	14
55	2016	1	4	5	5	0	1	0	5	16
56	2011	2	3	0	0	0	0	0	0	0
56	2012	2	3	1	0	0	0	0	2	3
56	2013	2	3	1	0	0	0	0	2	3
56	2014	2	3	1	0	0	0	0	2	3
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59	2011	1	3	0	5	5	5	5	5	25
59	2012	1	3	5	5	5	3	5	5	28
59	2013	1	3	5	5	5	3	5	5	28
59	2014	1	3	5	5	5	3	5	5	28
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59	2016	1	3	3	5	2	2	5	5	22
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61	2013	2	3	1	2	1	1	3	2	10
61	2014	2	3	1	2	1	1	3	2	10
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62	2012	3	3	0	0	2	1	2	2	7
62	2013	3	3	0	0	1	1	1	2	5
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62	2015	3	3	1	0	1	1	2	4	9
62	2016	3	3	1	0	1	1	3	3	9
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63	2016	3	5	0	0	0	0	0	2	2
64	2011	2	1	0	0	0	0	0	0	0
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65	2011	1	3	0	0	0	0	0	3	3
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65	2013	1	3	0	0	0	0	0	3	3
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65	2015	1	3	0	0	0	0	0	3	3
65	2016	1	3	0	0	0	0	0	3	3
66	2011	1	3	1	1	2	1	2	4	11
66	2012	1	3	1	1	3	1	2	5	13
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66	2014	1	3	4	5	3	2	2	3	19
66	2015	1	3	1	3	3	2	1	5	15
66	2016	1	3	2	3	3	1	0	5	14
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67	2012	1	2	1	2	2	1	4	2	12

67	2013	1	2	1	2	2	1	4	2	12
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67	2016	1	2	1	2	2	1	4	2	12
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68	2016	2	3							
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69	2012	2	2	0	0	0	0	0	3	3
69	2013	2	2	0	0	0	0	0	3	3
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70	2016	2	3	0	0	2	0	1	2	5
71	2011	2	3	0	0	0	0	0	0	0
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71	2014	2	3	0	0	0	1	0	2	3
71	2015	2	3	0	0	0	1	0	2	3
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72	2012	3	5	0	0	0	0	0	2	2
72	2013	3	5	0	0	0	0	0	4	4
72	2014	3	5	0	0	0	0	0	4	4
72	2015	3	5	0	0	0	0	0	4	4
72	2016	3	5	0	0	0	0	0	5	5
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73	2012	3	5	0	0	0	0	0	3	3
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73	2014	3	5	0	0	0	0	0	3	3
73	2015	3	5	0	0	0	0	0	3	3
73	2016	3	5	0	0	0	0	0	4	4
74	2011	1	4	0	0	0	0	0	0	0
74	2012	1	4	0	0	0	0	0	0	0
74	2013	1	4	0	0	0	0	0	5	5
74	2014	1	4	0	0	0	0	0	5	5
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74	2016	1	4	0	0	0	0	0	5	5
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75	2013	3	4	0	0	0	0	0	3	3
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76	2016	2	5	0	0	3	0	3	5	11
