

UNIVERSITY OF GHANA

**Examination of the AKOBEN Environmental Performance Rating Tool: Implications
for Environmental Disclosures**

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DECLARATION

I, John Amoah Kusi, hereby declare that this thesis is the result of my research undertaken at the University of Ghana Business School. This thesis has not been presented by any other person, either in part or in whole, by any other person for any academic award in this or any other university. References to the publications of the work of other people have been fully acknowledged. I, therefore, declare that I bear the sole responsibility for any shortcomings of this research.

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CERTIFICATION

We hereby certify that this thesis was supervised in accordance with procedures laid down by the University of Ghana.

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ABSTRACT

The purpose of the study is to assess the level of corporate environmental disclosures in the corporate annual reports of mining and manufacturing companies in Ghana and their environmental performance based on the industry. It further assesses the effect of environmental performance on environmental disclosures. Finally, the study evaluates the AKOBEN environmental performance rating tool as an evaluation tool.

A content analysis of the corporate annual reports of 25 companies over a four-year period for their environmental disclosures was undertaken using a disclosure index developed in line with Wiseman's (1982) environmental disclosure index. The environmental performance of the sampled firms was proxied by the rating score based on the AKOBEN environmental performance rating tool. A multiple regression analysis was undertaken using a random effect estimation model to test for the effects of environmental performance on environmental disclosures. The rating tool was evaluated by benchmarking it against the KLD Global Sustainability Index (GSI), China's GreenWatch, and Indonesia's PROPER.

The study finds the rating tool to have the key elements that make it comprehensive, only in evaluating the rating criteria it is set out to assess. Mining companies make more environmental disclosures than the manufacturing companies. Similarly, on the average, mining companies performed better than manufacturing companies. Environmental performance was found to be a statistically significant, but negative, determinant of environmental disclosures. This indicates that mining and manufacturing companies make environmental disclosures to legitimize their activities in the society.

The Environmental Protection Agency must consider expanding the rating tool to cover companies operating in other industries. Management of companies also needs to improve upon their environmental disclosure practices to gain legitimacy in the society. However, the study evaluates the rating tool without recourse to the perceptions of stakeholders about the appropriateness of the tool.

DEDICATION

I dedicate this piece of work to God Almighty, my wonderful family, and Esther Kyeremaa.



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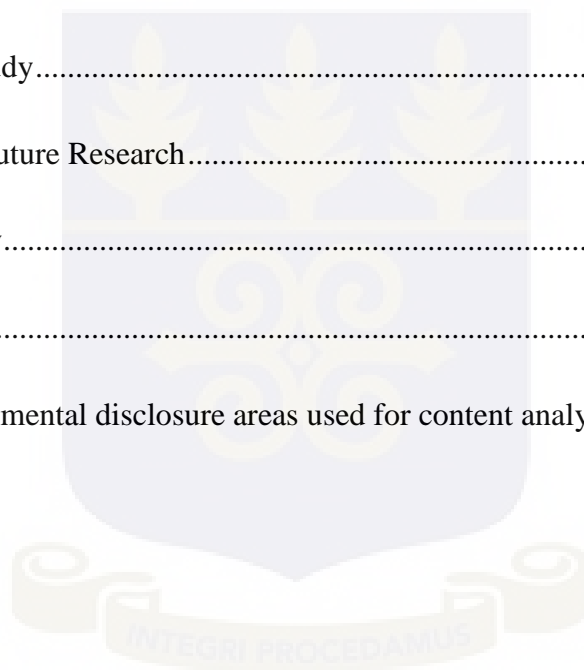
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LIST OF ABBREVIATIONS

ACRONYM	MEANING
CSR	Corporate Social Responsibility
EPA	Environmental Protection Agency
ESG	Environmental, Social, and Governance
GRI	Global Reporting Initiative
GSI	Global Sustainability Index
IRRC	Investor Responsibility Research Centre
ISO	International Organisation for Standardization
PROPER	Program for Pollution Control, Evaluation and Rating
SEPA	State Environmental Protection Agency
TRI	Toxic Release Inventory



CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND OF STUDY

There is a heightened level of public scrutiny of firms' environmental performance and disclosures (Al-Tuwaijri, Christensen, & Hughes, 2004). Numerous attempts have been made to define these two elements. Fontana, D'Amico, Coluccia, and Solimene (2015), for instance, define environmental performance in relation to the level of pollution of a company. They assert that "*the less pollution produced by a firm, the better its environmental performance*" (Fontana et al., 2015:p.43). The study, however, adopts the definition by the International Organization for Standardization (ISO), which is a key organization in the formulation and implementation of environmental management and sustainability standards. Environmental performance, according to ISO, refers to the "*measurable results of an organization's management of its environmental aspects*" (ISO 14004, 2004, as cited by Standard, 2004: p.2).

Similarly, numerous definitions for environmental disclosures exist in the literature. Thompson and Zakaria (2004) refer to environmental disclosures as the disclosure of both financial and non-financial information that is environmentally-related by firms. Similarly, van de Burgwal and Vieira (2014: p.62) refer to it as "*the provision of public and private information, financial and non-financial information, and quantitative and non-quantitative information regarding to the organization's management of environmental issues*". It has also been defined to involve firms' actions to measure, disclose, and be accountable to its stakeholders for its impacts on the environment (GRI, 2006). Huang and Kung (2010) describe environmental disclosure as a means for firms to exhibit their social responsibility and obligation to meet the demands of the various stakeholder groups.

The relationship between these two elements – environmental performance and environmental disclosure – has attracted the attention of regulators, academics, and market participants (Al-Tuwaijri et al., 2004; Clarkson, Li, Richardson, & Vasvari, 2008). However, most of the studies in the area of environmental disclosures and environmental performance of firms are segregated. Most of the studies have focused on environmental disclosures by firms alone and its determinants (see Deegan, Rankin, & Tobin, 2002; Kamal & Deegan, 2013), whereas others have focused on just the assessment of the environmental performance of firms (see Adams, 2002; Wood, 2010; Cho, Lee, & Pfeiffer Jr., 2013). The few studies that assess the relationship between corporate environmental disclosures and environmental performance of firms have found mixed results. As a proxy for environmental performance, the studies have also used the rating score of different environmental performance rating tools.

Prior studies have reported a consistent increase in the level of environmental disclosures (see Deegan et al., 2002). Others seem to think otherwise, and to that end have found a decreasing level of environmental disclosures, mostly after an initial increase (see Jamil, Alwi, & Mohamed, 2002). In their quest to compete in the global economy, it is however imperative for managers to compete within the societal constraints. Font, Walmsley, Cogotti, McCombes, and Häusler (2013) emphasized the need for firms to continuously perform well environmentally and further highlighted that being environmentally responsible alone is not enough. Firms must also report their environmental practices transparently. They, however, suggest that the link between the environmental performance of firms and their environmental disclosures is an under-researched area (Font et al., 2013).

The review of literature also points out that most of the studies that assess the environmental performance of firms and its effect on the level of environmental disclosures have not only found mixed results but have mostly used either the KLD Research and Analytics, Inc. Global

Sustainability Index (GSI) (see Waddock & Graves, 1997; Griffin & Mahon, 1997; Greening & Turban, 2000; Cho, Patten, & Roberts, 2006; Cho & Patten, 2007; Cho, Roberts, & Patten, 2010) or the United States Toxic Release Inventory (Clarkson et al., 2008; Cormier & Magnan, 2003). However, these performance rating tools used as proxies for environmental performance were promulgated for use in the developed economies. It is imperative to also consider the contextual differences that may exist across economies in the evaluation of the environmental performance of firms. This is mainly because specific indicators may be considered as necessary indicators in assessing the environmental performance of firms in particular jurisdictions (Font et al., 2013).

In the context of developing countries, there also exist environmental performance rating tools developed to mainly assess the environmental performance of companies that operate in the respective countries. More specifically, Indonesia and China are known to have environmental performance rating tools that have been specifically developed to assess the environmental performance of companies operating in these countries. These rating tools are the Indonesia's PROPER and China's GreenWatch. These environmental performance rating tools, according to Jin, Wang, and Wheeler (2010), derive their attractiveness in developing countries from the existence of institutional weaknesses which hinder conventional monitoring and enforcement of environmental laws, regulations, and standards. The case of Ghana is not different from Indonesia and China. Currently, in Ghana, the Environmental Protection Agency (EPA) has set up an environmental performance rating tool to assess the environmental performance of firms. This rating tool, known as AKOBEN environmental performance rating tool (hereinafter referred to as AKOBEN), represents an attempt by EPA to get-on-board the global trend in regulating the effects of business activities on the environment to ensure accountability (EPA, 2010). The AKOBEN is used to assess the environmental performance of the mining and manufacturing companies in Ghana. Considering that AKOBEN is a

relatively new phase in the regulation of environment-related issues, as well as its peculiar focus and concentration on the mining and manufacturing companies in Ghana, it is imperative to evaluate the tool as a measure of environmental performance. The KLD GSI has been widely used mainly because it draws its performance indicators from a wide variety of sources and provides an enhanced measure for the environmental performance, without the compromise of the rating tool (Hillman & Keim, 2001). Considering the apparent strengths of the KLD GSI, the need to evaluate the AKOBEN against the KLD GSI cannot be overemphasized.

Therefore, this study seeks to evaluate the AKOBEN against other environmental performance rating tools. Dragomir (2012) asserts that the relationship between environmental performance and environmental disclosures is influenced by the proxy used in the assessment of the environmental performance of firms. Based on this assertion and the existence of a peculiar environmental performance rating tool in Ghana, it is imperative to revisit the relationship that exists between the level of environmental disclosures and environmental performance in the Ghanaian context.

1.2 RESEARCH PROBLEM

Existing literature has reported a mixed relationship between corporate environmental disclosures and environmental performance. A statistically significant relationship, both positive and negative, between these two elements have been found by some studies (see Al-Tuwaijri et al., 2004; Clarkson et al., 2008; Cho, et al., 2010; Lyon & Maxwell, 2011), whereas other studies have also failed to find a significant relationship between them (see Patten, 2002; de Villiers & van Staden, 2006; Cho & Patten, 2007; Guidry & Patten, 2012). The relationship found by these studies has been explained either with the legitimacy or signalling theory. These two theories, however, give competing predictions.

Patten (2002), in his study, found a negative relationship between environmental disclosure and environmental performance, indicating that poorer environmental performers are incentivised to make more environmental disclosures. The relation between environmental performance and environmental disclosures indicated that firms used their environmental disclosures as a tool for legitimisation, hence the use of the legitimacy theory. In the assessment of the relationship between performance and disclosure, he examined the 1990 10-K report environmental disclosures for 131 firms sampled from the United States. Nevertheless, Patten (2002) used the amount of size-adjusted toxics based on the Toxics Release Inventory (TRI) of the US EPA as a proxy for performance. He however asserted that the lack of significant relationship found between the two elements by other studies may be attributed to the measure of performance used in those studies.

In a later study by Clarkson et al. (2008), contrary to the findings of Patten (2002), they reported a positive relationship between environmental performance and environmental disclosures. However, the study focused on 191 firms sampled from the United States, with the proxy for environmental performance being environmental performance data from the TRI database. Although the context of study and the proxy for measuring environmental performance was similar to that of Patten (2002), the two studies reported opposing findings. Unlike Patten (2002) whose disclosure index was based on the index developed by Wiseman (1982), Clarkson et al. (2008) developed a disclosure index in line with the disclosure requirements of the Global Reporting Initiative (GRI) guidelines. The findings of their study support the predictions of the signaling theory.

In their study, Bewley and Li (2000) also examined the factors that determine the level of environmental disclosures by Canadian firms. They considered 188 firms in the Canadian manufacturing industries in the 1993 fiscal year. To achieve the objectives of the study, the

annual reports of these firms were content-analysed using the Wiseman (1982) index. In line with the view of Fontana et al. (2015) about how environmental performance is assessed, they proxied environmental performance of the sampled firms by their pollution propensity. The study finds a negative relationship between environmental disclosures of firms and their environmental performance. The study thus concludes that firms that have more political exposure, higher pollution propensity, and more news media coverage of their environmental exposure are more likely to disclose general environmental information. To this end, the study predicts that environmental disclosures are used by firms as legitimization tools.

On the contrary, Al-Tuwaijri et al. (2004) found a positive relationship between environmental performance and environmental disclosure when they studied the relationship that exists between environmental disclosure, environmental performance, and economic performance using a simultaneous equations approach. They used the TRI as a proxy for environmental performance. The 1994 annual reports of 198 environmentally exposed firms listed on the Investor Responsibility Research Centre's (IRRC) directory were content-analysed to determine the environmental disclosure score of the firms. They, therefore, concluded that better environmental performance is significantly associated with more extensive quantifiable environmental disclosures of specific pollution measures and occurrences. The study was underpinned by the discretionary disclosure theory. The predictions of the theory are in line with the predictions of the signalling theory.

However, the performance rating tools developed for assessing environmental performance in the context of developing economies have not been used as proxies for assessing the nexus between the level of environmental disclosures and environmental performance of firms.

The use of different proxies and/or the same proxy for environmental performance in different or similar contexts of study has seen the report of varying conclusions with regards to the relationship that exists between the level of environmental disclosures and environmental performance. This supports the assertion made by Dragomir (2012) that the use of different proxies for environmental performance accounts for one of the reasons for the varying findings by prior studies. Based on this assertion, coupled with the non-existence of studies that proxy environmental performance by any of the environmental performance rating tools developed for use in the context of developing economies, there is the need to assess the relationship between environmental performance and environmental disclosures, given the existence and use of the AKOBEN and its peculiar focus on mining and manufacturing companies in Ghana. The evaluation of the AKOBEN to ascertain whether or not it is a comprehensive tool for the assessment of environmental performance is also key.

1.3 RESEARCH OBJECTIVES

The study has a four-fold objective. These objectives are outlined below:

1. To evaluate the AKOBEN as a tool for assessing environmental performance.
2. To assess the level of environmental disclosures of mining and manufacturing companies in Ghana.
3. To assess the environmental performance of mining and manufacturing companies in Ghana based on the industry.
4. To examine the relationship between environmental disclosures and environmental performance of mining and manufacturing companies in Ghana.

1.4 RESEARCH QUESTIONS

To meet the objectives of the study, the following questions were addressed:

1. Is the AKOBEN a comprehensive tool for measuring environmental performance?
2. Is there a difference in the level of environmental disclosures of mining and manufacturing companies in Ghana?
3. Is there a difference in the level of environmental performance of mining and manufacturing companies in Ghana?
4. Do organizations that are poor environmental performers make more environmental disclosures than better environmental performers?

1.5 SIGNIFICANCE OF THE STUDY

The study holds relevance for literature, policy, and practice. Considering the growing concern for corporate environmental accountability, the need for an assessment of whether or not firms' environmental performance influences their environmental disclosures cannot be overemphasized. Thus, as a contribution to literature, the study adds to the existing body of knowledge on the effect of environmental performance on environmental disclosures of firms in their corporate annual reports. Studies in this area are not sufficient. Considering the difference in the legal and institutional framework that exists in Ghana as a developing country, relative to that of other developed countries, the findings of the study provides a reference point for other researchers for further studies in this area.

The study's relevance to policy lies in the use of its findings, conclusions, and recommendations by EPA in ensuring that its performance rating tool is comprehensive enough, taking into consideration the specific contextual and cultural issues. An improvement in the AKOBEN will aid the EPA in the exercise of its environmental management and governance function.

To practice, the findings of the study provide management with information on the level of environmental performance of companies based on the environmental performance rating tool, and how that performance level tends to influence their level of corporate environmental disclosures. This will inform the decision of practitioners to align their level of environmental disclosures with that of other companies within their industry.

1.6 SCOPE OF STUDY

The focus of the environmental performance rating tool is on the mining and manufacturing firms. As a result of this, the study focuses on the mining and manufacturing firms in Ghana. Thus, the study assesses the effect of the environmental performance of mining and manufacturing firms in Ghana on their level of environmental disclosures.

1.7 CHAPTER DISPOSITION

The study is structured into five main chapters. The first chapter of the study gives an introduction to the study. This comprises a discussion on the research background, the motivation for the study, the research objectives, questions, and the significance of the study. Chapter two presents a review of available literature on the topic. It also discusses the underpinning theories and the conceptual framework of the study.

Chapter three presents the details of the methodology to be used to achieve the objectives of the study. The results of the study are presented and discussed in chapter four, with the final chapter providing a summary of the findings, conclusions, and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

This chapter reviews existing literature on environmental performance ratings, as well as corporate environmental performance and environmental disclosures. It further provides a discussion of the theories underpinning the relationship between environmental performance and environmental disclosures. The chapter is sectionalized into three main parts namely the theoretical review and hypothesis development, empirical review, and the conceptual framework. The empirical review provides a discussion of the existing research literature whereas the theoretical review provides the theoretical justification for the study. The section on the conceptual framework discusses how the theoretical framework and empirical literature combines to support and inform the current study.

