Critical Assessment of Environmental Sustainability Reporting Using the GRI G4 Guidelines: A Case Study of the South African Gold Sector

By

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VLJDAV003

Submitted to the University of Cape Town

In partial fulfilment of the requirements for the degree:

MPhil Specialising in Sustainable Mineral Resource Development

In the Department of Chemical Engineering

August 2019

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University of Cape Town

Abstract

Sustainability reports ought to be key channels for communication with stakeholders, enhancing organisational accountability and transparency. However, the proliferation of sustainability metrics and the voluntary nature of reporting leads to inconsistencies in the quality of sustainability reporting, invariably affecting its functionality and effectiveness. This research project investigates the quality and functionality of sustainability reporting within the South African gold mining sector. Firstly, a framework for characterising and subsequently assessing the quality of sustainability reports was developed based on a review and analysis of the published literature. This framework was then applied in a multi-method approach consisting of a desktop review involving a content analysis of three company reports that disclose performance according to the GRI G4 Guidelines, and semi-structured interviews with key internal and external stakeholders. The analysis shows that while sustainability reports in the South African mining sector have been found to have beneficial functions for both internal and external stakeholders, they also presented quality issues that are both technical and socio-political in nature. More specifically, the study found that sustainability reports are used internally at an executive level and that the reporting process enhances organisational transparency and accountability. Externally, sustainability reports were found to be used as a source of performance information and as an indicator of company commitment and legitimacy. However, the quality issues, namely levels of aggregation and detail, as well as the degree of integrity, were considered to have a negative effect on the functionality and effectiveness of sustainability reports for stakeholders. This study offers insight into how companies report and how stakeholders perceive and relate to sustainability reporting, and in turn serves to highlight both strengths that should be encouraged, and weaknesses that detract from sustainability reports' effectiveness and functionality. The application of a multi-criteria framework in a multi-method approach provides a more holistic picture of the quality and functionality of sustainability reports, allowing technical and political quality issues to be discussed in a simultaneous study, as well as highlighting the complexities and nuances of sustainability reporting.

Statement of Originality

DECLARATION

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13/08/2019

Acknowledgements

First and foremost, I would like to acknowledge the immense support, mentoring and guidance from my supervisor Professor Jennifer Broadhurst. Your contribution has been immense and is hugely appreciated. Thank you for this academic and personal journey.

I would also like to thank Dr. Edson Charikinya, Professor Harro Von Blottnitz and Professor Michael Solomon for their mentoring and contributions to this project.

I would like to thank all the individuals who assisted with the research and gave their time to be interviewed. Due to confedentiality reasons, I will not mention any individuals, but your willingness and assistance made a large component of this research possible.

I would also like to thank the African Development Bank, the National Research Foundation and Professor Jochen Pieterson and the Minerals to Metals research group for funding and enabling this research.

Then I would like to acknowledge the MPhil and honorary MPhil community for creating a shared space of support and learning. In particular I would like to acknowledge Reuben Dlamini, Alexandra Himunchul, De Waal Hugo, Conchita Kamanzi, Lelia Lelia and Bonolo Skee.

Finally, I would like to thank my off-campus community for emotional and personal support and nurturing. In particular I would like to acknowledge the following people: firstly, Matthew Fraser and Joshua Hartford, for their support and friendship at home. Secondly, my parents Carolyn and Stephen, and sisters, Rebecca and Maya, for their continual support, love, interest and enthusiasm. Thirdly, Chantel ‘Cinque’ Newmark, for being who you are: my rock and angel.

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Glossary

Quality Factor	Characteristics of sustainability reports that affect the quality criteria of sustainability reports. Quality factors can either be of a Functionalist perspective or of a Critical perspective.
Functionalist perspective quality factors	Quality factors that are as a result of technical factors in following reporting guidelines.
➢ Aggregation	The act of geographically aggregating data. The order of aggregation from least aggregated to most aggregated is: site or operation, region, country, continent, global.
➢ Clarity	The amount of obscuring of information there is, as well as the level of ease to which a sustainability report can be used.
➢ Completeness	The extent to which a company reports against the GRI Indicators. This is both as an absolute amount, and against each Indicator. For each Indicator a company can say not reported, partially reported, fully reported or not applicable.
➢ Consistency	The extent to which companies reporting practices are consistent with respect to the completeness, detail and aggregation of their disclosers. This refers to both inter and intra company reporting.
➢ Detail	The extent to which a company provides detail against a given Indicator.
Critical perspective quality factors	Issues that are a result of political factors in following the reporting guidelines.
➢ Balance	The balance between reporting on positive sustainability performance and negative sustainability performance. Balanced reporting is a key principle of the GRI Guidelines.
➢ Credibility	The degree to which company's reports and disclosures are credible.
➢ Integrity	The true commitment of a company t sustainable development and thus the extent to which their sustainability report is hiding the truth.
Quality criteria	Quality criteria are elements of sustainability reports that are affected by quality factors and in turn affect the effectiveness and functionality of a sustainability report.
➢ Accessibility	The ability to which the necessary information can be accessed by stakeholders.
➢ Comparability	The ability to which stakeholders can compare the necessary information.
➢ Materiality	The extent to which the information is of significant importance or use to the stakeholder, or to which the information represents an issue that has significant impacts on the stakeholder and/or the company. Materiality is a component of relevancy. i.e. if an issue has an impact it is relevant and material, but an issue can be relevant