77	2011	3	2	0	0	0	0	0	0	0
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77	2015	3	2	0	0	0	0	0	3	3
77	2016	3	2	1	0	1	0	2	2	6
78	2011	3	2	1	0	0	0	1	3	5
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79	2013	2	3	3	2	0	3	0	2	10
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79	2015	2	3	3	2	0	3	1	2	11
79	2016	2	3	1	4	0	2	1	1	9
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80	2014	2	2	0	0	0	0	0	3	3
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81	2011	3	3	0	0	0	0	0	0	0
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81	2013	3	3	0	0	0	0	1	1	2
81	2014	3	3	0	0	0	0	1	1	2
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82	2013	1	4	0	3	0	1	0	2	6
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83	2012	1	5	0	2	2	0	2	5	11
83	2013	1	5	0	0	0	0	2	5	7
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85	2015	1	3	3	0	0	1	0	2	6
85	2016	1	3	3	0	0	1	0	2	6
86	2011	2	2	0	0	0	1	0	4	5
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86	2013	2	2	0	0	0	1	0	4	5
86	2014	2	2	0	0	0	1	0	4	5
86	2015	2	2	0	0	0	1	0	4	5
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87	2012	3	5	0	0	0	0	0	3	3
87	2013	3	5	0	0	0	0	0	3	3
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87	2015	3	5	0	0	0	0	0	3	3
87	2016	3	5	0	0	0	0	0	3	3
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89	2013	2	5	0	2	2	0	1	3	8
89	2014	2	5	0	2	2	0	1	3	8
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89	2016	2	5	0	4	1	1	3	3	12
90	2011	2	3	0	0	0	0	0	0	0
90	2012	2	3	0	0	0	0	0	0	0
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90	2014	2	3	2	5	0	1	0	2	10
90	2015	2	3	2	5	0	1	0	2	10
90	2016	2	3	2	5	0	1	0	2	10
91	2011	3	3	0	0	0	0	5	5	10
91	2012	3	3	0	5	0	1	1	5	12
91	2013	3	3	0	3	1	0	2	5	11
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91	2015	3	3	0	2	0	1	2	4	9
91	2016	3	3	0	0	0	0	0	0	0
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92	2012	1	2	0	0	3	0	0	3	6
92	2013	1	2	0	0	3	0	0	3	6
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92	2016	1	2	0	0	0	0	0	4	4
93	2011	1	3	0	0	0	0	0	0	0
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93	2014	1	3	2	0	1	0	4	3	10
93	2015	1	3	1	0	3	0	3	2	9
93	2016	1	3	5	2	2	1	3	4	17
94	2011	2	3	2	1	1	0	4	2	10
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94	2016	2	3	1	2	1	0	4	1	9
95	2011	3	5	0	0	0	0	0	3	3
95	2012	3	5	0	0	0	0	0	3	3
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95	2015	3	5	0	0	0	0	0	3	3
95	2016	3	5	0	0	0	0	0	3	3
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96	2016	1	5	0	0	0	1	0	5	6
97	2011	3	5	0	0	0	0	0	4	4
97	2012	3	5	0	0	0	0	0	4	4