2.2 THEORETICAL REVIEW & HYPOTHESIS DEVELOPMENT

This section provides a discussion of the theories that underpin the study. Mostly, legitimacy and signalling theories are separately used to explain the link between firms' environmental disclosures in their corporate annual reports and environmental performance (see O'Donovan, 2002; Deegan, 2006; Clarkson, et al., 2008; Huang & Kung, 2010; Sullivan & Gouldson, 2012; Hahn, Pinkse, Preuss, & Figge, 2015). This study, however, adopts a test of the competing predictions of the two (2) theories as an explanation to the relationship between corporate environmental performance and environmental disclosures.

2.2.1 Legitimacy Theory

This theory posits that for the company to have a right of existence, it must perceive its values in coherence with the expectations of the society in which it operates (Magness, 2006; Cho, et al., 2012; Shehata, 2014). Thus, based on this theory, the relationship between the firm and the society is regarded as a social contract. This theory describes firms as part of the social

system, and as such influence and are influenced by this social system. Thus, when firms demonstrate actions that contradict the norms of the society, they would have their image as a legitimate business threatened. The legitimacy theory, therefore, explains what kind of information firms disclose, why such disclosures are made, and how these disclosures are made (Magness, 2006). Most corporate organizations have been found to report on their environmentally-related activities mainly to legitimize their activities (Cho, 2009; Kamal & Deegan, 2013).

Due to the link between the legitimacy of a company and the perception of the society about the firm, it is imperative that management makes disclosures that will positively influence the opinion of the society about the firm (Cormier & Gordon, 2001). Thus, making environmental disclosures in firms' corporate annual report serves as a means to legitimize corporate bodies (Lightstone & Driscoll, 2008).

Cho et al. (2012) assert that firms use environmental disclosures as a management tool to attain legitimacy. The rationale for the disclosure of environmentally-related issues is thus seen as a tool for managing social and political pressures that are faced by the firms and their accompanying risks (Cho, Patten, & Roberts, 2006; Patten 2002; Deegan, 2002; Cho et al., 2006; Cho & Patten 2007; Guidry & Patten 2012). Bad environmental performers tend to face more of such pressures and its accompanying risks. Thus, the theory further posits that bad environmental performers tend to disclose more environmental information as a means of offsetting the public pressures that arise from their poor environmental performance. It thus envisages that companies who have their legitimacy threatened and face greater public pressure tend to disclose more environmentally-related issues as a way to manage their legitimacy crisis.

In line with the legitimacy theory, de Villiers and van Staden (2006) found a negative relationship between the level of environmental disclosures and environmental performance. They content-analysed the annual reports of the top-100 industrial companies and all the mining companies in South Africa over a 9-year period (1994 to 2002). Similarly, Cho and Patten's (2007) study found a negative relationship between the level of environmental disclosures and environmental performance. The study used firms that can be matched in terms of their sizes, environmental sensitivity, and environmental performance to test whether or not there exists differences in firms' environmental disclosure that are monetary and non-monetary non-litigation. Both studies measured environmental performance using KLD Research and Analytics, Inc. Global Sustainability Index. They therefore concluded that firms use corporate environmental disclosures as tools of legitimacy. Thus, based on the findings of these studies and the predictions of legitimacy theory, the following hypothesis is proposed;

H1: There is a negative relationship between corporate environmental disclosures and environmental performance

2.2.2 Signalling Theory

The signalling theory was developed to provide a clarification on the existence of information asymmetry in the labour market (Spence, 1973). The theory has, however, been used to explain voluntary corporate disclosures. As an economics-based voluntary disclosure theory (Healy & Palepu, 2001), the signalling theory posits that in instances where there exists an asymmetric distribution of information, management of firms makes voluntary disclosure mainly to distinguish themselves from their peers when the benefits of such disclosures far outweigh the related disclosure costs.

Researchers have used the signalling theory, not only as an explanation to the disclosure of voluntary financial information, but also to explain the rationale for the disclosure of non-financial information, including environmental information, voluntarily (Bewley & Li, 2000;

Clarkson et al., 2008). These researchers posit that better environmental performers tend to disclose more environmental information as a way of revealing their nature as better performers (Clarkson, Fang, Li, & Richardson, 2013; Plumlee, Brown, Hayes, & Marshall, 2015; de Villiers & Marques, 2016).

The theory tends to suggest that firms would not choose to be “responsive actors”, but rather would use their environmental disclosures as an instrument to communicate, create and enhance their reputations (Hasseldine, Salama, & Toms, 2005). This is further echoed by Clarkson et al. (2008), who posit that firms that are better environmental performers will more likely than not provide information in the form of corporate environmental disclosures, to their stakeholders to signal them of their achievements.

Thus, for good environmental performers, more environmental disclosures will be made to signal their type. Such disclosures are seen as a way of signalling stakeholders of their positive environmental performance. This provides a competitive edge for such firms and enhances their corporate reputation (Mahoney, Thorne, Cecil, & LaGore, 2013; Lys, Naughton, & Wang, 2015). This implies that companies may choose to make corporate environmental disclosures to signal its shareholders that they are better environmental performers.

Al-Tuwaijri et al. (2004), in their analysis of how the overall strategies of management jointly affect corporate environmental disclosures, environmental performance, and economic performance, found a positive relationship between environmental performance and environmental disclosure. As a measure of environmental performance, the study used the ratio of toxic waste recycled to total toxic waste generated. Based on the 198 sampled firms included in the 1994 IRRC Environmental Profiles Directory, the study concluded that better

environmental performance is significantly associated with the level of environmental disclosures. Thus, in line with the predictions of the signalling theory, the study concludes that good environmental performers tend to make more environmental disclosures as a way of informing key stakeholders of their strategies and achievements. When environmental performance is better, the perceived benefits of making more environmental disclosures are seen to be higher and the perceived related cost such as risk of legal exposure is lower; thus, firms are motivated to disclose more environmentally-related issues (Aerts & Cormier, 2009). The conclusion drawn is consistent with that of Clarkson et al. (2008).

Consistent with the predictions of the signalling theory, Cho et al. (2010) in their study also found a positive relationship between corporate environmental performance and environmental disclosures. The study focused on a cross-sectional sample of 190 US firms in the 2002 fiscal year. The 10-K annual reports of these companies were content-analyzed to determine their environmental disclosure scores. As a proxy for environmental performance of the sampled firms, the study used scores from the KLD GSI ratings. Following this reasoning, this hypothesis below is proposed;

H2: There is a positive relationship between corporate environmental disclosures and environmental performance

2.3 EMPIRICAL REVIEW

This section presents a review of empirical studies on the subject matter under study. Specifically, it provides a review of literature on environmental disclosures, environmental performance, and the relationship between environmental disclosures and environmental performance.

2.3.1 Corporate Disclosures

Owusu-Ansah (1996:608) as cited by Shehata (2014) defines disclosure as “the communication of economic information, whether financial or nonfinancial, quantitative or otherwise concerning a company’s financial position and performance”. Corporate disclosures refer to the communication of information by internal stakeholders of an organization to its external stakeholders (Farvaque, Refait-Alexandre, & Saïdane, 2011). Corporate disclosures are very useful in ensuring that information asymmetry and its accompanying issues are addressed. Corporate disclosures are also seen to provide protection for investors by allowing them to know what goes on in the company. It is regarded as the most important means by which management of a company communicates its performance, as well as governance-related issues to current and prospective investors (Healy & Palepu, 2001). Such disclosures are mostly made through regulated reports, key among them being the corporate annual report. The disclosures made by organizations assist the end users of such information in their decision-making. The benefits of corporate disclosures, according to Farvaque et al. (2011) include, but not limited to, the creation of shareholder value, improvement in information held by third parties, and better governance and a fall in agency costs.

Generally, two types of corporate disclosures are discussed in the literature. They are mandatory and voluntary corporate disclosures (Farvaque et al., 2011). Being it voluntary or mandatory, disclosures could be economic, financial, social, environmental, legal, etc. Mandatory disclosures are disclosures made by organizations in line with legislative or regulatory requirements (Farvaque et al., 2011). They are made mainly in compliance with legal and regulatory requirements. Voluntary disclosures, on the other hand are made by the management of a company beyond legal and regulatory requirements because such information is deemed relevant to the users of the firms’ annual reports. They are “a measure of self-regulation or a response to the expectations of stakeholders and civil society for more

disclosure” (Chandler, 1997 as cited in Farvaque et al., 2011: p. 8). They are disclosures that are made by companies beyond the compulsory requirements. Such disclosures are made to complement those made by a company as a way of meeting its compulsory disclosure requirements. Mostly, however, such disclosures are made as a way to communicate and portray a better image of the company in the sight of investors and the society at large. The commonly discussed forms of corporate voluntary disclosures are the social and environmental disclosures. This study, however, focuses on environmental disclosure of firms.

2.3.1.1 Environmental Disclosures

Huang and Kung (2010) describe corporate environmental disclosure as a means for firms to exhibit their social responsibility and obligation to meet the demands of the various stakeholder groups. Erdogan, Sparrowe, Liden, and Dunegan (2004) state that organizations fulfil their responsibility of being accountable through reporting.

Corporate environmental disclosures and its drivers have received much attention in literature (see Cho & Patten, 2007; da Silva Monteiro & Aibar-Guzmán, 2010; Lewis, Walls, & Dowell, 2014). There has been a report of an increased level of public awareness and concern for the negative effects of the activities of firms on the environment (Ahmad & Sulaiman, 2004). It may therefore be the case that this change in public awareness of such issues may prompt a response from firms by making more environmental disclosures in their annual reports. This point is posited by Wilmshurst and Frost (2000). They stated that “if the members of the community are becoming more interested in the environmental impact of companies, it is likely that the senior management will be called on to explain the company’s activities affecting the environment. Such accessibility may be promoted through disclosure within the annual report” (p. 12).

These disclosures are fundamentally supposed to provide information to market investors (Lang & Lundholm 1993). However, they may be used as a tool to lessen the firms' political risk and social pressure exposure. The same has also been used over time by firms as a tool to manage the stakeholders' impression about the firms (Guidry & Patten 2012).

2.3.1.1.1 Determinants of Environmental Disclosures

Numerous studies have discussed the factors that influence the level of environmental disclosures of firms (see Fifka, 2012; Fifka, 2013). Notable among these factors are the industry type, firm age, firm size, capital intensity, leverage, and profitability.

2.3.1.1.1.1 Industry Type

The type of industry a firm operates in has been found to be one of the determinants of its level of environmental disclosures (Cormier & Magnan, 2003; Campbell et al., 2003; Cho & Patten, 2007; Brammer & Pavelin, 2006, 2008; Clarkson et al., 2008; da Silva Monteiro & Aibar-Guzmán, 2010; Zeng, Xu, Yin, & Tam, 2012; Fifka, 2013; Braam, de Weerd, Hauck, & Huijbregts, 2016). Industry type, as used here indicates the sensitivity of the industry in which firms operate. Generally, a positive relationship has been found between a firm's industry sensitivity and its level of environmental disclosures. This indicates that firms that operate in more sensitive industries are expected to make more environmental disclosures than those operating in less sensitive industries (Campbell et al., 2003; Cho & Patten, 2007; Brammer & Pavelin, 2006, 2008; Zeng et al., 2012). This is mainly because such companies, because of the nature of their industry and the kind of activities undertaken, are subject to strict environmental laws and regulations. As such, they have the responsibility to make more disclosures in order to assure stakeholders that they have concern for the environment in which they operate (Cormier & Magnan, 2003; Cho & Patten, 2007; Clarkson et al., 2008). Also, firms that operate in more environmentally sensitive industries are subject to a lot of social and political pressures. As a way to manage these pressures and legitimize their stay

and operation in the society, they make more environmental disclosures (Cho & Patten, 2007; Clarkson et al., 2008).

2.3.1.1.1.2 Firm Age

The age of firms, in terms of how long the firms have been in existence, has been found to influence their level of environmental disclosures (Haniffa and Cooke, 2002; Camfferman & Cooke, 2002; Aerts, Cormier, & Magnan, 2006; Alsaeed, 2006; Aerts et al., 2008; Soliman, 2013). The results of studies on the effect of firm age on firms' level of environmental disclosures have been mixed. Older firms may have an improved level of financial reporting and employees with more expertise. As such, older firms will, more likely than not, be engaged in making more environmental disclosures.

2.3.1.1.1.3 Firm Size

Firm size has predominantly been used to explain the level of environmental disclosures of firms (Patten, 2002; Haniffa & Cooke, 2005; Brammer and Pavelin, 2006; Stanny & Ely, 2008; Clarkson et al., 2008). Most of these studies report that the size of a firm positively influences its level of disclosures. This indicates that larger firms disclose more environmentally-related information than smaller firms. One of explanations for such a relationship is that since larger firms undertake a lot of activities, they tend to have more effects on the environment in which they operate. Haniffa and Cooke (2005: p. 402) suggest that such relationship exists because the "*larger companies are also subject to greater scrutiny by various groups in society and therefore would be under greater pressure to disclose their social activities to legitimize their business*". da Silva Monteiro and Aibar-Guzmán (2010) also argue voluntarily disclosing environmentally-related information comes at a cost, and larger firms are mostly in the position to bear such costs than their smaller counterparts, hence the positive relationship.

2.3.1.1.1.4 Capital Intensity

The effect of capital intensity on the level of environmental has received much attention in the literature (Clarkson et al., 2008; Silva-Gao, 2011; Clarkson, Overell, & Chapple, 2011; Cho et al., 2012). Capital intensity relates to the firm's investment in capital assets. Generally, capital intensity has been found to be a negative determinant of firms' level of environmental disclosures. This strand of empirical studies suggest that as firms invest in new capital assets, such assets are more *“likely to employ cleaner and less polluting technologies, a fact that such firms are likely to inform stakeholders of”* (Clarkson et al., 2011 : p. 38).

2.3.1.1.1.5 Leverage

The level of gearing of a firm influences its level of corporate environmental disclosures. Studies have generally reported mixed results on the effect of firms' level of gearing on their level of environmental disclosures (Cormier et al., 2005; Barako, Hancock, & Izan, 2006; Aerts & Cormier, 2009; Adelopo, 2011; Lan et al., 2013). Firms with lower level of gearing are generally expected to make more environmental disclosures as *“a precautionary measure to ensure proper assessment of its financial risk level”* (Ahmad, Hassan & Mohammad, 2003: p. 75).

2.3.1.1.1.6 Profitability

Studies on the effect of the profitability of firms on their level of environmental disclosures have found varying results. Some studies have found the profitability of firms to positively influence its level of environmental disclosures (Cormier & Magnan, 2003; Haniffa & Cooke, 2005; Tagesson, Blank, Broberg, & Collin, 2009; Liu & Anbumozhi, 2009; Clarkson et al., 2011) while others have found a negative relationship between the two variables (Brammer & Pavelin, 2008; da Silva Monteiro & Aibar-Guzmán, 2010). Studies that found the profitability as a positive determinant of the level of environmental disclosures indicate that more profitable firms are mostly in the position to bear the extra voluntary disclosure costs that come with making environmental disclosures than less profitable firms. On the other hand,

studies that found a negative relationship between the two variables assert that less profitable firms are more motivated to make more environmental disclosures than more profitable firms in order to justify the level of profitability. These environmental disclosures are used by management of such firms as a legitimization tool in order to ‘remain in the good books of shareholders’.

2.3.2 Environmental Performance

The performance of firms is generally seen as a key factor in investors’ decision to invest in a company or not. Due to the high relevance of firms’ performance, managers continuously strive to improve upon the performance of their respective companies. The measure of a firms’ performance provides an explanation of how successful the firm has been over a specified period of time. However, there is no specific performance metric that can provide the measurement for every performance area (Al-Matari, Al-Swidi, & Fadzil, 2014).

Generally, measures of performance can be classified into financial and non-financial performance measures. Both measures are relevant in the management of an organization. The financial measures help in the assessment of the profitability of firms, whereas the non-financial measures help assess other key area of firm performance like customer satisfaction, customer retention, employee satisfaction, environmental impact and performance etc. (Whittington & Delaney, 2011).

Environmental performance as stated earlier refers to the “*measurable results of an organization’s management of its environmental aspects*” (ISO 14004, 2004, as cited by Standard, 2004: p.2). Some firms have doubts about whether improvement in their environmental performance really pays off. This is mainly because achieving such improved level of environmental performance has its own accompanying costs like investment in environmental management systems and technology. This may tend to reduce the levels of

reported profits; thus, firms' unwillingness to adequately allocate resources into achieving better environmental performance measures (Li, Zhao, Sun, & Yin, 2016).