	without being material. Furthermore, the GRI reports according to materiality and not relevancy.
➢ Relevancy	The extent to which the information is appropriate, useful or important to the stakeholder, or to which the information represents an issue that is related to or required by the stakeholder. An issue is first relevant, and if it has a significant impact on a stakeholder and/or company, then the issue is material.
➢ Reliability	The extent to which a stakeholder can trust the information provided in terms of quality factors.
Effectiveness	The ability for the information provided to bring something to effect for the stakeholders, such as transparency and accountability. The effectiveness is a function of the quality criteria.
Functionality	The ability for the information to fulfil the completion of a function, such as enhanced transparency or accountability. The functionality is also a function of the quality criteria.
Transparency	"Timely and reliable economic, social and political information, which is accessible to all relevant stakeholders" (Kolstad and Wiig, 2009).
Accountability	"The principle of providing to society the information about which it has a right to know" (Gray and Milne, 2004).
Stakeholders	"Groups that can affect, or are affected by, the accomplishment of organisational purpose" (Freeman, 1984).

Abbreviations and Acronyms

COP	Communication on Progress
COPD	Chronic Obstructive Pulmonary Disease
CDP	Carbon Disclosure Project
CSR	Corporate Social Responsibility
CWP	Coal Workers' Pneumoconiosis
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
EIA	Environmental Impact Assessments
EMPR	Environmental Management Programme Report
GRI	Global Reporting Initiative
GRI G4 Guidelines	The fourth version of the GRI guidelines
GRI Standards	The most recent version of the GRI guidelines
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immuno Deficiency Syndrome
IIRC	International Integrated Reporting Council
ISO	International Organisation for Standardisation
PM	Particulate Matter
SLO	Social Licence to Operate
SRT	Sustainability Reporting Tool
TB	Tuberculosis
UNEP	United Nations Environment Programme

UNGC	United Nations Global Compact
WDP	Water Disclosure Project
WHO	World Health Organisation
WUL	Water Use Licence

Chapter 1

Introduction

1.1. Background

The South African gold mining industry has historically been a major driver of the country's economy as well as socio-political landscape (Smit, 2013). For over a century it has provided employment, investments, infrastructure, and taxes (Onn and Woodley, 2014; Schonfeld *et al.*, 2014), and been responsible for the development of dozens of cities and towns across the country, most notable of which is Johannesburg (Naicker *et al*., 2003; Durand, 2012; Ojelede *et al*., 2012; Kneen *et al.*, 2015). Gold was first discovered in the Witwatersrand Basin in 1886, a geographical feature that was once the largest gold resource in the world (Minerals Council South Africa, n.d.). This discovery transformed South Africa's agricultural economy into a mining economy, and opened the country up for international trade (Durand, 2012; Rand Refinery, 2013). However, the gold mining industry is also responsible for a legacy of inequality, exploitation, damaged family structures, health impacts and environmental degradation (Lawrence and Samkin, 2005; Durand, 2012; de Villiers *et al*., 2014; International Human Rights Clinic (IHRC), 2016). Furthermore, it is important to note that apartheid is inextricably linked to the gold mining industry in particular (de Villiers *et al*., 2014; Benchmarks Foundation, 2017). The industry has left a legacy of ownerless and abandoned mines and tailing storage facilities that compromise the health and safety of nearby communities and eco-systems due to air, water and soil pollution including but not limited to acid mine drainage (Winde and van der Walt, 2004; Duruibe *et al*., 2007; Durand, 2012; Bobbins, 2015). Furthermore, the gold industry is in decline and global commodity markets are turbulent (Mudd, 2007; Hartnady, 2009; Chamber of Mines of South Africa, 2017). From 2004 to 2016, South Africa's percentage of global gold production fell from 13.5% to 4.4% (Chamber of Mines of South Africa, 2017). Furthermore, the Witwatersrand reserves are nearly exhausted (Hartnady, 2009), and there are only an estimated 39 years of accessible gold reserves remaining (Statistics South Africa, 2018). It is thus clear that the South African gold industry is in a precarious situation, and is running out of time to create a sustainable legacy.