97	2013	3	5	0	0	0	0	0	4	4
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97	2015	3	5	0	0	0	2	0	5	7
97	2016	3	5	0	0	0	2	0	5	7
98	2011	2	5	0	0	0	0	0	5	5
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98	2015	2	5	0	0	0	0	1	4	5
98	2016	2	5	0	0	0	0	0	0	0
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99	2012	2	3	5	3	1	0	4	5	18
99	2013	2	3	5	3	1	0	4	5	18
99	2014	2	3	5	3	1	0	4	5	18
99	2015	2	3	5	3	1	0	4	5	18
99	2016	2	3							
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101	2011	1	2	0	1	0	0	2	2	5
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101	2013	1	2	1	1	1	0	1	2	6
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102	2016	1	3	0	0	0	0	0	4	4
103	2011	3	5	2	3	3	5	4	5	22
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103	2013	3	5	4	3	3	3	3	5	21
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103	2015	3	5	2	0	0	3	0	5	10
103	2016	3	5	0	0	0	0	0	0	0
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104	2012	3	1	0	0	0	0	1	2	3
104	2013	3	1	0	0	1	1	1	2	5
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104	2016	3	1	0	0	1	1	1	2	5
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106	2014	3	5	0	0	0	0	1	5	6
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107	2011	2	3	0	0	0	0	0	1	1
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107	2013	2	3	0	0	0	1	0	5	6
107	2014	2	3	0	0	0	1	0	4	5
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112	2011	1	3	0	0	0	2	0	4	6
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112	2013	1	3	0	0	0	2	0	4	6
112	2014	1	3	0	0	0	2	0	3	5
112	2015	1	3	0	0	0	2	0	5	7
112	2016	1	3	2	2	0	1	1	5	11
113	2011	1	2	0	3	5	0	2	3	13
113	2012	1	2	0	2	2	2	5	3	14
113	2013	1	2	2	0	2	3	2	3	12
113	2014	1	2	1	5	2	1	2	3	14
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113	2016	1	2	0	5	4	1	0	3	13
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116	2016	1	2	2	4	0	1	0	5	12
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117	2016	2	2							
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118	2016	3	3							
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120	2013	1	2	1	1	0	5	2	5	14
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120	2016	1	2	1	4	0	4	3	5	17
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121	2013	3	5	0	0	0	0	0	3	3
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122	2016	3	3	0	2	2	0	3	4	11
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124	2013	2	2	1	1	1	0	2	3	8
124	2014	2	2	1	1	1	0	2	3	8
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124	2016	2	2	0	1	1	0	2	3	7
125	2011	1	2	2	1	0	0	1	4	8
125	2012	1	2	2	1	0	1	1	4	9
125	2013	1	2	0	0	0	1	0	4	5
125	2014	1	2	0	2	0	0	0	4	6
125	2015	1	2	1	0	0	0	1	5	7
125	2016	1	2	0	2	0	0	0	3	5
126	2011	1	5	0	0	0	0	0	0	0
126	2012	1	5	0	0	0	0	0	0	0
126	2013	1	5	0	1	0	0	1	2	4
126	2014	1	5	0	1	0	0	3	3	7
126	2015	1	5	0	0	0	0	5	1	6
126	2016	1	5	0	0	0	0	0	5	5
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127	2016	3	3	0	0	0	0	0	2	2
128	2011	3	1	0	0	0	0	0	0	0
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128	2013	3	1	1	0	1	1	2	2	7
128	2014	3	1	1	0	1	1	2	2	7
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128	2016	3	1	1	0	1	0	2	2	6
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130	2015	1	1	0	0	0	0	0	2	2
130	2016	1	1	0	0	0	0	0	2	2
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131	2015	3	1	0	0	0	0	0	2	2
131	2016	3	1	0	0	0	0	0	2	2
132	2011	1	4	0	0	0	0	0	0	0
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132	2013	1	4	0	0	1	1	1	2	5
132	2014	1	4	0	0	1	1	0	2	4
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133	2011	2	2	0	0	0	0	0	3	3
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133	2015	2	2	0	1	0	1	0	5	7
133	2016	2	2	0	1	0	1	0	5	7
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134	2012	1	5	2	0	0	0	0	5	7
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135	2012	2	2	2	3	5	0	2	5	17
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136	2012	3	5	0	0	0	0	0	4	4
136	2013	3	5	0	0	0	0	0	5	5
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136	2015	3	5	0	0	0	0	0	5	5
136	2016	3	5	0	0	0	0	0	5	5
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137	2014	1	2	0	0	0	0	0	1	1
137	2015	1	2	2	1	0	0	1	1	5
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138	2011	1	1	0	1	1	0	3	3	8
138	2012	1	1	0	1	1	0	3	3	8
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139	2016	2	2	4	0	0	0	0	2	6
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140	2012	3	5	1	1	0	1	0	5	8
140	2013	3	5	0	0	0	0	0	5	5
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140	2016	3	5	0	0	3	1	0	5	9
141	2011	3	5	0	0	3	0	0	3	6
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141	2016	3	5	0	0	0	0	0	3	3
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142	2012	1	5	0	2	1	0	0	4	7