Klassen and McLaughlin (1996) in their study examined the relationship that exists between environmental performance and financial performance of firms. They concluded that positive environmental performance positively affects the financial performance of firms. Dowell, Hart, and Yeung (2000) also found a positive relationship between firms' environmental performance and their financial performance, as measured by Tobin's Q. The study used a sample of 89 multinational firms over a four-year period (1994 to 1997). Their findings were confirmed in a later study by King and Lenox (2001).

Clarkson, Li, Richardson, and Vasvari (2011) examined the factors that cause firms to be proactive in the development of environmental strategies, and whether or not such strategies improve the financial fortunes of firms. Based on a longitudinal data spanning 14 years (1990-2003) for most polluting industries in the US, the study found that better level of financial performance tends to improve the level of firms' environmental performance in financial years subsequent to the year such improved level of financial performance is reported. The study concludes that there exists a robust positive relationship between financial performance and corporate environmental performance. This provides an indication of relevance of superior environmental performance by firms in their quest to achieve their goals.

2.4 ENVIRONMENTAL PERFORMANCE RATING TOOLS

Environmental performance rating tools are tools designed to provide an assessment of the environmental performance of companies. These tools are mostly developed and implementation on a national basis, with a few private rating companies doing same. These tools have been found to make an impact in achieving a reduction in the level of pollution in

the respective countries, thus, encouraging more countries to learn and test this strategy for controlling pollution (Gozun, Laplante, & Wang, 2011). In clear terms, the use of these tools involves releasing information on how a company whose activities will, more likely than not, result in the pollution of the environment in an understandable manner to a varied number of stakeholders. Mostly designed and implemented by environmental regulatory bodies in countries, the basic tenet underlying the design and implementation of these rating tools is that with the public disclosure of such information these companies will be concerned about their reputation in the public and the society at large, and will do the 'right thing', including earning better environmental performance rating score, to ensure that their reputations do not get tarnished. In the case of Ghana, the EPA is the environmental regulatory body charged with this responsibility.

The environmental performance rating tools have seen a growing level of popularity over time. The growing popularity arises from the existing evidence that indicates that environmental performance ratings and disclosure programmes have caused a fall in emissions in North America, Europe, and Southeast Asia, as well as its perceived lower related cost as a regulatory mechanism (Tietenberg & Wheeler, 2001; Wang, Bi, Wheeler, Wang, Cao, Lu, & Wang, 2004). These tools mostly comprise of two related components namely the performance rating and the public disclosure components. In their design, the environmental performance rating tools must clearly identify the specific environmental issues to target (like water quality, toxic release, air quality, etc.), with justifications provided for the selection of those issues (Gozun et al., 2011). In this study, however, the focus is on the evaluation of the AKOBEN against the KLD GSI, Indonesia's PROPER, and China's GreenWatch.

2.4.1 KLD Research and Analytics Inc. Global Sustainability Index

KLD Research and Analytics Inc. Global Sustainability Index is a social and environmental performance ratings that has been independently developed to cover a range of dimensions that are stakeholder-related. KLD has, since 1994, maintained a database that rates hundreds of companies that trade on the US stock exchanges. The rating provides a measure for social and environmental performance that can be quantified (Hillman & Keim, 2001).

The rating mainly assesses the performance of the firms based on five environmental, social, and governance factors namely environment, community & society, employees & supply chain, customers, and governance & ethics (KLD Research & Analytics, Inc., 2007). Scores are then awarded to the firms that have demonstrated some level of commitment to environmental and social issues. The ratings aid socially responsible investors in their investment decisions. The index is however sector neutral and its development was based on rigorous standards of sustainability.

The KLD GSI assesses companies that make up for the top 75% of market capitalization of each sector mainly in twenty-three developed countries. It analyzes firms' environmental performance by assessing the utilization of resources, environmental management, compliance with applicable laws and regulations, planning and impact assessment, and emissions of each firm (KLD Research and Analytics, Inc., 2003). It basically considers three (3) pillars, with ten (10) main themes. These are presented in the table below:

Table 2.1: KLD GSI Pillars & Themes

Pillars	Themes
Environment	Climate Change
	Natural Resources
	Pollution & Waste
	Environmental Opportunities
Social	Human Capital
	Product Liability
	Stakeholder Opposition
	Social Opportunities
Governance	Corporate Governance
	Corporate Behaviour

2.4.2 China GreenWatch Program

China, in their quest to mitigate the negative effects of the action of firms on the environment launched and piloted an environmental performance rating and disclosure programme in 2000 (Wang et al., 2004). The GreenWatch program was adapted from Indonesia's PROPER. Launched by China's State Environmental Protection Agency (SEPA), it provides ratings for firms' environmental performance using a five-code colour scheme (green, blue, yellow, red and black) ranging from best to worst environmental performers (Wang et al., 2004).

The main yardstick for the rating is emission by firms as well as China's discharge standards that specify effluent concentration limits. Red is awarded to firms that violate any of the standards while black is awarded to firms that violate more than 60% of inspections. Generally, red and black denote inferior environmental performance. China's load-based

emission and discharge standards are the secondary benchmarks used in assessing environmental performance of firms based on GreenWatch. Thus, firms that meet all the main benchmarks but are in violation of the secondary benchmarks are awarded yellow. Blue and green colours denote superior environmental performance (Jin et al., 2010).

The rating, at the pilot stage, was implemented in the assessment of the environmental performance of companies in two municipalities and later extended to twenty-two municipalities in 2005. GreenWatch, as a complement to other conventional regulations in China has provided as aid in sustaining the rate at which total emissions grow relative to the industrial growth rate in the country (Wang et al., 2004).

2.4.3 Indonesia's PROPER

Indonesia National Pollution Control Agency (BAPEDAL), with the help of the World Bank, Canadian and Australian development agencies, and USAEP/USAID, pioneered environmental performance ratings and disclosure programmes in developing countries in 1995 with the launch of Program for Pollution Control, Evaluation and Rating (PROPER). This was an initiative to improve the environmental performance of companies operating within the country. As a regulatory tool, PROPER seeks to promote compliance with pollution control regulations among firms operating in Indonesia. PROPER is made up of two components namely performance rating and a public disclosure components. The programme mainly targeted water pollution (López, Sterner, & Afsah, 2009). The rating, at its inception, was used to assess 187 plan facilities.

The introduction of PROPER has had a significant influence on the compliance level of factories in terms of environmental performance by moving them from the position of noncompliance to compliance. It has also increased the level of awareness of environmentally-related issues (Torres).

PROPER uses a five-colour code (black, red, blue, green, and gold) to rate the environmental status of each firm that is assessed. Black was awarded to firms that did not make any effort to control pollution whereas red was awarded to those who made some effort to control pollution but failed to meet legal standards and did not report sufficiently. Firms that met the legal standards, as well as, reasonably reported in a frequent manner were awarded blue. Green was awarded to firms that proactively reduced pollution below the legally required standards, as well as undertook good maintenance of equipment and frequently reported on their environmentally-related issues. Gold was also awarded to firms that were able to meet international standards of environmental excellence. This also included the usage of clean production technology, undertaking pollution preventing activities, and minimizing waste (López et al., 2009). The five-colour code is summarized in the figure below:

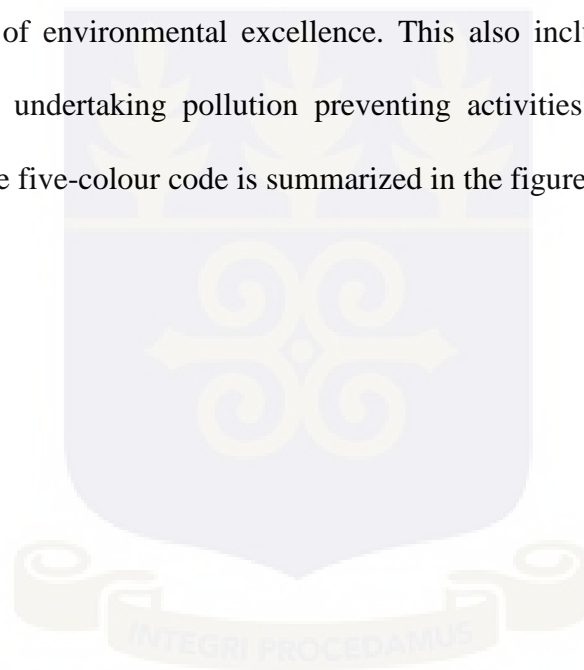


Table 2.2 PROPER Performance Rating Colours

Compliance Status	Rating	Performance Level	Performance Criteria
In Compliance	GOLD	Excellent	All requirements of Green , plus similar levels of pollution control for air and hazardous waste. Polluter reaches high international standards by making extensive use of clean technology, waste minimization pollution prevention, recycling, etc.
	GREEN	Good	Pollution level is lower than the discharge standards by at least 50%. Polluter also ensures proper disposal of sludge; good housekeeping; accurate pollution records; and reasonable maintenance of the waste water treatment system.
	BLUE	Adequate	Polluter only applies effort sufficient to meet the standard
Not in Compliance	RED	Poor	Polluter makes some effort to control pollution, but not sufficiently to achieve compliance.
	BLACK	Very Poor	Polluter makes no effort to control pollution, or causes serious environmental damage.

Source: Team, Afsah, Laplante, & Wheeler (1995)

2.4.4 Summary of KLD GSI, China's GreenWatch, and Indonesia' PROPER

This section summarizes the similarities and differences that exist among the environmental performance rating tools discussed above.

Table 2.3: Summary of Environmental Performance Rating Tools

	KLD GSI	China's GreenWatch	Indonesia's PROPER
Legal Backing	X	√	√
Components			
Rating Component	√	√	√
Disclosure Component	√	√	√
Rating Scheme	Use Rating Scale ranging from AAA to CCC	Uses a five-colour rating scale	Uses a five-colour rating scale
Factors Used for Assessment			
Environment	√	√	√
Community and Society	√	x	x
Employee and Supply Chain	√	x	x
Customers	√	x	x
Governance and Ethics	√	x	x
	KLD GSI	China's GreenWatch	Indonesia's PROPER
Industries Assessed	Industries that make up 75% of the market capitalisation of each sector in 23 developed countries	Industrial Sector in China	Industrial Sector in Indonesia

2.5 RELATIONSHIP BETWEEN ENVIRONMENTAL DISCLOSURES AND ENVIRONMENTAL PERFORMANCE

Prior empirical studies on nexus between corporate environmental disclosures and environmental performance have reported mixed results. Some also indicates that there exists a performance-disclosure gap (Font at al., 2013). Patten (2002) found an inverse relationship between environmental disclosure and environmental performance. The study quantified the environmental performance using the amount of toxics released based on the 1998 TRI database. This suggests that bad performing firms in terms of environmental performance have the incentive to disclose more environmental information disclosures (Hughes et al., 2001).

In their study, Li et al. (2016) found a nonlinear relationship between corporate environmental performance and environmental disclosure. They explored the relationships that exist among corporate environmental performance, environmental disclosures and financial performance of firms in China. With a sample of 950 observations from 475 Chinese listed companies between 2013 and 2014 financial years, they concluded that Chinese firms are not motivated to make more environmental disclosures or improve their environmental performance, and suggested the need for mandatory environmental disclosure requirements.

Guidry and Patten (2012) found a similar relationship in their study. Based on a review of thirteen academic literature on environmental disclosures, the study found that even with there exists a negative relation between the corporate environmental disclosure and corporate environmental performance. With the introduction of financial control variables that are aligned with the voluntary disclosure theory, the authors found that the nexus between environmental disclosures and environmental performance is a negative one.

In their study, Clarkson et al. (2008) tested the competing predictions of the possible relationship that exists between firms' environmental performance and their level of environmental disclosures. The study sampled 191 firms from the five most polluting industries in the US. The sustainability reports of these firms and/or the sections of their discussions on their corporate websites and social responsibility reports that conform to the former were content-analysed to determine the level of environmental disclosures by the sampled firms. In assessing the environmental performance of sampled firms, the study developed an environmental performance proxy based on the actual pollution discharge data from the TRI database. This proxy was developed by aggregating the toxic releases and the toxic waste treated for each of the sampled firms for the study period (2003). The study found a positive relationship between environmental performance, as proxied by US TRI, and environmental disclosures of firms. They, thus, concluded that superior environmental performers are more forthcoming with environmental disclosures than poor environmental performers.

In a later study, Clarkson et al. (2013) confirmed the existence of a positive relationship between the environmental disclosures and environmental performance. Based on a sample of one hundred and ninety-five firm-year observations of public US companies, the study found statistically significant positive relationship between environmental performance of the sampled firms, as proxied by the TRI, and their environmental disclosures. The sampled firms operated in the Metals and Mining, Pulp and Paper, Oil and Gas, Chemicals, and Utilities industries.

Hummel and Schlick (2016) in their study of the relationship between sustainability performance and sustainability disclosure of a sample of 195 European companies located in Italy, France, Switzerland, Spain, Sweden, Germany, or the United Kingdom, sought to

reconcile the propositions of the voluntary disclosure theory and legitimacy theory. The study found a positive relationship between sustainability performance and sustainability disclosure. They concluded that superior sustainability performers make high-quality sustainability disclosures to signal stakeholders of their performance. They added that poor sustainability performers provide low-quality sustainability information as a disguise to their poor sustainability performance, while maintaining their legitimacy at the same time. As a proxy for environmental performance, the author developed an environmental performance measure based on four environmental (energy consumption, water withdrawal, greenhouse gas emissions, and total weight of waste) and four social (employee turnover, lost time incident rate, employee training, share of women in the highest corporate bodies) performance indicators.

Iatridis (2013) in his study assessed how environmental performance, corporate governance, and value relevance influence environmental disclosures of firms listed on Bursa Malaysia (Kuala Lumpur Stock Exchange). The study covered the period of 2005 to 2011, based on data collected from corporate annual reports and company websites. With a sample of 529 listed environmentally-sensitive firms in Malaysia, the study found that corporate environmental disclosure is positively related to environmental performance. As a measure of environmental performance, the study used the ratio of the total amount of hazardous waste produced by the firms to their respective net sales.

Cong and Freedman (2011) in their study found no negative relationship between environmental performance and environmental disclosure. The study examined the relationships that exist between good corporate governance practices, environmental disclosures and environmental performance. The study sampled the 50 top firms that had Gov-Scores for 2003 to 2005 financial years, and have prepared environmental, social

responsibility, or sustainability reports throughout the study period. As a measure for environmental performance, the study used a risk-related metric that considers chemical release, toxicity, pollution pathway, and surrogate dose. The study concluded that firms are more likely to place emphasis on projecting their good image by making disclosures that are consistent to what society expects from them.

2.6 CONCEPTUAL FRAMEWORK

This section presents the conceptual framework upon which the study is based. It provides the narrative, as well as the diagrammatic representation of the relationships that exist among the variables of interest.

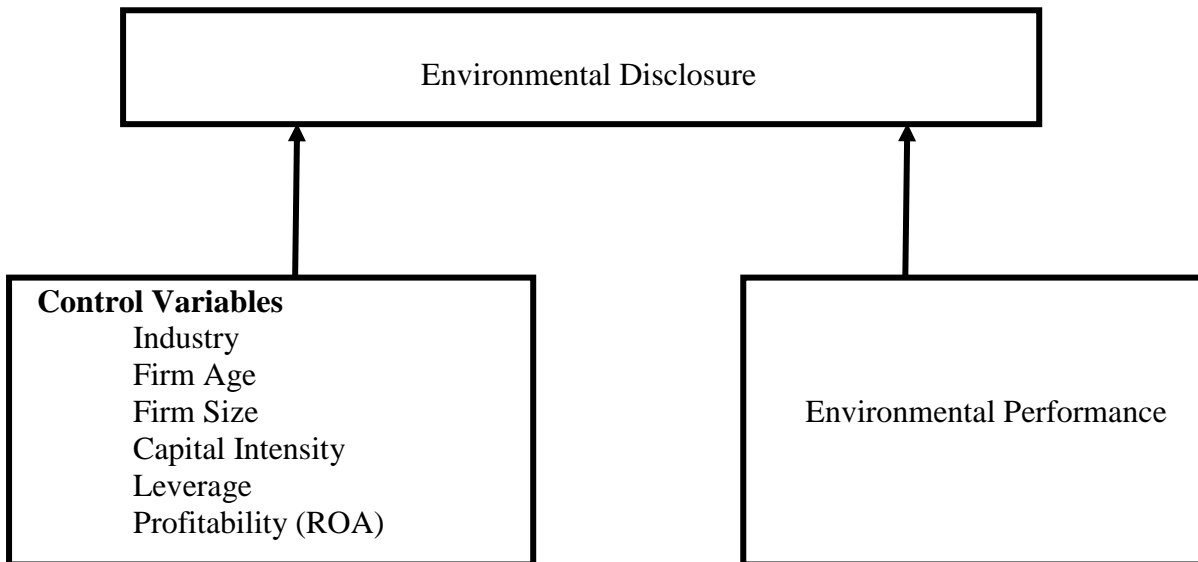
Drawing from the predictions of the legitimacy and signalling theories, there exists a possible relationship between corporate environmental performance and environmental disclosures. Several studies have reported a relationship between these two elements – environmental performance and environmental disclosures (see Al-Tuwaijri et al., 2004; de Villiers & van Staden, 2006; Clarkson et al., 2008; Cho, et al., 2010; Lyon & Maxwell, 2011; Guidry & Patten, 2012). Thus, this study predicts that environmental performance of a firm influences their level of environmental disclosures. This is shown in figure 2.1 below.