142	2013	1	5	0	3	1	0	1	5	10
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142	2015	1	5	0	1	2	0	1	4	8
142	2016	1	5							
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143	2014	3	5	0	2	3	3	0	4	12
143	2015	3	5	0	2	3	3	0	4	12
143	2016	3	5	0	2	3	3	0	4	12
144	2011	1	4	0		0	0	0	0	0
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144	2015	1	4	0	2	0	0	2	1	5
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145	2016	3	5	0	0	0	0	0	3	3
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146	2016	3	5	0	0	0	0	0	3	3
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147	2013	2	5	0	0	0	0	1	5	6
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147	2016	2	5	0	0	0	1	0	5	6
148	2011	1	2	4	4	1	1	5	5	20
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148	2014	1	2	1	0	1	1	1	2	6
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148	2016	1	2	3	3	1	2	4	5	18
149	2011	1	2	1	0	0	1	5	2	9
149	2012	1	2	1	0	0	1	5	2	9
149	2013	1	2	1	0	0	1	5	2	9
149	2014	1	2	1	0	0	1	5	2	9
149	2015	1	2	1	0	0	1	5	2	9

149	2016	1	2							
150	2011	2	5	0	2	3	0	2	3	10
150	2012	2	5	0	2	3	0	2	3	10
150	2013	2	5	0	2	3	0	2	3	10
150	2014	2	5	0	2	3	0	2	2	9
150	2015	2	5	0	2	3	0	2	2	9
150	2016	2	5							
151	2011	2	1	5	5	5	0	3	3	21
151	2012	2	1	5	5	5	0	3	4	22
151	2013	2	1	5	5	5	1	3	3	22
151	2014	2	1	5	5	2	1	2	3	18
151	2015	2	1	5	5	2	1	2	3	18
151	2016	2	1	5	5	3	1	3	4	21
152	2011	1	4	1	0	0	1	3	5	10
152	2012	1	4	1	0	0	1	3	5	10
152	2013	1	4	1	0	0	1	3	5	10
152	2014	1	4	1	0	0	1	3	5	10
152	2015	1	4	1	0	0	1	3	5	10
152	2016	1	4	1	0	0	0	1	1	3
153	2011	3	3	0	0	0	0	0	2	2
153	2012	3	3	0	0	0	0	0	2	2
153	2013	3	3	0	0	0	0	0	2	2
153	2014	3	3	0	0	0	0	0	2	2
153	2015	3	3	0	0	0	0	0	2	2
153	2016	3	3	0	0	0	0	0	2	2
154	2011	1	3	1	0	1	1	1	2	6
154	2012	1	3	1	1	3	1	1	3	10
154	2013	1	3	1	1	3	1	1	3	10
154	2014	1	3	1	1	3	1	1	3	10
154	2015	1	3	1	1	3	1	1	3	10
154	2016	1	3							
155	2011	2	1	2	2	2	2	2	2	12
155	2012	2	1	3	2	2	2	2	2	13
155	2013	2	1	3	2	2	2	5	3	17
155	2014	2	1	3	2	2	2	5	3	17
155	2015	2	1	3	2	2	2	5	3	17
155	2016	2	1	3	0	0	0	0	0	3
156	2011	1	4	3	0	1	0	3	4	11
156	2012	1	4	3	2	1	0	3	4	13
156	2013	1	4	5	2	2	0	5	4	18
156	2014	1	4	5	2	2	0	5	4	18
156	2015	1	4	5	2	2	0	5	4	18
156	2016	1	4	4	3	2	0	4	4	17
157	2011	1	4	2	0	2	2	5	5	16
157	2012	1	4	3	0	2	2	5	5	17

157	2013	1	4	3	0	5	2	5	5	20
157	2014	1	4	2	0	2	2	5	5	16
157	2015	1	4	2	0	2	2	5	5	16
157	2016	1	4							
158	2011	3	5	0	0	0	0	0	2	2
158	2012	3	5	0	0	0	0	0	2	2
158	2013	3	5	0	0	0	0	0	3	3
158	2014	3	5	0	0	0	0	0	3	3
158	2015	3	5	0	0	0	0	0	3	3
158	2016	3	5	0	0	0	0	0	3	3
159	2011	2	3	0	0	0	0	0	2	2
159	2012	2	3	0	0	0	0	0	2	2
159	2013	2	3	1	1	1	1	0	5	9
159	2014	2	3	1	1	1	1	0	5	9
159	2015	2	3	1	1	1	1	0	5	9
159	2016	2	3	1	1	1	1	0	5	9
160	2011	2	1	1	0	1	0	4	3	9
160	2012	2	1	1	0	1	0	4	3	9
160	2013	2	1	1	0	1	0	4	3	9
160	2014	2	1	1	0	1	0	4	3	9
160	2015	2	1	1	0	1	0	4	3	9
160	2016	2	1	2	2	2	0	4	4	14
161	2011	3	5	0	0	0	0	0	2	2
161	2012	3	5	0	0	0	0	0	2	2
161	2013	3	5	0	0	0	0	0	2	2
161	2014	3	5	0	0	0	0	0	2	2
161	2015	3	5	0	0	0	0	0	2	2
161	2016	3	5	0	0	0	0	0	3	3
162	2011	1	4	0	0	0	0	0	0	0
162	2012	1	4	0	0	0	0	0	0	0
162	2013	1	4	3	0	4	0	2	3	12
162	2014	1	4	1	2	2	0	0	3	8
162	2015	1	4	3	2	4	0	1	4	14
162	2016	1	4							
163	2011	3	5	1	2		0		2	5
163	2012	3	5	0	0	0	1	0	4	5
163	2013	3	5	0	0	0	1	0	4	5
163	2014	3	5	0	0	0	1	0	4	5
163	2015	3	5	0	0	0	1	0	4	5
163	2016	3	5	0	0	0	1	0	4	5
164	2011	3	5	0	0	0	0	1	5	6
164	2012	3	5	0	0	0	0	0	5	5
164	2013	3	5	0	0	0	0	0	5	5
164	2014	3	5	0	0	0	0	0	5	5
164	2015	3	5	0	0	0	0	0	5	5