Prior studies have also reported that firm size, capital intensity, profitability, company age, leverage, and industry type are key determinants of the level of environmental disclosures of firms (see Haniffa & Cooke, 2002; Cho & Patten, 2007; Aerts et al., 2008; Clarkson et al., 2008; Aerts & Cormier, 2009; Morhardt, 2010; Cormier & Magnan, 2014). The study therefore includes these variables and predicts that they are also determinants of the level of environmental disclosures of firms.

Thus, the conceptual framework, from figure 2.1, indicates that firms' environmental performance, size, capital intensity, profitability (as proxied by ROA), leverage, industry, and age influences their level of environmental disclosures.



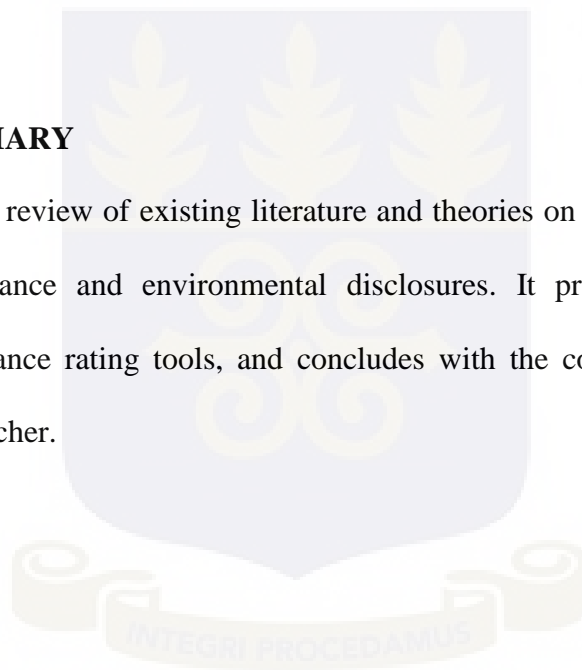
Figure 2.1 Conceptual Framework



Source: Author's own framework

2.7 CHAPTER SUMMARY

This chapter provides a review of existing literature and theories on the relationship between environmental performance and environmental disclosures. It provides a discussion on environmental performance rating tools, and concludes with the conceptual framework, as developed by the researcher.



CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter presents a description of the research methods and techniques to be used in order to achieve the objectives of the study. Research methodology refers mainly to the principles and ideas that serve as a basis for the strategies and procedures adopted for the study. The chapter provides a discussion on the research philosophy used, the research approach, and research design, as well as the methods for the collection and analysis of data mainly to achieve the objectives of the study.

3.2 RESEARCH PHILOSOPHY AND PARADIGM

Research philosophy, according to Mark, Philip, and Adrian (2009), refers to the belief about the way in which data about a phenomenon should be gathered, analyzed, and used. The research philosophy mainly deals with three aspects of knowledge creation: the source, the nature, and the development of knowledge. It reflects the significant assumptions that underlie a study and also serve as a basis for the selected research strategy and the methods chosen as part of that strategy.

According to Saunders, Lewis, and Thornhill (2009), there are four (4) research philosophies that describe how knowledge is developed. These philosophies include positivism, realism, interpretivism, and pragmatism. They are underlined by philosophical assumptions that direct action and thoughts (Krauss, 2005). They define what the researcher considers as relevant, by reflecting the significant assumptions that underlie a study.

The study was conducted from the positivist lens or viewpoint. The positivist research philosophy hinges on the basic tenet that “the researcher neither affects nor is affected by the subject of the research” (Remenyi, Williams, Money, & Swartz, 1998:33). This study adopts

the positivist research philosophy because knowledge of environmental performance and its influence on environmental disclosure is not subjective, but rather requires objectivity from the researcher. The researcher's choice of the positivism is also influenced by the objectives of the study, which is to predict the nexus between corporate environmental disclosures and environmental performance through the use of research approaches that are consistently rational and logical (Carson, Gilmore, Perry, & Gronhaug, 2001). This philosophy also helps in the generalization of the findings of the study through statistical possibility.

3.3 RESEARCH DESIGN AND APPROACH

Research design refers to the general plan that helps in providing answers to the research questions of a study in a systematic way. It indicates how the study will be carried out by the researcher. Creswell (2009) identifies three broad research designs namely qualitative, quantitative and mixed methods.

Quantitative research design stresses on quantification in the collection and analysis of data gathered (Bryman, 2012). It relates to providing explanation to occurrence or events through the collection of data that are numeric in nature and analyzed using mathematical tools or methods. It usually involves testing objective theories deductively through the examination of the relationship that exist among variables. These variables, when measured using specific instruments, are analyzed using statistical procedures (Creswell, 2009).

Qualitative research design, on the other hand places emphasis on words (rather than quantification) in the process of collecting and analyzing data (Bryman, 2012), whereas the mixed methods integrate both quantitative and qualitative research designs. Johnson, Onwuegbuzie, and Turner (2007) describes it as a research design that “*combines elements of qualitative and quantitative research designs (e.g., use of qualitative and quantitative*

viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration” (p.123).

Following from the discussions in the literature review, it is apparent that this research follows the quantitative research design. The quantitative research design obtained an unbalanced panel data on mining and manufacturing companies in Ghana over a four-year period. An unbalanced data is used (rather balanced panel) because of unavailability of some observations of the same unit in every time period.

The research approach serves as a link between a chosen research philosophy and the appropriate research methods used (Byrne, 2001). There are two (2) main research approaches, namely the inductive approach and the deductive approach (Saunders et al., 2009). The inductive approach also relates to collecting data and developing a theory out of the analysis of the data gathered. This approach suggests the need for ‘meticulous and objective observation and measurement, and the careful and accurate analysis of data to produce scientific discoveries’ (Blaikie, 2009: p. 102). The deductive approach involves developing and testing hypothesis based on a specified theory. This approach is based on the argument that ‘observations do not provide a reliable foundation for scientific theories’ (Blaikie, 2009: p. 102), and that all data collection is selective and also involves the explanation by the researcher, who then develops an appropriate logic.

The deductive research approach is adopted in explaining the causal relationships between environmental performance and environmental disclosures, and to test the hypothesis made. The adoption of this approach provides a sufficient basis for the generalisation of the conclusions drawn.

3.4 RESEARCH POPULATION AND SAMPLE

3.4.1 Population

Research population refers to all the cases of people, organizations, or institutions of interest to the researcher (Neuman, 2009). The study population comprises of all mining and manufacturing firms that subscribe to EPA's AKOBEN since the rating is used mainly to assess the environmental performance of mining and manufacturing firms in Ghana.

3.4.2 Sample and Sampling Technique

Neuman (2009) refers to sampling as the process of selecting a subset of the population for purposes of making observations or statistical inferences about the entire population. It ensures that cases are selected out of the population and examined in detail to learn from them to understand the much larger set of cases. Sampling is of high relevance, especially in situations where it is quite difficult, if not impracticable, to collect data on the entire target population.

There are two main types of sampling techniques namely probability and non-probability sampling. Probability sampling involves selecting randomly from the target population so that each unit in the population has an equal chance of being sampled (Bryman, 2012). Unlike probability sampling, in the case of non-probability sampling, all units of the target population do not have an equal chance of being sampled. This implies that some units in the target population have a more likely chance of being selected than others.

In this study, a non-probability sampling technique is used. The units of study are purposively sampled. Purposive sampling involves the use of the researcher's judgment to select units from the population that will enable the researcher to achieve the objectives of the study and answer the research questions (Saunders et al., 2009). The AKOBEN was launched in November, 2010. This saw the launch and public disclosure of the performance ratings of

mining and manufacturing firms in Ghana for the 2009 financial year. Thus, the sample for the study, therefore, comprises of mining and manufacturing firms that satisfy the following sampling criteria:

- the firm has been in existence from 2009 to 2012; and
- the firm has an environmental performance score based on the AKOBEN performance rating for those periods

The Environmental Protection Agency of Ghana has publicly disclosed the environmental performance ratings for 2009 to 2012 financial years. Based on this and the sampling criteria indicated above, a total forty-nine (49) manufacturing firms and eleven (11) mining firms are expected to be sampled for the study. However, the final sample for the study comprised of fifteen (15) manufacturing firms and ten (10) mining firms. This results in a final sample of twenty-five (25) firms over a four-year period, resulting in one hundred (100) firm-year observations.

The final sample selection is influenced by the availability of data for the study. Most of the firms that qualify to be sampled for the study are not public entities, and as such are not required by the Ghanaian laws to publish their annual reports. The researcher was therefore constrained as most of these firms were not willing to give out their annual reports for the study.

3.5 DATA COLLECTION PROCESS

3.5.1 Source of Data

The study mainly makes use of secondary data. The data needed for the study include corporate environmental disclosure scores and environmental performance ratings of the

sampled firms. The environmental disclosures of the sampled firms were sourced from the corporate annual reports of the various mining and manufacturing firms.

Also, data on the environmental performance rating of the sampled firms was sourced from the Environmental Protection Agency's (EPA) published environmental performance rating of the sampled firms. As the regulatory agency with the responsibility for assessing the environmental performance of firms, the EPA publishes the environmental performance rating mining and manufacturing firms in Ghana annually based on the AKOBEN.

To evaluate the AKOBEN, the rating criteria for other globally accepted environmental performance rating tools was sourced from the websites of the respective rating agencies. The KLD Research & Analytics' Global Sustainability Index was used as the benchmark for assessing the AKOBEN. The KLD GSI is selected based on its wide usage as well as its strengths from the use of a wide variety of performance indicators and enhanced measure for environmental performance (Hillman & Keim, 2001). With Ghana being a developing country, two environmental performance rating tools from the context of developing economies were also used as benchmarks – that is China's Green Watch Program and Indonesia's PROPER. These benchmarks were selected because of the similarities in the institutional frameworks that exist between Ghana, China, and Indonesia.

3.5.2 Time Period

The study covers a four-year period from 2009 to 2012. The selected period is influenced by the date on which the first results of the AKOBEN were launched – that is November 2010. The launch saw the public disclosure of the environmental performance rating of a selected mining and manufacturing firms for the 2009 financial year. The Environmental Protection Agency of Ghana has publicly disclosed the environmental performance ratings for only 2009

to 2012 financial years, with 2012 being the last year EPA publicly disclosed the rating scores.

3.6 MEASUREMENT OF VARIABLES

3.6.1 Dependent Variable

3.6.1.1 Environmental Disclosure

The dependent variable for the study was the environmental disclosure score of the sampled firms. Similar to Patten (2002), the environmental disclosure score of the sampled firms was identified using content analysis of the corporate annual report of the sampled firms and line count. The corporate annual reports of the sampled firms were examined for the presence or absence of aspects of statements that relate to a seven (7) item content analysis classification. The content analysis areas were developed based on the review of environmental disclosure studies that have used content analysis in determining the level of environmental disclosures by firms (see Wiseman, 1982; Freedman & Wasley, 1990; Hughes et al., 2001; Patten, 2002; Cho et al., 2006; Cho & Patten, 2007). The classification was however modified to include the disclosure of the corporate social responsibilities of the sampled firms. This is mainly because the Ghanaian view of the concept of “environment” to include the social environment in which decisions are made (Environmental Protection Agency, 2004). Also, Hilson and Murck (2000), Hochstetler (2003), and Guidi (2008) also add that the CSR of firms, especially in the developing countries, include the environmental responsibilities, mainly because such responsibilities are critical in the context of developing economies. As such, most CSR activities of firms in developing countries focus on environmental management initiatives (Roitstein, 2004; Newell & Muro, 2006; Carroll & Shabana 2010). The environmental disclosure score thus ranges from zero to seven. The content analysis areas are presented in Appendix A.

3.6.2 Independent Variables

3.6.2.1 Environmental Performance

The main independent variable for the study is the environmental performance of the sampled mining and manufacturing firms. The environmental performance rating as published by EPA based on the AKOBEN was used as a proxy for environmental performance. The respective colours were quantified as follows;

Table 3.1: Quantification of AKOBEN Rating

Rating Level	Performance	Assigned Quantification
RED	POOR	1
ORANGE	UNSATISFACTORY	2
BLUE	GOOD	3
GREEN	VERY GOOD	4
GOLD	EXCELLENT	5

3.6.3 Control Variables

3.6.3.1 Firm Size

The firms sampled were of different size. It is, thus, imperative to control for the effect of the size of the sampled firms. Contrary to Patten (2002) and Cho & Patten (2007), the proxy adopted in this study as a measure of firm size was the natural logarithm of total assets (Clarkson, et al., 2008; Aerts & Cormier, 2009; Cormier & Magnan, 2014).

3.6.3.2 Capital Intensity

It is a measure of the efficiency with which a firm deploys its assets. As a control variable for the study, capital intensity is measured as the ratio of the total assets of the firms to their

revenues for the respective years (Clarkson et al., 2008; Aerts & Cormier, 2009; Cho, Patten, & Roberts, 2010; Elshahat, Freedman, & Elshahat, 2015).

3.6.3.3 Profitability

Prior studies on the determinants of the level of environmental disclosures have established that firms' profitability influences the level of their environmental disclosures (Cormier & Magnan 2003; Clarkson et al., 2008; Aerts & Cormier, 2009; Elshahat et al., 2015). Consistent with these prior studies, profitability is proxied by return on assets (ROA). This is measured as the ratio of net profit before interest expenses and income taxes to total assets.

3.6.3.4 Company Age

Studies suggest that new firms disclose less environmental information because they may lack not just the monetary resources, but also the expertise to do so (Hossain & Hammami, 2009; Sehar, Bilal, & Tufail, 2013; Soliman, 2013). These firms place more emphasis on meeting the costs incurred to set up rather than incurring additional costs. Such firms also face less pressure from their stakeholders to make such disclosures (Habbash, Hussainey, & Awad, 2016). Generally, a firm's age is measured in years. For this study, age is measured as the natural log of the number of years the firm has been in existence (Aerts, Cormier, & Magnan, 2008).

3.6.3.5 Leverage

Studies have found a statistically significant association between a firm's level of leverage and its environmental disclosures (Aerts, Cormier, & Magnan, 2008; Clarkson et al., 2008; Alves, Rodrigues, & Canadas, 2012). For this study, leverage is measured as the ratio of long term debt to total assets.

3.6.3.6 Industry

Generally, the level of environmental disclosures differs across industries, both in nature and extent. Considering that the study focuses on firms in two key industries, mining and

manufacturing industries, the study seeks to find the nexus between the industry in which a firm operates and its level of environmental disclosure. This variable is a dummy variable measured as follows; one (1) if a firm operates in the manufacturing industry and zero (0) otherwise.

3.7 SPECIFICATION OF MODEL

To estimate of the nexus between environmental disclosure and environmental performance, the environmental disclosure model specified below was used:

$$\begin{aligned} ENVDISC_{it} = & \beta_0 + \beta_1 ENVPERF_{it} + \beta_2 SIZE_{it} + \beta_3 CAPIN_{it} + \beta_4 ROA_{it} + \beta_5 AGE_{it} \\ & + \beta_6 LEV_{it} + \beta_7 IND_{it} + \varepsilon_{it} \end{aligned}$$

These variables are tabled below:



Table 3.2: Description and Measurement of Variables

VARIABLE	SYMBOL	MEASUREMENT
Environmental Disclosure	ENVDISC	Environmental disclosure score based on content analysis
Environmental Performance	ENVPERF	Environmental performance rating based on the AKOBEN rating
Firm Size	SIZE	Natural log of total assets
Capital Intensity	CAPIN	Ratio of total assets to total revenue
Profitability (Return on Assets)	ROA	Ratio of profit before interest expense and income taxes to total assets
Company Age	AGE	Natural log of the number of years of existence of the firm
Leverage	LEV	Ratio of long term debt to total assets
Industry	IND	A dummy variable of 1 if the firm operates in the manufacturing industry, otherwise 0

3.8 MODEL DIAGNOSTICS

The model diagnostics focuses on procedures that are used to ascertain the validity of a regression model. This helps in addressing potential problems that can affect the results of the estimation model used – that is potential problems that might make the results biased. This subsection will focus on the test for multicollinearity and heteroscedasticity.

3.8.1 Variance Inflation Factor (VIF)

The VIF provides a quantification of how the severity or otherwise of the existence of multicollinearity among the predictors in a regression model. The existence of multicollinearity can cause the variance of the regression coefficients to increase. This will

make create a difficulty in interpreting the regression coefficients as they will become unstable.

O'brien (2007) posits that if the mean VIF is greater than 10, then there exists a problem of multicollinearity. The VIF test, as shown in the table 3.3 below shows a mean VIF of 2.02. This is less than 10 and indicates the non-existence of the problem of multicollinearity.

Table 3.3: Variance Inflation Factor (VIF)

Variable	VIF	1/VIF
SIZE	3.33	0.3001
IND	3.18	0.3141
CAPIN	1.57	0.6384
AGE	1.50	0.6669
ROA	1.53	0.6555
LEV	1.85	0.5420
ENVPERF	1.16	0.8602
Mean VIF	2.02	

3.8.2 Breusch-Pagan Test

The Breusch-Pagan (BP) test is used to test for linear heteroscedasticity of errors in an estimation model. It provides a measurement of how errors in an estimation model increase across the predictors. The result from the BP test is shown in table 3.4 below.

From table 3.4 below, the p-value (Prob > chi2) of 0.7314 is higher than 0.05, we fail to reject the null hypothesis. It can be concluded that there is no heteroscedasticity. This indicates that the variances are constant.

Table 3.4: Breusch-Pagan (BP) Test for Heteroscedasticity

Ho	Constant Variance
Variables	Fitted values of ENVDISC
chi2(1)	0.12
Prob > chi2	0.7314

3.8.3 Fixed Effect Model or Random Effect Model

The study reports regression results of fixed effect and random effect method of estimation. However, in deciding on which of the two other models to choose (random effect and fixed effect), the Hausman's specification test is conducted.

The chi-square ($\chi^2 = 3.71$) shows a p-value of 0.7163. The p-value is greater than α of 5%. Thus, the null hypothesis of the test of no significant systematic difference between the coefficients is supported. The p-value suggests that the random effect model is superior to fixed effect model, hence, the random effects model is recommended.

3.8.4 Breusch and Lagrange Multiplier (LM) Pagan Test

The Breusch-Pagan Lagrange Multiplier (LM) test is used to test to determine whether or not the simple OLS regression estimation model should be used or the random effect estimation model should be used. The result from the LM test is shown in table 3.5 below.

The null hypothesis in this test is that the variance across the sampled companies is zero. This indicates that there are no significant differences across the companies; hence there is no need for panel effects. The result from the test is indicated in table 3.5 below.

From table 3.5 below, the p-value (Prob > chi2) of 0.0000 is less than 0.05. Thus, we reject the null hypothesis and conclude that there is evidence that significant differences exist across the sampled companies; hence the need for random effects estimation model.

Table 3.5: Breusch-Pagan Lagrange Multiplier (LM) Test

	Var	Sd=sqrt(Var)
ENVDISC	3.2685	1.8079
e	0.2889	0.5375
u	1.7837	1.3356

chibar2(01) = 52.59

Prob > chibar2 = 0.0000

3.8.5 Test for Normality

It is necessary to conduct a normality test to check whether or not the data on the key variables of interest (environmental disclosures and environmental performance) is normally distributed. The Shapiro-Wilk test of normality was, thus, conducted. The result of the test is reported in table 3.6 below.

Table 3.6: Shapiro-Wilk W Test for Normal Data

Variable	Obs.	W	V	Z	Prob>z
Envdisc	91	0.9830	1.302	0.582	0.2803
Envperf	95	0.9223	6.149	4.018	0.000

Source: Study Results, 2017

From the results in table 3.6 above, it is evident that the data on environmental disclosures is normally distributed (p-value < 0.05), whereas that of environmental performance is not

normally distributed (p -value < 0.05). Thus, this test leads to a failure to reject the null hypothesis that Envdisc is normally distributed, while rejecting the null hypothesis that Envperf is normally distributed.

3.9 DATA ANALYSIS & PRESENTATION

Analyzing data involves putting data into a simple and clear form for easy understanding (Saunders et al., 2011). The data gathered was analysed using descriptive tests, multiple regressions, and correlation between the variables selected.

The multiple regression was used to assess whether or not environmental performance as measured by the AKOBEN is a determinant of environmental disclosure. With regards to the evaluation of the AKOBEN, data gathered was analysed by juxtaposing what goes into assessing the environmental performance of the mining and manufacturing firms based on the AKOBEN against the benchmark indexes. The thematic areas that emerged were then discussed.

3.10 CHAPTER SUMMARY

This chapter discusses the research methodology that was used to aid in the achievement of the objectives of the study. To achieve the set objectives, the study adopts the positivist research philosophy and the quantitative research design, together with the deductive research approach was selected. Data gathered was analysed using descriptive tests, multiple regressions, and correlation between the variables selected. Other data gathered was analysed and discussed based on thematic areas that emerged during the data collection process.

CHAPTER FOUR: DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1 INTRODUCTION

This chapter presents an analysis and a discussion of the data collected for the purpose of achieving the objectives of the study. In line with the objectives of the study, the findings are structured and presented along the following lines: assessment of the AKOBEN and relationship between environmental disclosures and environmental performance. Based on the first objective of the study, the chapter specifically analyzes and discusses the findings along the following lines: legal and regulatory framework; scope and participation; rating criteria; data collection, verification, processing, and analysis; and disclosure of ratings score. Based on the second objective of the study, this chapter specifically focuses on the model diagnostics, descriptive analysis, correlation analysis, decision between using fixed effect model or random effect model, and analysis and discussion of the regression results.

4.2 ENVIRONMENTAL PERFORMANCE RATING IN GHANA

There has been increased level of economic activities in Ghana over the last two decades. This has resulted in increased economic development in the form of increasing levels of GDP, more jobs for the Ghanaian populace, increased tax revenues for the government, increased foreign direct investments, among others (Mhango, 2010; Welbeck, 2017). This increased level of economic activities come its own detrimental effects on the environment. These detrimental effects are mostly in the form of pollution, land degradation, and neglect of the effects of their activities on the health and safety of their employees. Over that time period, there appears to be increased level of public awareness for the impact firms' actions have on the Ghanaian environment. This increased level of public awareness could also be attributed to the efforts by the EPA of Ghana to ensure that the Ghanaian environment is preserved and conserved. This, the EPA has done through, among other things, the development of an environmental performance rating geared towards ensuring that the negative effects of firms'

actions – particularly mining and manufacturing firms (Allotey, Sekyi, Faabeluon, Erquaye-Tetteh, Affull, Sarfo-Afriyie, Forocco, & Afsah, 2011) – are reduced. This is also EPA's attempt to get-on-board the global trend in regulating the effects of business activities on the environment to ensure accountability (EPA, 2010).

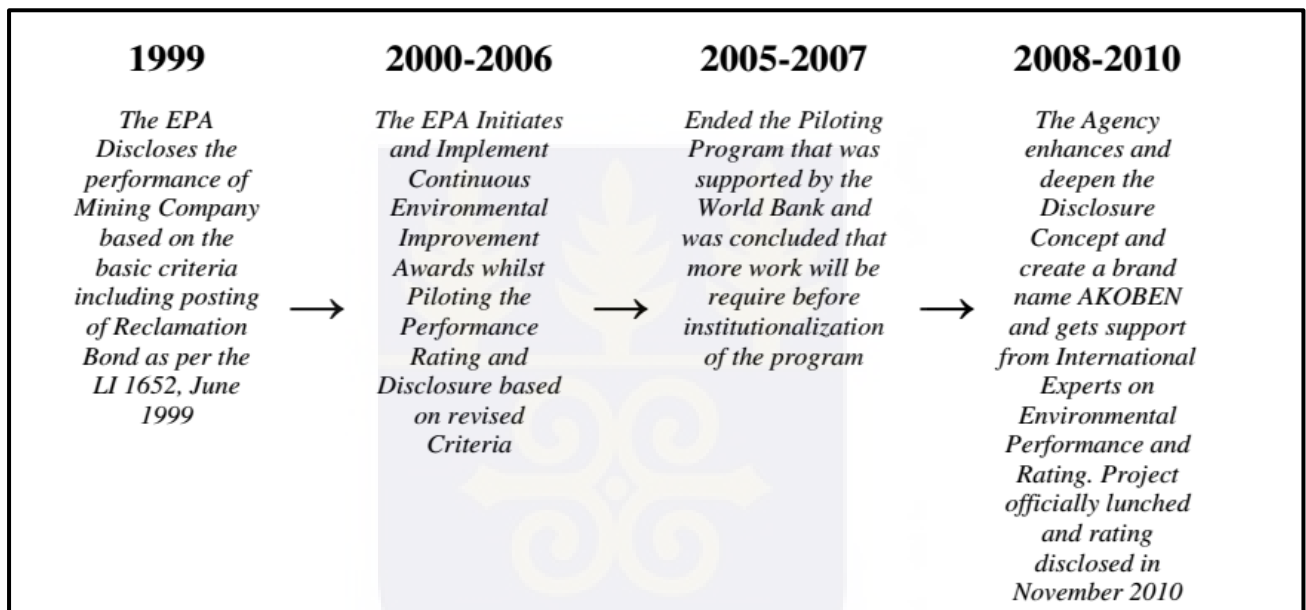
The EPA launched its official environmental performance rating in November, 2010. The rating is named as AKOBEN. This rating is the in the Sub-Saharan Africa that is fully sponsored by the government and the first in the world with a comprehensive environment rating for the mining sector. The AKOBEN gives a reflection of the environmental issues in Ghana. The name of the performance rating has its roots in the Ghanaian traditional Adinkra Symbols which means vigilance and weariness.

The introduction of the AKOBEN traces its roots from the passing into law, the Environmental Assessment Regulations, LI1652 (1999). The passage of this law established a sub-component of EPAs Environmental Impact Assessment (EIA) system to ensure that proposals in the law can be enforced. With this, the EPA placed emphasis on companies in the mining sector and used reclamation bonds as the main criterion for the assessment of the environmental performance of firms in the sector, and the disclosure of same to the public. The EPA of Ghana, in 2000, then established a system, called Continuous Environmental Improvement Award, mainly to reward firms in the manufacturing sector based on their improved environmental performance over time. This system received criticism a being a subjective system due to the unavailability of a clearly defined method for the assessment of the performance of firms.

While using the Continuous Environmental Improvement Award system, the EPA begun to pilot an environmental performance rating, with the assistance from the World Bank, mainly

using 32 companies within the manufacturing industry with the results from the assessment disclosed to the participating companies. Based on concerns and the complaints from the participating companies, EPA modified the performance rating to reflect the concept of environment in the Ghanaian context. The modified rating is what ‘gave birth’ to the current environmental performance rating, AKOBEN. The history leading to the launch of the AKOBEN is summarized in the figure below.

Figure 4.1: Pathway to the Launch and Implementation of AKOBEN



Source: Sekyi, 2011

The AKOBEN assesses the environmental performance of the mining and manufacturing companies based on a five-colour rating scheme. These colours are gold, green, blue, orange, and red. The ratings, after they have been assessed, are then publicly disclosed. The AKOBEN has seven parameters namely legal issues, hazardous waste management, toxic and non-toxic releases, monitoring and reporting, environmental best practices, community complaints, and corporate social responsibility (CSR). These parameters focus on almost all facets of environmental governance and management (Darko-Mensah & Okereke, 2013).

Figure 4.2: AKOBEN Performance Rating Colours

Rating Level	Performance	General Description
RED	POOR	Has not fulfilled the requirements of LI 1652, and creates risks from toxics and hazardous wastes mismanagement and discharges.
ORANGE	UNSATISFACTORY	Exceedance of regulatory standards for conventional pollutants, non-toxics and noise pollution
BLUE	GOOD	Adequate compliance with environmental standards
GREEN	VERY GOOD	BLUE + company is responsive to public complaints
GOLD	EXCELLENT	GREEN + company follows its corporate social responsibility policies

Source: <http://www.epaghanaakoben.org/akoben/methodology> (Accessed on 15th November, 2016)

4.3 EVALUATION OF AKOBEN

This section presents an evaluation of the AKOBEN against the selected benchmarks.

4.3.1 Legal and Regulatory Framework

The AKOBEN does not have a directly developed legal document backing its development and implementation. However, it was developed and implemented by the EPA Agency of Ghana, a governmental agency. Legally, the rating derives backing from the EPA Act 1994, Act 490 and the Environmental Assessment Regulations, 1999, L.I. 1652. The EPA Act enjoins the agency to put in cost-effective measures that will aid them in undertaking their mandate as a regulatory body charged with the function of securing the control and prevention of discharge of waste into the environment and the protection and improvement of the quality of the environment in Ghana. This point is highlighted in Section 2 (o) of the EPA Act, which states that the EPA has as one its functions, ‘to develop a comprehensive database on the environment and environmental protection for the information of the public’. Similar to the AKOBEN, the KLD GSI has no legislative framework that provides legal backing for its usage. This is mainly because the rating is developed and ran by an independent investment

research firm called the KLD Research and Analytics Inc. that provides management tools that enable environmental, social, and governance (ESG) factors to be included in investment decisions.

On the other hand, Indonesia PROPER and China's GreenWatch have specific legislative instruments and frameworks that provide backing for these environmental performance rating tools. PROPER is developed by and ran by Indonesia National Pollution Control Agency (BAPEDAL), a governmental agency under Ministry of Environment while GreenWatch is developed and ran by State Environmental Protection Administration (SEPA). In order for an environmental performance rating tool to be effective, Gozun, Laplante, and Wang (2011) posit that it must have a strong legal backing. One challenge that comes with the non-existence of a strict legal backing is the ambiguity it creates as to whether or not the submitting to the requirements of such tools is mandatory or voluntary. To address this challenge however, submitting to the periodic assessment based on the AKOBEN is included as one of requirement for the award of an environmental permit to operate. This indicates that these companies are coerced into submitting themselves to the assessment by the EPA.

To add, the AKOBEN does not have an independent advisory body set out to help address the grievances of the companies, especially after there has been internal disclosure of the rating scores. In the case of Indonesia's PROPER and China's GreenWatch, there is an established independent advisory board tasked with the role of ensuring objectivity and accuracy of the rating scores even before they are publicly disclosed. In the case of KLD GSI, there is a formal committee established with the responsibility of undertaking quality review of all processes at all stages of rating. This is regarded as a weakness of the performance rating as the establishment of such a board can improve the objectivity, as well as the acceptability of the AKOBEN and the scores generated from the used of this rating tool. The formation of

such a board will also require external representative in order to promote the level of public participation in ensuring the success of the performance rating as an environmental performance rating tool. The board should be made up of the key stakeholders that have an interest, in one way or the other, in the promotion of an environmental governance system that is transparent.

4.3.2 Scope and Participation

The AKOBEN covers environmental and social rating categories. This is mainly due to how Ghanaians regard the concept of the environment. Ghanaians regard environmental issues to also include social, economic, and cultural issues. The AKOBEN covers water and air pollution substances, as well as non-conventional substances like lead and mercury. Indonesia's PROPER was initially developed to focus on water pollution substances, but has over the time included in air pollution substances. Similarly, China's GreenWatch also covers water and air pollution substances. The KLD GSI, however, does not only cover the conventional water and air pollution substances as in the case of the other three discussed above, but also covers labour-related issues.

To add, the AKOBEN focuses on assessing the environmental performance of firms that operate in the mining and manufacturing industries of Ghana. Its area of coverage is thus nationwide. PROPER and GreenWatch focus on firms that operate in the industrial sectors of the respective countries. The area coverage of PROPER is also nationwide. The coverage of China's GreenWatch, however, was initially regional (1998 in Zhenjiang and Hohhot in 2000) and then extended to a nationwide coverage. The KLD GSI assesses companies that make up for the top 75% of market capitalization of each sector mainly in twenty-three developed countries. It covers a broader sector of the market in twenty-three countries.

4.3.3 Rating Criteria

The AKOBEN captures seven key rating criteria. These include legal issues, hazardous waste management, toxic and non-toxic releases, monitoring and reporting, environmental best practices, community complaints, and corporate social responsibility (CSR). The criteria used, according to Darko-Mensah and Okereke (2013) are regarded as very comprehensive, as it covers the broad sectors of environmental management and governance. China's GreenWatch covers six rating criteria in relation to environmental pollution namely water, air, solid waste, electromagnetic radiation, noise, and radioactive contamination.