164	2016	3	5	0	0	0	0	0	5	5
165	2011	2	2	3	0	0	0	0	0	3
165	2012	2	2	3	2	0	0	0	1	6
165	2013	2	2	3	2	0	0	0	3	8
165	2014	2	2	3	2	0	0	0	3	8
165	2015	2	2	3	2	0	0	0	3	8
165	2016	2	2							
166	2011	2	2	0	0	0	0	0	4	4
166	2012	2	2	0	0	0	0	0	4	4
166	2013	2	2	0	0	0	0	0	5	5
166	2014	2	2	0	0	0	0	0	3	3
166	2015	2	2	0	0	0	0	0	3	3
166	2016	2	2	0	0	0	0	0	3	3
167	2011	3	5	0	0	0	0	0	3	3
167	2012	3	5	0	0	0	0	0	3	3
167	2013	3	5	0	0	0	0	0	3	3
167	2014	3	5	0	0	0	0	0	3	3
167	2015	3	5	0	0	0	0	0	3	3
167	2016	3	5	0	0	0	0	0	3	3
168	2011	1	2	0	0	1	3	3	5	12
168	2012	1	2	0	0	1	3	3	5	12
168	2013	1	2	0	0	4	3	3	5	15
168	2014	1	2	3	3	4	3	4	4	21
168	2015	1	2	3	3	4	3	4	4	21
168	2016	1	2	3	3	4	3	4	4	21
169	2011	3	3	0	0	0	0	0	3	3
169	2012	3	3	0	0	0	0	0	3	3
169	2013	3	3	0	0	0	0	0	3	3
169	2014	3	3	0	0	0	0	0	3	3
169	2015	3	3	0	0	0	0	0	3	3
169	2016	3	3	0	0	0	0	0	3	3
170	2011	1	2	0	2	2	2	3	5	14
170	2012	1	2	0	1	2	1	0	5	9
170	2013	1	2	1	2	2	1	0	5	11
170	2014	1	2	3	3	1	2	0	5	14
170	2015	1	2	4	1	2	3	3	5	18
170	2016	1	2	2	1	0	3	2	5	13
171	2011	1	2	0	0	0	1	3	5	9
171	2012	1	2	0	0	0	1	3	5	9
171	2013	1	2	0	0	0	1	3	5	9
171	2014	1	2	0	5	1	2	5	5	18
171	2015	1	2	5	5	1	2	5	5	23
171	2016	1	2	0	0	0	3	0	5	8
172	2011	3	3	0	0	0	0	0	0	0
172	2012	3	3	1	1	2	0	3	4	11

172	2013	3	3	1	1	2	0	3	4	11
172	2014	3	3	1	1	2	0	3	4	11
172	2015	3	3	1	1	2	0	3	4	11
172	2016	3	3	2	2	2	0	3	2	11
173	2011	1	3	2	4	3	1	5	5	20
173	2012	1	3	5	3	3	1	5	5	22
173	2013	1	3	4	3	3	1	5	5	21
173	2014	1	3	2	5	5	1	5	5	23
173	2015	1	3	2	3	1	1	1	5	13
173	2016	1	3	4	4	1	2	1	5	17
174	2011	2	2	0	0	0	0	0	3	3
174	2012	2	2	0	0	0	0	0	3	3
174	2013	2	2	0	0	0	0	0	3	3
174	2014	2	2	0	0	0	0	0	3	3
174	2015	2	2	0	1	0	0	2	5	8
174	2016	2	2	0	1	1	0	2	5	9
175	2011	3	3	0	0	0	0	0	0	0
175	2012	3	3	0	0	0	0	0	0	0
175	2013	3	3	1	1	0	0	0	3	5
175	2014	3	3	1	1	0	0	0	3	5
175	2015	3	3	1	1	0	0	0	3	5
175	2016	3	3	1	1	0	0	0	3	5
176	2011	2	5	0	0	0	0	0	0	0
176	2012	2	5	0	0	0	0	0	0	0
176	2013	2	5	0	0	0	0	0	5	5
176	2014	2	5	0	0	0	0	0	5	5
176	2015	2	5	0	0	0	0	0	5	5
176	2016	2	5	0	0	0	0	0	5	5
177	2011	3	5	0	0	0	0	0	3	3
177	2012	3	5	0	0	0	0	0	3	3
177	2013	3	5	0	0	0	0	0	3	3
177	2014	3	5	0	0	0	0	0	3	3
177	2015	3	5	0	0	0	0	0	3	3
177	2016	3	5	0	0	0	0	0	3	3
178	2011	1	3	1	0	1	0	3	3	8
178	2012	1	3	1	0	1	0	3	4	9
178	2013	1	3	1	0	1	0	3	3	8
178	2014	1	3	1	0	1	0	3	3	8
178	2015	1	3	2	0	1	0	3	4	10
178	2016	1	3	2	0	0	0	4	4	10
179	2011	1	2	0	3	0	0	0	1	4
179	2012	1	2	0	0	0	0	0	0	0
179	2013	1	2	0	1	0	0	4	2	7
179	2014	1	2	1	2	1	0	1	3	8
179	2015	1	2	2	1	1	0	1	4	9