At inception, PROPER assessed environmental performance by focusing on three key environmental indicators namely water pollution, hazardous waste management, and air pollution. In recent times, however, the rating criteria has been expanded to cover other ones including energy and climate change, water conservation, and corporate social responsibility. The current criteria thus cover a wide spectrum. The KLD GSI covers ten broad thematic areas. These areas include carbon emissions, water stress, toxic emissions and waste, environmental opportunities, human capital (labour management and health & safety), product safety & quality, stakeholder opposition, social opportunities, corporate governance, and corporate behaviour. Relative to GreenWatch and PROPER, the AKOBEN could be said to be comprehensive enough based on the rating criteria used in the assessment of the environmental performance. Although the AKOBEN is regarded as a comprehensive environmental performance rating tool, it does not cover key areas like product quality, corporate governance issues as well as corporate behaviour issues like the business ethics, tax transparency, and anti-competitive practices of the firms. These areas of businesses affect their environmental management policies and environmental performance.

4.3.4 Data Collection, Verification, Processing, and Analysis

In rating the environmental performance of firms based on the AKOBEN, data must be collected. The data collection process is done in three (3) stages. The first stage is the collection of data from monthly reports that are submitted by firms operating in the mining and manufacturing industries. It is important to mention that the reports to be submitted by the companies are time-bound and any delay affects their overall ratings for a given year. The second stage involves a site inspection undertaken by the AKOBEN team to verify the data captured on the monthly reports submitted by the companies. The final stage is an annual audit conducted by the AKOBEN team to assess the companies and to also collect the data that were not reported in the monthly reports submitted by the companies. The processing of the data collected as well as its analysis is done mainly with the use of an information system. The system was initially designed without an open access to the companies. Thus, the data was captured into the information system directly by the members of the AKOBEN team. Over time, however, the system has been updated to permit the companies to submit their monthly reports electronically by inputting the data into the system. Based on how the software for the analysis of the data is done, the environmental performance rating for the various companies, based on a five-colour scale rating system, are automatically generated after all data requirements have been met. This process addresses the issue of subjectivity in the analysis and assignment of ratings to the various companies.

Indonesia's PROPER has four data sources. In the collection of data for the assessment of environmental performance of companies, BAPEDAL has been using a program called PROKASIH since 1989. In 1991, KEP/MEN/03/1991 program was introduced. Its legal enforcement sub-system called JAGATIRTA became available as another source of pollution data. With the initiation of PROPER, the third (monthly report by companies to BADEPAL) and fourth (on-site factory inspection by PROPER teams) data sources were added. Based on

the four sources of data, data gathered by the JAGATIRTA and the PROPER team are regarded as more reliable. A database system has been developed which compares results based on the data gathered from the four different sources before a final rating score is automatically generated.

The data collection, verification, processing, analysis process based on China's GreenWatch Program is no different from that of the AKOBEN process. The companies are required to submit reports on their polluting emissions to SEPA. These reports are verified and confirmed by the GreenWatch team during an on-site inspection. In addition to this, data for the rating is collected from records of public complaints about the companies, as well as records of regulatory actions and penalties against the companies. Data collected is analysed electronically to generate the rating of the companies based on a five-colour scale rating system.

The KLD Research and Analytics Inc. independently collect, process, and analyze data from specialized datasets including datasets from the government and non-governmental organizations (NGOs) using their experienced research analysts. The data collected from these datasets are complemented with data extracted from the sustainability reports and proxy reports of the companies being assessed. The team of research analysts constantly monitor global and local media news sources to gather other information that may be relevant in their assessment of the companies. As a way of verifying the data collected, there is a frequent systematic communication with the issuers of the data gathered. The data collected is electronically analysed to generate a rating for the various companies. The companies are rated on an AAA to CCC scale relative to the standards and performance of their industry peers.

Although the data collection process is thorough, the AKOBEN team does not consider the disclosure of the environmentally-related activities of the companies in the assessment of their performance. Being environmentally accountable goes beyond just doing the right thing to include the reportage of such activities (Grey et al., 1996). The AKOBEN ignores the disclosure of the environmentally related issues by the rated companies in their medium of communication to the other stakeholders. The need for companies to report to their stakeholders about their environmental activities cannot be overemphasized.

4.3.5 Disclosure of Ratings Score

In the disclosure of the environmental performance of the companies based on the AKOBEN, a two-step procedure is used. The first step is termed as the internal disclosure. At this stage, the rating results are privately shared with the companies assessed through a comprehensive rating report. The AKOBEN team meets with the individual companies, either on-site or at the EPA office to discuss the content of the rating report issued. The report indicates the performance of the companies as well as guidance on areas that require improvement from these companies. The objective is to provide information about the environmental performance of these companies as well as settle any discrepancies that may exist. After the internal disclosure, companies are granted two to four weeks to provide reaction to the rating and seek redress for any further concerns they have. This face of the disclosure process is similar to that of China's GreenWatch and Indonesia's PROPER.

This is then followed by the second step, which is the public disclosure. The disclosure of the rating results for the four-year period (2009 to 2012) has received political support. The public disclosure sessions held have been attended by the Minister of Environment, Science and Technology. The political support received by the AKOBEN is similar to what happens in the case of China's GreenWatch and Indonesia's PROPER (Afsah, Laplante, & Wheeler, 1997; Kathuria, 2009). In the case of the KLD GSI, such political support is not expected since it is

developed and implemented by a private organization. However, the rating results are widely accepted for use, especially by socially responsible investors. The team of research analysts at KLD Research and Analytics Inc., as well as the formally established committee undertake systematic monitoring of disputes that may arise based on the rating disclosures made. The rating results based on the AKOBEN are then published on the website of the EPA. Although the stated disclosure process will result in the provision of information to the public and ensure accountability, the challenge, however, is the delays in the public disclosure of the rating results. Based on the policy guideline, the public disclosure of the rating results is to be done annually on the World Environment Day. However, the EPA has publicly disclosed only four out of the seven assessments done so far. The problem with this is that it discourages participation by the public and affects its effective implementation.

4.3.6 Summary of the Assessment of the AKOBEN

This section provides a summary of the similarities and differences that exists among the environmental performance rating tools as discussed above. They are summarized in the table below.

Theme	AKOBEN	KLD GSI	China's GreenWatch	Indonesia's PROPER
Legal and Regulatory Framework	1. No direct legal framework but developed and implemented by EPA of Ghana.	1. No legislative or regulatory framework to provide legal backing.	1. There is a specific legislative instrument and framework backing its formulation and implementation.	1. There is a specific legislative instrument and framework backing its formulation and implementation.
	2. There is no independent advisory board.	2. There is a formal committee established to undertake quality review.	2. There is an independent advisory board.	2. There is an independent advisory board.

Theme	AKOBEN	KLD GSI	China's GreenWatch	Indonesia's PROPER
Scope and Participation	1. Covers environmental and social categories.	1. Covers environmental, social, and governance categories.	1. Covers environmental categories.	1. Covers environmental categories.
	2. Nationwide coverage with focus on mining and manufacturing companies in Ghana.	2. Industries that make up 75% of the market capitalisation of each sector in 23 developed countries.	2. Nationwide coverage with focus on companies in the industrial sector of China.	2. Nationwide coverage with focus on companies in the industrial sector of Indonesia.
Rating Criteria	Assessment is based on seven rating criteria (legal issues; hazardous waste management; toxic and non-toxic releases; monitoring and reporting; environmental best practices; community complaints; corporate social responsibility)	Assessment is based on ten broad themes (climate change; natural resources; pollution and waste; environmental opportunities; human capital; product liability; stakeholder opposition; social opportunities; corporate governance; corporate behaviour)	Assessment is based on six environmental indicators (water; air; solid waste; electromagnetic radiation; noise; radioactive contamination)	Assessment is based on six indicators (water pollution; hazardous waste management; air pollution; energy and climate change; water conservation; corporate social responsibility)

Theme	AKOBEN	KLD GSI	China's GreenWatch	Indonesia's PROPER
Data Collection, Verification, Processing, and Analysis	1. Data is collected, independently verified, and electronically analysed to generate rating scores.	1. Data is collected, independently verified, and electronically analysed to generate rating scores.	1. Data is collected, independently verified, and electronically analysed to generate rating scores.	1. Data is collected, independently verified, and electronically analysed to generate rating scores.
	2. Uses a five-colour rating scale	2. Use Rating Scale ranging from AAA to CCC.	2. Uses a five-colour rating scale.	2. Uses a five-colour rating scale
Disclosure of Rating Score	Disclosure is done internally followed by a public disclosure.	Rating scores of companies assessed are only disclosed publicly.	Disclosure is done internally followed by a public disclosure.	Disclosure is done internally followed by a public disclosure.

4.4 DESCRIPTIVE STATISTICS

The sample is made up of ten mining firms and fifteen manufacturing firms studied over a period of four years, 2009 to 2012. A summary of the descriptive statistics of the data collected is presented in table 4.1 below. Specifically, the table presents information on the mean, standard deviation, median, minimum, and maximum values of each of the variables used in the estimation model.

Table 4.1: Summary of Descriptive Statistics

Variable	Number of obs.	Mean	Std. Dev.	Min.	Max.
ENVDISC	91	2.6484	1.8401	0	5
ENVPERF	95	1.6737	0.7062	1	4
SIZE	91	8.3874	0.8469	6.8356	10.2148
CAPIN	91	1.5352	1.0867	0.4527	6.6585
ROA	91	0.0880	0.1646	-0.7645	0.3986
LEV	91	0.2835	0.4667	0	3.2292
IND	100	0.600	0.4924	0	1
AGE	100	1.3291	0.3479	0.6990	1.9868

Source: Study Results, 2017

4.5 LEVEL OF ENVIRONMENTAL DISCLOSURE

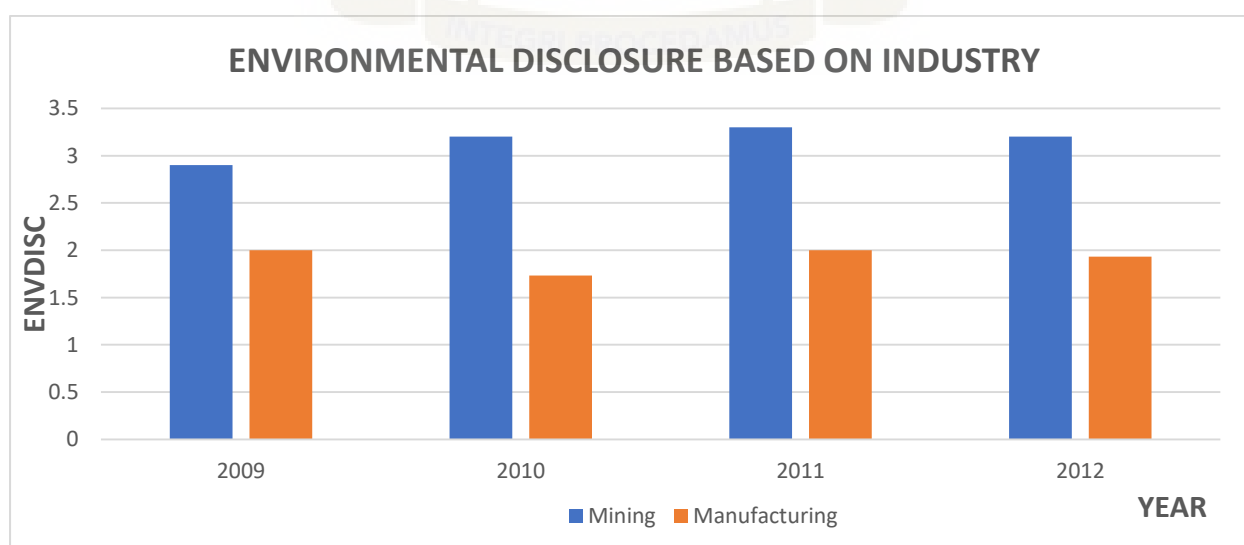
From table 4.1 above, based on the sample of twenty-five (25) firms, the average of the environmental disclosure made by the sampled firms over the study period was approximately 3. This indicates that, on the average the sampled firms disclosed three of the seven environmental indicators in their corporate annual report. The maximum of these areas disclosed by the sampled firms was five, with some firms not disclosing any of them. The most disclosed environmental indicator was firms' corporate social responsibilities, with none of the companies disclosing its resolve of present and potential environmental litigation. Based on the type of industry, it is clear that on the average, firms operating in the mining industry made more environmental disclosures than the firms that operate in the manufacturing industry. This is shown in table 4.2 below.

Table 4.2: Summary Descriptive Environmental Disclosure by Industry

Industry	Mean	Min.	Max.
Mining	3.3158	0	5
Manufacturing	2.2115	0	5

It is also evident that, unlike the companies operating in the manufacturing industry, the average environmental disclosures made by those operating in the mining industry, collectively, increased steadily throughout the study period from 2009 to 2012. The case of the companies in the manufacturing industry was different. On average, environmental disclosures made by the manufacturing companies collectively fell in 2010 below that of 2009. This is shown in figure 4.3 below. The level of disclosure however slightly increased in the subsequent years above that of 2009. This increasing level of environmental disclosures could be described as the companies' response to the increasing level of public awareness of and concern for the negative effects of their activities on the environment (Wilmshurst & Frost, 2000; Ahmad & Sulaiman, 2004; Al-Tuwaijri et al., 2004).

Figure 4.3: Trend of Environmental Disclosures based on Industry



Source: Study Results, 2017

4.5.1 Test for Statistical Difference

Since the data on the environmental disclosures is normally distributed (refer to Shapiro-Wilk W Test for Normal Data), the study make use of a parametric test to establish whether or not there exists a statistically significant difference in the level of environmental disclosures between the mining and manufacturing companies. Thus, an independent t test on the sample of twenty-five companies was run to determine if there was a statistically significant difference in the level of environmental disclosure based on the industry type, consisting of mining and manufacturing industries. The results, as presented in table 4.3 below, shows that manufacturing companies had a statistically significant lower level of environmental disclosures (2.1698 ± 0.2405) than the mining companies (3.3158 ± 0.2875), $t = 3.0632$, $p\text{-value} = 0.0029$.

Table 4.3: Independent T Test

Industry	Obs.	Mean	Standard Error
Mining	38	3.3158	0.2875
Manufacturing	53	2.1698	0.2405
Combined	91	2.6484	0.1929

Prob (|T| > |t|) = 0.0029

4.6 ENVIRONMENTAL PERFORMANCE

The environmental performance of the sampled firms based on the AKOBEN was averagely 3, indicating a good environmental performance (blue). The best performing firms over the period earned the green colour, indicating a very good environmental performance. However, most of the firms were awarded the red colour over the study period, indicating a poor environmental performance.

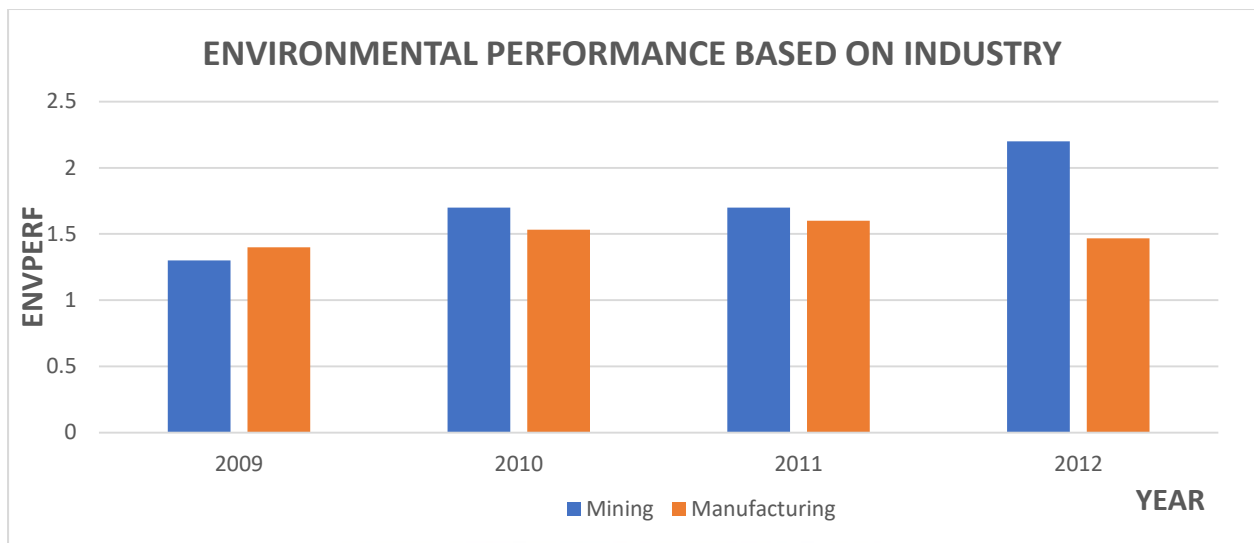
Based on the type of industry, it is clear that on the average, companies operating in the mining industry performed better based on the AKOBEN relative to those operating in the manufacturing industry. However, companies operating in both industries had an unsatisfactory (orange) environmental performance on the average. Generally, the best environmental performers in the mining industry based on the AKOBEN were awarded the green colour, indicating very good environmental performance. On the other hand, the best environmental performers within the manufacturing industry were awarded an orange colour, indicating an unsatisfactory environmental performance. This is shown in table 4.4 below.