179	2016	1	2	2	2	2	2	1	5	14
180	2011	2	5	0	0	0	0	0	3	3
180	2012	2	5	0	0	0	0	0	3	3
180	2013	2	5	0	0	0	0	0	3	3
180	2014	2	5	0	0	0	0	0	3	3
180	2015	2	5	0	0	0	0	0	3	3
180	2016	2	5	0	0	0	2	0	3	5
181	2011	3	3	1	0	0	1	0	2	4
181	2012	3	3	1	0	0	1	0	2	4
181	2013	3	3	1	0	0	1	0	2	4
181	2014	3	3	1	0	0	1	0	2	4
181	2015	3	3	1	0	0	1	0	2	4
181	2016	3	3	1	0	0	1	0	2	4
182	2011	3	5	0	0	0	2	0	4	6
182	2012	3	5	0	0	0	2	0	4	6
182	2013	3	5	0	0	0	2	0	4	6
182	2014	3	5	0	0	0	2	0	4	6
182	2015	3	5	0	0	0	2	0	4	6
182	2016	3	5	0	0	0	0	0	1	1
183	2011	2	5	2	4	3	3	4	5	21
183	2012	2	5	1	5	1	2	3	5	17
183	2013	2	5	0	1	3	0	0	3	7
183	2014	2	5	0	1	3	0	0	3	7
183	2015	2	5	0	3	3	0	0	3	9
183	2016	2	5							
184	2011	3	2	4	3	3	1	3	4	18
184	2012	3	2	4	3	3	1	3	4	18
184	2013	3	2	4	3	3	1	3	4	18
184	2014	3	2	4	3	3	1	3	4	18
184	2015	3	2	4	3	3	1	3	4	18
184	2016	3	2	5	3	4	1	3	4	20
185	2011	1	4	4	1	1	0	4	5	15
185	2012	1	4	4	1	1	0	4	5	15
185	2013	1	4	4	1	1	0	4	5	15
185	2014	1	4	4	1	1	0	4	5	15
185	2015	1	4	4	1	1	0	4	5	15
185	2016	1	4	5	2	0	0	4	5	16
186	2011	1	2	0	1	2	3	3	5	14
186	2012	1	2	0	1	4	5	3	5	18
186	2013	1	2	2	5	3	5	5	5	25
186	2014	1	2	2	5	3	5	5	5	25
186	2015	1	2	2	3	2	2	4	5	18
186	2016	1	2							
187	2011	2	2	0	2	2	2	3	5	14
187	2012	2	2	0	2	2	2	3	5	14

187	2013	2	2	0	2	2	2	3	5	14
187	2014	2	2	0	2	2	2	3	5	14
187	2015	2	2	0	2	2	2	3	5	14
187	2016	2	2	0	1	1	2	2	5	11
188	2011	2	4	5	5	1	0	5	5	21
188	2012	2	4	5	5	2	0	5	5	22
188	2013	2	4	5	5	4	1	5	5	25
188	2014	2	4	5	5	4	1	5	5	25
188	2015	2	4	5	5	4	1	5	5	25
188	2016	2	4	1	3	2	0	4	5	15
189	2011	1	3	0	0	0	0	0	0	0
189	2012	1	3	0	5	0	0	0	3	8
189	2013	1	3	3	3	0	0	0	3	9
189	2014	1	3	0	3	0	0	0	2	5
189	2015	1	3	0	3	0	0	0	2	5
189	2016	1	3	0	5	0	0	0	3	8
190	2011	3	3	0	0	0	1	0	3	4
190	2012	3	3	0	0	0	1	0	3	4
190	2013	3	3	0	0	0	1	0	3	4
190	2014	3	3	0	0	0	1	0	3	4
190	2015	3	3	0	0	0	1	0	3	4
190	2016	3	3	0	0	0	1	0	3	4
191	2011	2	3	0	0	1	0	1	2	4
191	2012	2	3	0	0	1	0	1	2	4
191	2013	2	3	0	0	1	0	1	2	4
191	2014	2	3	0	0	1	0	1	2	4
191	2015	2	3	0	0	1	0	1	2	4
191	2016	2	3	0	0	1	0	1	2	4
192	2011	2	3	0	0	2	0	2	2	6
192	2012	2	3	0	0	2	0	2	2	6
192	2013	2	3	0	0	2	0	2	2	6
192	2014	2	3	0	0	2	0	2	2	6
192	2015	2	3	0	0	2	0	2	2	6
192	2016	2	3	0	0	0	1	0	2	3
193	2011	1	4	0	0	2	0	1	4	7
193	2012	1	4	0	0	2	0	1	4	7
193	2013	1	4	0	2	2	0	1	4	9
193	2014	1	4	0	2	2	0	1	4	9
193	2015	1	4	0	2	2	0	1	4	9
193	2016	1	4	1	0	1	0	1	4	7
194	2011	2	3	0	0	0	0	0	4	4
194	2012	2	3	0	0	0	0	0	4	4
194	2013	2	3	0	0	0	0	0	4	4
194	2014	2	3	0	0	0	0	0	4	4
194	2015	2	3	0	0	0	0	0	4	4

194	2016	2	3	0	0	0	0	0	0	0
195	2011	2	3	0	0	3	0	3	2	8
195	2012	2	3	0	0	3	0	3	2	8
195	2013	2	3	0	0	3	0	3	2	8
195	2014	2	3	0	0	3	0	3	2	8
195	2015	2	3	0	0	3	0	3	2	8
195	2016	2	3	1	1	2	0	3	2	9
196	2011	1	2	5	2	5	1	1	5	19
196	2012	1	2	5	2	5	1	1	5	19
196	2013	1	2	5	2	5	1	1	5	19
196	2014	1	2	5	2	5	1	4	5	22
196	2015	1	2	5	2	4	1	3	5	20
196	2016	1	2	5	1	0	0	1	3	10
197	2011	2	5	1	0	1	0	0	5	7
197	2012	2	5	1	0	1	0	0	5	7
197	2013	2	5	1	0	1	0	0	5	7
197	2014	2	5	1	0	1	0	0	5	7
197	2015	2	5	1	0	1	0	0	5	7
197	2016	2	5	1	0	0	1	1	5	8
198	2011	1	3	1	1	2	1	2	5	12
198	2012	1	3	1	1	2	1	2	5	12
198	2013	1	3	1	3	2	1	2	5	14
198	2014	1	3	1	1	1	1	1	4	9
198	2015	1	3	1	1	1	1	1	4	9
198	2016	1	3	1	1	1	0	0	3	6
199	2011	1	1	0	0	2	0	3	3	8
199	2012	1	1	0	0	2	0	3	3	8
199	2013	1	1	0	0	2	0	3	3	8
199	2014	1	1	0	1	2	0	3	3	9
199	2015	1	1	0	1	2	0	3	3	9
199	2016	1	1	0	1	3	0	3	3	10
200	2011	1	4	0	1	0	1	1	5	8
200	2012	1	4	0	1	0	1	1	5	8
200	2013	1	4	0	1	0	1	1	5	8
200	2014	1	4	0	1	0	1	1	5	8
200	2015	1	4	0	3	3	1	3	5	15
200	2016	1	4	0	2	3	2	2	5	14
201	2011	3	4	0	0	0	0	0	3	3
201	2012	3	4	0	0	2	0	2	3	7
201	2013	3	4	0	0	0	0	0	5	5
201	2014	3	4	1	1	1	0	1	5	9
201	2015	3	4	1	1	1	0	1	5	9
201	2016	3	4	0	1	1	0	0	4	6

Appendix 2: Summary Statistics of Small, Medium and Large Companies

Appendix (2a) Summary Statistics 2011 - 2016 for Small Companies

VARIABLES	(1) N	(2) mean	(3) Sd	(4) Min	(5) max	(6) Median	(7) Skewness	(8) Kurtosis
ROA	233	0.00336	0.179	-0.750	0.455	0	-.542	4.542
TBQ	251	2.655	4.172	0.168	40.58	1.32	4.796	34.877
EMQ	346	4.971	3.684	0	22	4	1.850	7.828
Energy	346	0.283	0.769	0	5	0	3.521	16.401
GHG	346	0.353	0.856	0	5	0	2.807	11.490
Waste	345	0.409	0.845	0	4	0	2.158	6.746
Stake	346	0.434	0.818	0	5	0	2.392	9.783
Materials	345	0.478	0.997	0	5	0	2.191	7.091
Compliance	346	3.017	1.383	0	5	3	-.241	2.500
Size	318	21.90	15.08	1	74	19	.735	3.003
Liquidity	329	7.229	14.10	0.0100	170.3	2.54	6.057	59.577
Gearing	317	40.34	95.78	0	844.3	12.99	5.177	34.066
Board Size	342	5.143	1.888	0	11	5	.122	3.070
NEDS	342	3.012	1.516	0	7	3	.622	3.334
CEO Rem	329	218,027	154,142	12,000	908,363	174981.6	1.562	5.745
Growth	302	24.63	100.5	-74.99	900.4	.503	4.496	29.880
Cash	309	6,497	16,013	4	111,589	1630	4.604	26.049