Table 4.4: Summary Descriptive Environmental Performance by Industry

Industry	Mean	Min.	Max.
Mining	1.7250	1	4
Manufacturing	1.6364	1	2

However, the trend of the environmental performance of firms operating in both industries indicates that the level of performance based on the rating has steadily risen throughout the study period. This suggests that the AKOBEN has been, somewhat, successful in promoting environmental compliance among firms operating in the mining and manufacturing industries. This is in line with the findings reported by Darko-Mensah & Okereke (2013). They posited that the environmental performance of firms, as assessed with the AKOBEN, improved in all the rating criteria. They however found the highest level of change to be in the sanction attracting criteria like the legal issues and hazard waste management. The trend of the environmental performance of the firms is reported in figure 4.4 below.

Figure 4.4: Trend of Environmental Performance based on Industry



Source: Study Results, 2017

4.6.1 Test for Statistical Difference

Since the data on the environmental performance is not normally distributed (refer to Shapiro-Wilk W Test for Normal Data), the study make use of a non-parametric test to establish whether or not there exists a statistically significant difference in the environmental performance between the mining and manufacturing companies. Thus, a Wilcoxon rank-sum (Mann-Whitney) test was run on the sample of twenty-five companies to determine if there was a statistically significant difference in the environmental performance based on the industry type, consisting of mining and manufacturing industries. The results, as presented in table 4.5 below, indicate that the environmental performance of the mining companies was not statistically different from the environmental performance of the manufacturing companies ($z = -0.464$, $p\text{-value} = 6427$). Any difference reported in the environmental performance between the two industries may be due to chance.

Table 4.5: Wilcoxon rank-sum (Mann-Whitney) test

Industry	Obs.	Rank Sum	Expected
Mining	40	1865	1920
Manufacturing	55	2695	2640
Combined	95	4560	4560

z = -0.464

Prob > |z| = 0.6427

4.7 SUMMARY DESCRIPTIVE OF CONTROL VARIABLES

4.7.1 Firm Size

From table 4.1, the firm size of sampled firms, as proxied by the natural logarithm of the total assets, on the average, was 8.39. This implies average total assets of approximately GH¢ 254.47million. The sampled firms have a minimum and maximum asset base of approximately GH¢ 6.85 million and GH¢ 16.4 billion respectively. The reported mean size of 8.39 for the sampled firms is comparable with the mean firm size that was reported by Clarkson et al. (2008). They indicated that with such an average, there is an indication that the firms considered in the sample are relatively large.

4.7.2 Capital Intensity

As seen in table 4.1, on the average, the efficiency with which sampled firms deployed their assets over the study period is approximately 1.5 times, with a minimum and maximum capital intensity of approximately 0.45 times and 6.66 times respectively. This variable showed a standard deviation of 1.09 times, suggesting the existence of an appreciable level of deviation from the mean capital intensity.

4.7.3 Return on Assets

On the average, the ROA of sampled firms was approximately 8%. The maximum ROA of the sampled firms was approximately 40% and a minimum of -76%. This indicates that, on the average, the performance of the sampled firms in efficiently utilizing their assets to generate sales was fairly low. The reported negative ROA as the minimum for sampled firms is consistent to the findings of Aerts and Cormier (2009) and Cormier and Magnan (2014), who found that that some of their sampled firms made losses over their study period.

4.7.4 Leverage

Consistent with the findings of Alves et al. (2012), the average leverage of sampled firms over the study period was approximately 28% of the total assets. They analysed the factors that influence the disclosure of different categories of voluntary information in the corporate annual reports of companies listed in Iberian Peninsula. They indicated that more than half of these listed firms financed most of their investments in assets with equity than long-term debt. The maximum leverage of the sampled firms to their total assets over the study period was approximately 323%. The minimum value indicates that not all companies sampled from the two industries employed debt finance in their quest to meet their funding needs. A minimum of zero and a maximum of 323% indicate that there is a large dispersion in the leverage of the sampled firms to their total assets.

4.7.5 Industry

Table 4.1 indicates that 60% of the sampled firms operated in the manufacturing industry while the remaining 40% operated in the mining industry. Thus, fifteen (15) of the sampled firms operated in the manufacturing industry, with the remaining ten (10) firms being companies that operate in the mining industry.

4.7.6 Company Age

From table 4.1, the age of the sampled firms ranges from ninety-seven (97) years to five (5) years with a standard deviation of approximately thirty-five percent (35%).

4.8 CORRELATION ANALYSIS**Table 4.6: Correlation Matrix**

	ENVDISC	ENVPERF	SIZE	CAPIN	ROA	LEV	IND	AGE
ENVDISC	1.0000							
ENVPERF	-0.1815***	1.0000						
SIZE	0.5982***	0.0284	1.0000					
CAPIN	-0.0341	-0.0554	0.2465**	1.0000				
ROA	0.4102***	-0.0865	0.2658***	-0.2381*	1.0000			
LEV	-0.1790*	-0.1760	-0.0620	0.0021	-0.3795***	1.0000		
IND	-0.3088***	-0.0623***	-0.7136***	-0.2786***	-0.0110	-0.3322***	1.0000	
AGE	-0.3842***	0.1232	-0.3989***	-0.3127***	-0.2535**	0.2395**	0.2664***	1.0000

***, **, and * represent significant levels at 1%, 5%, and 10% respectively

Source: Study Results, 2017

Table 4.6 above presents the analysis of the correlation between the variables. This is to help test the association between the variables used in the study. Table 4.6 shows the association between the environmental disclosure of the sampled firms and the explanatory variables. The results indicate that there exists a positive association between environmental disclosure and firm size and profitability (as measured by return on assets). The association between environmental disclosure and the two independent variables is statistically significant at 1% level of significance. This is consistent with the findings of Clarkson et al. (2008), Aerts and Cormier (2009), and Cho et al. (2010). They found the size of their sampled firms, as well as their level of profitability, to be positively associated with their level of environmental disclosures. They therefore asserted that, as a firm gets larger and make profit, it tends to make more environmental disclosures.

Environmental performance, capital intensity, leverage, industry type, and firm age were however negatively associated with environmental disclosure. This is in line with the findings of Cho et al. (2010) and Welbeck (2017) who found capital intensity and firm age to be

negatively associated with the level of environmental disclosures. The association between the dependent variable and environmental performance and firm age was statistically significant at 1% level of significance. On the other hand, the association between the dependent variable and leverage and industry type was statistically significant at 10% level of significance. The study finds that firm size has the highest association with environmental disclosures of 59.82 percent, followed by return on assets (41.02 percent), and then firm age (38.42 percent). Capital intensity has the lowest association with environmental disclosure, with correlation of 3.41%.

When the degree of association between two explanatory variables is 0.8 or less, the reliability of a regression output is increased (Gujarati, 2003). This serves as a benchmark in the determination of multicollinearity among the explanatory variables. In relation to the association between the explanatory variables, the study found the highest association to exist between firm size and industry type (negative 71.36 percent). Even though this association is high, it falls below the benchmark as suggested by Gujarati (2003). The lowest association between the explanatory variables was found between capital intensity and leverage (0.21 percent). The correlation matrix therefore indicates the non-existence of multicollinearity among the explanatory variables. This is in line with the results of the VIF test above.

4.9 RELATIONSHIP BETWEEN ENVIRONMENTAL DISCLOSURES AND ENVIRONMENTAL PERFORMANCE

This section presents and discusses the results from the assessment of the nexus between corporate environmental disclosures and environmental performance based on the random effect regression model. The results from the regression analysis using random effect estimation models are presented in table 4.7 below.

The regression results report that 39 percent of the variations in environmental disclosures of the sampled firms over the study period are explained by the model. Previous studies have mostly reported values that range from 4 percent to 65 percent (Liu & Anbumozhi, 2009; Cho et al., 2010; Adelopo, 2011; Dainelli, Bini, & Giunta, 2013; Cormier & Magnan, 2015; Welbeck, 2017).

Table 4.7: Regression Results

Variable	Model 1 Random Effect
ENVPERF	-0.2869** (0.1347)
SIZE	0.5647* (0.3398)
CAPIN	-0.3167* (0.1657)
ROA	-0.3568 (0.5939)
LEV	-0.6211* (0.3399)
IND	-0.9036 (0.7423)
AGE	-1.4524* (0.8110)
CONS.	1.3679 (3.2689)
R-Squared	0.39
Wald chi2	23.15
Prob > chi2	0.0016

Standard Errors in parentheses

***, **, and * represent significant levels at 1%, 5%, and 10% respectively

Source: Study Results, 2017

4.9.2.1 *Environmental Performance*

Table 4.7 indicates that environmental performance of firms has significant negative effect on the environmental disclosure of the sampled firms. This means that worse environmental performers tend to make more environmental disclosures than better environmental performers. From the estimated coefficient of environmental performance based on the random effect model, as the environmental performance of the mining and manufacturing increases by a unit, it results in the firms reducing their environmental disclosures by approximately 0.29 units, all other things being equal.

This finding is consistent with the first hypothesis of this study, which hypothesize that the environmental performance of firms in the mining and manufacturing industries in Ghana is negatively related to their environmental disclosures. Thus, this finding conforms to the predictions of the legitimacy theory. This suggests that the firms regard their relationship with the society as a social contract and use environmental disclosures as a tool to gain legitimacy. Thus, bad environmental performers disclose more environmentally-related issues as a way of managing political and social pressures that result from bad environmental performance. This finding is consistent with the findings of Patten (2002), Cho and Patten (2007), and Guidry and Patten (2012). These studies concluded that firms make environmental disclosures in their various media of communication mainly to legitimize their business with the society.

The finding, however, contradicts the findings of Al-Tuwaijri et al. (2004), Clarkson et al. (2008), Iatridis (2013), Clarkson et al. (2013), and Hummel and Schlick (2016) who concluded based on their findings that environmental performance of firms positively affects their environmental disclosures. The differences between the current findings and the findings of these studies could be associated with the difference in the measure used for both the level of environmental disclosures and environmental performance. For instance, Patten (2002)

concluded that firms use environmental disclosures as a legitimising tool when he studied the effect of corporate environmental performance on the level of environmental disclosures. As a proxy for environmental performance, the study used USA's TRI rating score. In assessing the level of environmental disclosures, the study developed a seven-indicator disclosure index based on the index developed by Wiseman (1982). On the other hand, Clarkson et al. (2008) in their study also used USA's TRI as a proxy for environmental performance, but found that environmental performance influences environmental disclosures positively. The study however assessed the level of environmental disclosure of the sampled firms based on a disclosure index designed in line with the GRI guidelines. Al-Tuwaijri et al. (2004) in their study of 198 firms that are in the IRRC Directory proxied environmental performance with the ratio of toxic waste recycled to the total toxic waste generated. In measuring the level of environmental disclosures of the sampled firms, a disclosure index based on four environmental indicators was developed. The study, however, found environmental performance to be a positive determinant of environmental disclosures.

4.9.2.2 Firm Size

Firm size is reported to significantly affect the environmental disclosure of the mining and manufacturing firms positively. The effect of firm size on the level of environmental disclosures is statistically significantly at 10%. This indicates that an increase in the size of the mining and manufacturing companies by 1 percent leads to an increase in the level of environmental disclosure of these firms by approximately 56 percent, all other things held constant. This finding is consistent with the findings of Lan, Wang, and Zhang (2013), Cormier and Magnan (2014), and Welbeck (2017). This suggests that larger mining and manufacturing firms in Ghana have the tendency to disclose more environmentally-related information than smaller ones. Welbeck (2017), for instance, in a study on how the institutional environment influences the level of corporate responsibility disclosures found that larger Ghanaian firms listed on the Ghana Stock Exchange tend to make more disclosures

than their smaller counterparts. The study therefore concluded that making environmental disclosures, in the case of these large firms, could be a way of portraying their kind and type to the society in order to be accepted by the society and considered to be doing genuine business (Welbeck, 2017). Intuitively, this can also be explained by reason that larger firms, due to their size, can take on the extra voluntary disclosure cost that come with disclosing more environmentally-related issues.

4.9.2.3 Capital Intensity

Capital intensity has a statistically significant negative effect on the level of environmental disclosures by mining and manufacturing firms. The effect of capital intensity on the level of environmental disclosures is statistically significant at 10% level of significance. This finding is consistent with the findings of Welbeck (2017). In a study on listed firms in Ghana, Welbeck (2017) found capital intensity to be a statistically significant determinant of environmental disclosures. The study concluded that within the Ghanaian context, firms that invest in assets heavily are less likely to disclose more environmentally-related information in their corporate annual reports. However, the findings of the study are inconsistent with the findings of Aerts et al. (2008) and Clarkson et al. (2008) who found that capital intensity of firms positively affect their environmental disclosures. For instance, Clarkson et al. (2008) in their study found capital intensity to be a positive determinant of the level of firms' environmental disclosures. The study found the variable to be a statistically significant determinant of environmental disclosures. They therefore concluded that firms with more capital expenditures relative to their revenues disclose more environmental information. The results suggest that mining and manufacturing firms in Ghana that undertake investment in new capital assets to generate revenue tend to disclose less environmental information. Intuitively, as more investment is made in capital assets, all other things being equal, the firm will have less resources to spend on the extra voluntary disclosure costs that come with the disclosure of environmental information.

4.9.2.4 Return on Assets

From table 4.7, it is evident that profitability, as measured by return on assets, negatively influenced the environmental disclosures of the sampled firms. This finding is consistent with the findings of Welbeck's (2017), Adelopo's (2011), and Cormier and Magnan's (2014) studies. The consistency in the findings is mainly due to the similarity in the measurement of profitability of the sampled firms, and the context of study in the case of Welbeck (2017). However, the findings of the study contradict that of Cormier and Gordon (2001). Cormier and Gordon (2001), for instance, found a profitability of a firm to negatively affect its level of disclosures. However, as a proxy for profitability, the study use return on equity.

Intuitively, the negative effect found could be explained by reason that firms who do not make more profits are motivated to make more environmental disclosures as a way to justify the level of profitability. The environmental disclosures are therefore used by management as a legitimization tool in order to 'remain in the good books of shareholders'. However, the effect of return on assets on the level of environmental disclosure was not statistically significant.

4.9.2.5 Leverage

In line with the findings of Adelopo (2011), leverage is found to negatively affect the level of environmental disclosures of the sampled firms over the study period. The effect of leverage on environmental disclosures is statistically significant at 10% level of significance. This indicates that, all other things being equal, an increase in the level of debt used by the sampled firms results in a reduction of their level of environmental disclosures. An explanation for the relationship found between leverage and the level of environmental disclosure may be that firms that are highly levered are not able to bear the extra voluntary disclosure costs due to the related cost of the debt finance.

4.9.2.6 *Industry*

The study finds the industry type of the sample firms not to significantly affect their level of environmental disclosures. This can be attributed to the fact that both industries considered in the study are environmentally sensitive industries (Cho & Patten, 2007). The results indicate that the industry type has an insignificantly negative effect on the level of environmental disclosures. This finding indicates that firms in the manufacturing industry will more likely make less environmental disclosures than firms in the mining industry. Thus, the level of environmental disclosures of the sampled firms will be approximately one unit lower if the company is a manufacturing company than mining. This is evident the trend of the environmental disclosures as indicated in figure 4.3.

4.9.2.7 *Firm Age*

The perceived stability of the sampled firms, as indicated by the firm age (Liu & Anbumozhi, 2009), negatively affects the level of their environmental disclosures. The effect of the age of the firms on their level of environmental disclosure was statistically significant at 10% level of significance. This indicates that the more stable a firm is, in terms of its age, the lower the level of environmental disclosures. This may be linked to the fact that all other things being equal, new firms, unlike the old firms, might face more political and social pressures, and have their legitimacy threatened. As a way to manage these pressures and the accompanying risks, the new firms tend to make more environmental disclosures in their annual report. This will also help such firms to manage their legitimacy crisis. This finding is consistent with the findings of Aerts et al. (2008). Habbash et al. (2016), on the other hand, found firm age to be a positive and statistically significant determinant of the level of corporate environmental disclosures in their study of the determinants of voluntary disclosures by 361 firms listed on the Saudi Arabia Stock Exchange. They argued that new firms disclose less environmental information because they may lack not just the monetary resources, but also and expertise to

do so. They further add that the rationale for the positive effect is because new firms also face less pressure from their stakeholders to make environmental disclosures.