Appendix (2b) Descriptive Statistics 2011 - 2016 for Medium-sized Companies

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max	(6) Median	(7) Skewness	(8) Kurtosis
ROA	398	0.0439	0.156	-0.920	0.423	.0539	-1.344	8.168
TBQ	325	1.419	1.496	0.130	12.13	.916	3.113	16.451
EMQ	423	7.203	5.670	0	25	5	1.319	4.217
Energy	423	0.870	1.454	0	5	0	1.690	4.737
GHG	423	0.934	1.515	0	5	0	1.664	4.698
Waste	422	0.822	1.254	0	5	0	1.815	5.955
Stake	422	0.436	0.767	0	4	0	1.732	5.337
Materials	423	1.161	1.566	0	5	0	1.167	3.172
Compliance	422	2.991	1.478	0	5	3	-.240	2.331
Size	410	168.3	163.1	1	1,475	130.5	4.156	26.211
Liquidity	410	3.119	6.622	0.0600	93	18.585	8.684	101.609
Gearing	402	39.78	59.98	0	495.9	6	3.291	17.728
Board Size	392	6.235	1.865	3	13	3	.594	3.592
NEDS	392	3.293	1.477	0	10	3	.988	4.602
CEO Rem	380	312,628	266,490	42,568	3731302	240668.3	6.656	75.902
Growth	398	14.55	51.89	-85.42	418.2	4.433285	4.206	26.916
Cash	398	13,485	31,804	0	374,392	4413.5	6.844	64.058

Appendix (2b) Descriptive Statistics 2011 - 2016 for Large Companies

VARIABLES	(1) N	(2) Mean	(3) sd	(4) min	(5) max	(6) Median	(7) Skewness	(8) Kurtosis
ROA	413	0.133	0.120	-0.268	0.835	.1087	.688	5.370
TBQ	321	1.614	2.382	0.120	37	1.29	10.927	155.38
EMQ	415	9.684	5.955	0	28	9	.701	3.125
Energy	415	1.313	1.634	0	5	1	1.082	2.919
GHG	414	1.278	1.574	0	5	1	1.155	3.286
Waste	415	1.099	1.323	0	5	1	1.201	3.857
Stake	415	0.819	1.135	0	5	0	1.757	6.227
Materials	415	1.694	1.700	0	5	1	.620	2.085
Compliance	415	3.484	1.526	0	5	4	-.673	2.434
Size	362	1,177	1,047	23	5,611	1474	1.730	5.796
Liquidity	408	1.453	1.925	0.0300	17.85	1.025	5.248	35.070
Gearing	403	60.25	52.60	0	376.5	49.074	2.038	9.007
Board Size	373	6.641	1.754	3	12	6	.692	1.754
NEDS	373	3.670	1.422	0	11	4	.824	4.938
CEO Rem	355	472,479	324,879	40,000	2634262	371000	2.292	12.121
Growth	375	15.10	43.82	-61.98	518.7	8.046	7.240	74.26
Cash	385	27,649	62,336	4	572,778	7545	4.664	29.385

Appendix 3: Computation of Residual and Cook Distance for Outliers

VARIABLES	N	mean	sd	min	Max
ROA	1,044	0.07	0.158	-0.92	0.835
TBQ	897	1.835	2.821	0.12	40.58
EMQ	1,184	7.421	5.604	0	28
Energy	1,184	0.854	1.425	0	5
GHG	1,183	0.884	1.427	0	5
Waste	1,182	0.799	1.208	0	5
Stake	1,183	0.57	0.943	0	5
Materials	1,183	1.149	1.553	0	5
Compliance	1,183	3.172	1.485	0	5
Residuals	863	3.47E-11	0.1312	-0.900	0.716
Cooksd	863	0.00115	0.00301	0.0000	0.037