4.10 ROBUSTNESS TEST

The study conducts a robustness test to check the consistency and reliability of the regression results presented above. Similar to Welbeck (2017), the study uses the Clustered Standard Errors model. The results are presented in table 4.8 below.

Consistent to with the results based on the random effect model, environmental performance is found to be a statistically significant determinant of the level of environmental disclosures of the sampled firms, with a negative coefficient. The level of significance, in line with the findings of the random effect model, was 5% level of significance. The findings on the effect of the control variables on the level of environmental disclosures are consistent with that of the random effect model, with the exception of the capital intensity which is became statistically significant at 5% instead of the 10% originally reported in the results for the random effect estimation model. Generally, the results of the clustered standard errors estimation model confirm the robustness of the results based on the random effect estimation model.

Table 4.8: Robustness Test

Variable	Model 3 Clustered Standard Errors
ENVPERF	-0.2966** (0.1351)
SIZE	0.6775** (0.3337)
CAPIN	-0.3407** (0.1668)
ROA	-0.0278 (0.5989)
LEV	-0.6169* (0.3442)
IND	-0.8225 (0.6657)
AGE	-1.2057* (0.7269)
CONS.	0.0899 (3.2267)
R-Squared	0.42
Wald chi2	28.29
Prob. (F statistic)	0.0004

Standard Errors in parentheses
 ***, **, and * represent significant levels at 1%, 5%, and 10% respectively

Source: Study Results, 2017

4.11 CHAPTER SUMMARY

This chapter presented the analysis and discussion of the findings of the study. It provided an assessment of the AKOBEN as a measure for environmental performance. It also provides the analysis and discussion of the results in relation to the effect of environmental performance, as proxied by the AKOBEN score, on environmental disclosures. In line with the first objective, this chapter provides an assessment of the legal and regulatory framework, scope and participation, rating criteria, data collection, verification, processing and analysis, and the

disclosure of the rating score. Based on the second objective of the study, the chapter presents the descriptive statistics, correlation analysis, and the regression results.



CHAPTER FIVE: SUMMARY, CONCLUSION, AND RECOMMENDATIONS

5.1 INTRODUCTION

The study sought to assess the level of corporate environmental disclosures and environmental performance of mining and manufacturing companies in Ghana. In addition the study assessed the nexus between corporate environmental disclosures and environmental performance of these companies. As a proxy for environmental performance for these companies, the study used the rating scores from the AKOBEN. In light of this, the study also assessed the AKOBEN as a tool for measuring environmental performance of companies. This last chapter provides a summary of the key findings of the study, draws conclusions based on the findings, and provides the practical and policy implications by making recommendations for the improvement in the AKOBEN as well as the level of environmental disclosures of mining and manufacturing companies in Ghana.

5.2 SUMMARY OF FINDINGS

The study assesses the level of environmental disclosures and environmental performance of ten (10) mining and fifteen (15) manufacturing companies in Ghana over a four-year period from 2009 to 2012, based on the industry. It further examines the nexus between these elements (environmental disclosures and environmental performance) over the said period. The study sought to test the competing predictions of the legitimacy and signalling theories with regards to how environmental performance influences environmental disclosures. The AKOBEN, as environmental performance rating tool developed by the EPA of Ghana mainly for assessing the environmental performance of mining and manufacturing companies in Ghana, was also assessed.

Using a content analysis, the level of environmental disclosures of the sampled firms was determined, with data on their environmental performance sourced from the rating scores disclosed by the EPA. A regression analysis was run to estimate the effect of environmental performance of the sampled companies. In assessing the rating tool, its rating criteria and parameters were juxtaposed against benchmark indexes. The summary of the findings are presented in the subsequent sections.

5.2.1 Evaluation of AKOBEN

The study finds that AKOBEN, unlike China's GreenWatch and Indonesia's PROPER, does not have the backing of a strict legislative instrument or framework that solely regulates its implementation. It however relies on the provisions of the EPA Act, 1994, Act 490 and the Environmental Assessment Regulations, 1999, L.I. 1652, which authorizes the EPA to put in measures that will help the agency achieve its objectives for which it was set up. The non-existence of such a legal framework may create ambiguity as to whether or not it is mandatory for the companies to submit themselves to such assessment.

Unlike the KLD GSI, China's GreenWatch, and Indonesia's PROPER, the study finds that there is no established independent advisory board in place to adjudicate disputes that may arise in the assessment and disclosure of the environmental performance rating of the companies assessed based on the AKOBEN. The existence of such a board enhances the objectivity and acceptability of the whole assessment and ratings disclosure process.

The AKOBEN is limited in its usage. It provides an assessment of the environmental performance of only companies operating within the mining and manufacturing industries in Ghana. The KLD GSI, on the other hand focuses on industries that make up 75% of the market capitalisation of each sector in 23 developed countries. Similarly, China's GreenWatch and Indonesia's PROPER focus on all companies that operate in the industrial sectors of the

respective companies. AKOBEN also focuses on seven key parameters as its rating criteria in the assessment of the environmental performance of these companies. These include legal issues, hazardous waste management, toxic and non-toxic releases, monitoring and reporting, environmental best practices, community complaints, and corporate social responsibility. Unlike the KLD GSI, AKOBEN ignores rating criteria such as the quality of the products of the companies being assessed, corporate governance issues, as well as issues related to corporate behaviour like business ethics, tax transparency and anti-competitive practices of the companies.

The data collection, verification, processing, and analysis process do not differ across all the four environmental performance rating tools. However, in the disclosure of the ratings, the case of the AKOBEN is similar to that of the GreenWatch and PROPER, where there is a private disclosure to the companies assessed before the public disclosure. In the case of the KLD GSI, disclosure is only made publicly.

5.2.2 Level of Environmental Disclosures

The study finds that on the average, the sampled firms disclosed three of the parameters of the disclosure index in their corporate annual reports. The maximum disclosures made were five, while some of the firms also failed to disclose any of the parameters of the rating criteria. The most disclosed environmental indicator was firms' corporate social responsibilities, with none of the companies disclosing its resolve of present and potential environmental litigation. The study finds that manufacturing companies had a statistically significant lower level of environmental disclosures than the mining companies. Generally, the level of disclosure by the sampled firms consistently increased over the study period with the exception of 2010, where there was a decline in the level of environmental disclosures. This is consistent with the findings of Welbeck (2017).

5.2.3 Environmental Performance

To add, the study finds that on the average, the environmental performance of the sampled companies was averagely three, indicating a good environmental performance (blue colour). The best environmental performing firms received the green colour, indicating very good environmental performance. Most of the firms, however, received a red colour rating over the study period indicating a poor environmental performance. Although the average environmental performance of both mining and manufacturing industries increased over the study period, the study finds that the mining firms performed better than the manufacturing firms throughout the study period with the exception of 2009. The study finds that the level of environmental performance of the mining companies was not statistically different from the environmental performance of the manufacturing companies. Any difference reported in the level of environmental performance between the two industries was merely due to chance.

5.2.4 Relationship between Environmental Disclosure and Environmental Performance

To achieve this objective, the study uses a panel regression model which involved pooled observations on a cross-section of variables on twenty-five (25) sampled firms over a four-year period from 2009 to 2012. Based on the random effect and clustered standard errors estimation models, the study finds that environmental performance of the mining and manufacturing companies negatively affect their level of environmental disclosures. The effect of the environmental performance on the level of environmental disclosures is statistically significant. This finding is consistent with the first hypothesis and suggests that the mining and manufacturing companies use their environmental disclosures as a tool for legitimization. This is consistent with the findings of Patten (2002), Cho and Patten (2007), and Guidry & Patten (2012).

5.2.5 Control Variables and Environmental Disclosure

The study finds that firm size is a statistically significant determinant of environmental disclosures of mining and manufacturing companies. The effect of firm size on environmental

disclosures is a positive one. This indicates that larger mining and manufacturing companies tend to make more environmental disclosures than smaller companies. Capital intensity, on the other hand, had a statistically significant negative effect on the environmental disclosures of the mining and manufacturing companies. This indicates that mining and manufacturing companies in Ghana that undertake more investment in new capital assets to generate revenue tend to disclose less environmental information.

Return on assets was found to negatively affect the level of environmental disclosures. The effect of return on assets on environmental disclosures was however not statistically significant. The study also finds that highly levered mining and manufacturing companies tend to make less environmental disclosures, with the less stable companies (as indicated by firm age) making more environmental disclosures. Finally, the study finds that the kind of industry the companies operated in did not have a statistically significant impact on their level of environmental disclosures.

5.3 CONCLUSIONS

To begin, the study concludes that the AKOBEN is comprehensive in evaluating the rating criteria it sets out to assess. However, the same cannot be said about it generally as an environmental performance rating tool since it ignores other relevant rating criteria such as the quality of the products of the companies being assessed, corporate governance issues, as well as issues related to corporate behaviour like business ethics, tax transparency and anti-competitive practices of the companies. The data collection, verification, processing, and analysis process is complex enough to ensure that the right data is captured and the problem of subjectivity is eliminated in the rating of the companies. The AKOBEN, if properly and effectively managed and implemented, will help the EPA in its attempt to regulate the effects of business activities on the environment and ensure environmental accountability. The

disclosure process based on the policy guideline is adequate. There is however the need to adhere to the policy guidelines in relation to the disclosure of the rating results.

The study also concludes that the level of environmental disclosures by mining and manufacturing companies in Ghana is on the ascendency, particularly issues related to corporate social responsibilities. The mining companies make more of such disclosures than their counterparts in the manufacturing industry. However, these companies make no disclosures about their resolution of environmental litigation, whether present or potential. Similarly, the mining companies perform better than the manufacturing companies better in terms of their environmental performance based on AKOBEN.

The results of the study indicate that the environmental performance of the mining and manufacturing companies in Ghana influences their level of environmental disclosures. The results indicate that poor environmental performers tend to disclose more environmental information. The results of the study support the predictions of the legitimacy theory that companies use environmental disclosures as a management tool to attain legitimacy in the society in which they operate.

The study also concludes that firm size has a statistically significant positive impact on the level of environmental disclosures of mining and manufacturing companies in Ghana. This indicates that larger mining and manufacturing companies tend to make more environmental disclosures than smaller ones. In addition, the study concludes that highly levered mining and manufacturing companies in Ghana disclose more environmental information.

Finally, the study concludes that capital intensity is a statistically significant determinant of the level of environmental disclosures of mining and manufacturing companies in Ghana. It

has a negative effect on the level of these companies in Ghana. This provides an indication that all other things being equal, the higher the level of investment in new capital assets to generate revenue, the lower the level of environmental disclosures.

5.4 CONTRIBUTIONS OF STUDY

The study makes two major contributions to the existing literature. Firstly, the impact of environmental performance of mining and manufacturing companies in Ghana on their level of environmental disclosures lends support to the predictions of the legitimacy theory. Mining and manufacturing companies in Ghana make more environmental disclosures when they perform poorly environmentally, as a way to legitimize their continuous stay and operation in the society in which they find themselves. For mining and manufacturing companies in Ghana, the implication is that, in order to gain their right of existence within the societies in which they operate, it is imperative to make more environmentally-related disclosures in their corporate annual reports. This will help these companies to manage the social and political pressures they face, as well as the accompanying risks, especially when these companies are poor environmental performers.

Another contribution to literature is that, in contrast with the expectation that more profitable companies will disclose more environmental information as they will have enough resources to meet the extra voluntary disclosure cost of making environmental disclosures, the study found that more profitable mining and manufacturing companies make less environmental disclosures. This is because less profitable companies, unlike more profitable ones, have the incentive to make more of environmental disclosures as a way to provide a justification for their level of profitability.

5.5 RECOMMENDATIONS

The findings and conclusions drawn from the study have key implications for policy, practice, and further studies. Subject to the findings and conclusions from the study, the following recommendations are made.

5.5.1 Recommendations for Policy

To begin, there is the need for the EPA to push for the establishment of a legislative instrument or framework that will provide a backing for the AKOBEN. This will generally enhance the acceptability and effectiveness of the performance rating.

Secondly, there is the need for the establishment of an independent advisory board tasked with the responsibility of adjudicating disputes that may arise either before or after the disclosure of the rating results. However, the membership of such a board must include representatives of the various stakeholders that have interest in environmental governance and management in order to enhance the objectivity and acceptability of the whole assessment process.

In addition, the EPA should consider extending the rating to cover other industries whose activities have an impact on the environment. Key among such industries to be considered would be the oil and gas sector. It is also worth mentioning that the timing of such an extension must be right in order to ensure its effective implementation.

Without ignoring the focus of the AKOBEN on firms in the mining and manufacturing industries, it is imperative for the regulators to modify the rating to also include labour-related issues as the employees of every organization are the most valuable assets of such organizations (Kumar, Hossain, & Jebin, 2016). Also, the EPA should consider an expansion of the rating criteria to cover corporate governance issues, as well as issues related to

corporate behaviour as they affect environmental management policies and processes of companies.

Finally, the EPA must put in place punishment and reward schemes. ‘Naming and shaming’ bad environmental performers only may not be enough motivation to ensure that these companies perform better environmentally. For instance, the EPA could institute punitive sanctions such as fines against companies who consistently perform poorly based on the AKOBEN. Also, EPA could institute awards schemes mainly to reward companies with better environmental performance in order to encourage the other companies to perform better in subsequent assessment years.

5.5.2 Recommendations for Practice

The study finds that on the average, the sampled companies had an unsatisfactory environmental performance based on the AKOBEN. Also, the companies disclosed three out of the disclosure areas identified, indicating a low level of disclosure. This indicates that there is the need for management to increase their level of environmental disclosures in order to ensure that they gain the acceptance of the society at large. Also, management ensure that their companies adhere to the requirements of the AKOBEN in order to enhance their environmental performance. To do this, there is the need for consistent education for managers, as well as sensitization programmes, on the need for the companies to strive to achieve better environmental performance ratings and the disclosure of their environmentally-related activities.

5.6 LIMITATIONS OF STUDY

As with any research, this study is subject to a few limitations. The study evaluates the environmental performance rating tool without considering the perceptions of the key

stakeholders about appropriateness of the rating tool. The perceptions of key stakeholders about the appropriateness of the AKOBEN is imperative in reaching a conclusion as to whether or not the AKOBEN environmental performance rating tool is comprehensive enough as a rating tool. However, the current study focused on the assessment of the tool vis-à-vis other performance rating tools, without recourse to the opinions of stakeholders about the appropriateness of the rating tool.

To add, in assessing the level of environmental disclosures, the study did not consider the quality of such disclosures. The current study, in scoring the environmental disclosures of the sampled firms failed to categorize these disclosures based on the quality, either quantitatively or qualitatively. Such distinction could also provide further information as to the sampled firms that make decision-useful environmental disclosures in their corporate annual reports and those that do not. Such distinction can provide a new dimension in the analysis of the data gathered.

Also, the study does not consider all companies assessed by the rating tool due to the selection criteria used in sampling the companies for the study. The current study only considers a sample of the overall population assessed by AKOBEN. Considering all these companies may further improve on the findings of such study.

5.7 SUGGESTIONS FOR FUTURE RESEARCH

Following from the limitations of the study, future studies should consider the following recommendations. An area for future studies will be the assessment of the perception of stakeholders on how appropriate the AKOBEN is as a tool for evaluating environmental performance. In addition to this, future studies can also assess the perception of stakeholder

groups about the call for the extension of the AKOBEN to cover other industrial sectors of the economy.

The trend analysis indicated that on the average, the level of environmental disclosures by mining and manufacturing companies increased over the study period, with the exception of 2010. Consistent with the call made by Welbeck (2017), future studies should investigate the causes of the decline in the level of environmental disclosures in 2010 as indicated by trend analysis. The study further finds that none of the companies disclosed their resolution of present and potential environmental litigation. Future studies could assess the rationale for the non-disclosure of such issues if they exist. Finally, future studies could extend the scope to include all other mining and manufacturing companies that are assessed based on the AKOBEN, with a focus on the quality of their environmental disclosures.

5.8 CHAPTER SUMMARY

This chapter presents a summary of the findings and conclusions drawn from the findings in line with the objectives of the study. It further presents the contribution of the study to literature. The chapter concludes by making recommendations for both policy, practice, and future research.

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APPENDIX A: ENVIRONMENTAL DISCLOSURE AREAS USED FOR CONTENT ANALYSIS

1. Discussion or mention of company's compliance with specific environmental regulations
2. Discussion or mention of company's processes, facilities, or product innovations relative to reduction of environmental degradation
3. Statement or discussion environmental compliance status
4. Statement or discussion of company's concern for the environment
5. Discussion or mention of company's CSR activities
6. Statement or mention of company's reportage to EPA
7. Discussion or mention of company's resolve of present and potential environmental litigation