Governments, civil society and, more recently, finance are putting increasing pressure on mining companies to account for their social and environmental impacts and to justify their continued existence, forcing mining companies into adopting sustainability agendas (Mudd, 2008; Higgins and Coffey, 2016). Many mining companies, particularly multi-nationals, are reporting on their sustainability performance in publicly available annual reports, commonly termed sustainability reports, using standardised frameworks developed under the auspices of various responsible business initiatives (Siew, 2015). Sustainability reports are believed to play an important role in mining company's sustainability agendas, and the primary purpose of sustainability reports can be seen to

increase transparency and accountability in terms of a company's sustainability performance (Global Reporting Initiative (GRI), 2010 and 2017**;** Milne and Gray, 2013; Stubbs *et al*., 2013; Higgins and Coffey, 2016). In the mining industry, the Global Reporting Initiative (GRI) guidelines are the most common and revered framework that guides companies on how to compile sustainability reports (Morhardt *et al*., 2002). However, issues relating to quality can impede the functionality and effectiveness of sustainability reports in driving increased accountability and transparency (Drivdal, 2015; Higgins and Coffey, 2016).

These quality issues relate to the relevance and credibility of information, as well as technical aspects such as the level of aggregation, detail and completeness of disclosures (Mudd, 2012; Fonseca *et al*., 2013; Responsible Mining Foundation (RMF), 2018 and 2019). Whilst enhanced reputation is a key driver for sustainability reporting, companies are also accused of hiding bad news and green washing in order to manage their reputation and protect themselves from litigation (Gray and Milne, 2004; Hamann and Kapelus, 2004; Fonseca, 2010; de Villiers and van Staden, 2011a; Higgins and Coffey, 2016; Boiral and Henri, 2017).

The focus of studies to date has been mainly on the technical and logistical issues relating to reporting guidelines and practices, while little consideration given to issues relating to political factors, let alone considering both political and technical issues in parallel. Literature has also not been clear as to what extent these quality issues affect the functionality or perceived usefulness of sustainability reports.

1.2. Problem Statement

Mining companies are under increasing pressure to demonstrate that their performance is consistent with the principles of sustainable development. This pertains, in particular, to the gold mining industry in South Africa, which has been associated with significant environmental, socio-economic and community impacts. Although sustainability reporting can play a key role in increasing transparency and accountability to external stakeholders, quality issues can affect their effectiveness and functionality. Despite sustainability reports being recognised as being of critical importance in literature, comprehensive studies on quality issues and their relationship to functionality have been limited.

1.3. Scope of Study

The aim of this study is to investigate the quality and functionality of sustainability reporting within the gold mining sector in South Africa, with specific emphasis on environmental issues. To this end, a multi-method approach has been applied, which takes the form of two different sub-sets of the South African gold mining sector case study:

(i) A review and critical analysis of publically available literature was conducted in order to develop a more comprehensive understanding of the sustainability issues of specific concern

to the gold mining sector of South Africa, as well as the status of sustainability reporting of relevance to the mining sector, with particular emphasis on quality issues and functionality. This review informed, and served a basis for, subsequent case studies as outlined in ii and iii.

(ii) A desktop study involving a content analysis of sustainability reporting in the local gold mining sector was conducted. The desktop study focused on the reporting against select environmental indicators from the GRI G4 Guidelines by three multi-national gold mining companies operating in South Africa, namely AngloGold Ashanti, Gold Fields and Harmony. This assessment set out to identify sustainability reporting issues of a technical and logistic nature. Quality issues of a political nature are not considered, as this is perceived to be too speculative and subjective.

(iii) Semi-structured interviews with key internal and external stakeholders were conducted in order to determine the perceptions on the experiences, usefulness and quality of sustainability reports in the local gold mining sector, with specific focus on reporting of environmental impacts. This part of the study provided insights into quality issues of both a technical and political nature, as well as the perceived functionality of sustainability reports.

This study does not set out to provide an overall rating or score on the performance of the individual company's sustainability reports or reporting practices, nor does it provide a statement on which company reports the best. It rather offers insight into how companies report and how stakeholders perceive and relate to sustainability reporting. This in turn serves to highlight both strengths that should be encouraged, and weaknesses that detract from sustainability reports' effectiveness and functionality. This research thus contributes findings to the uses and purpose of reports, as well as the limitations of sustainability reports. Findings from this study also provide evidence and results for studies on the applicability and quality of the GRI G4 Guidelines.

It is further recognised that whilst this study focuses specifically on the environmental aspects of sustainability reports, sustainability reporting also needs to consider other criteria pertaining to social and economic performance. Thus, there is are innate limitations in this study as a consequence of only considering environmental aspects of sustainability reporting, namely a lack of assessment of the compliance and subsequent quality and functionality of the compliance of gold mining companies with respect to social and economic reporting indicators. Nevertheless, the focus on environmental impacts is considered justified given the extent of these impacts, and their direct social and economic consequences, especially on vulnerable and previously disadvantaged communities who often exist in close proximity to gold mining operations in the South African context. Furthermore, it is proposed that the key findings of this study will be of relevance to all aspects of sustainability reporting within the gold mining sector. Similarly, while the study focusses on the gold mining industry in South Africa, findings from these studies will be largely applicable to different mineral commodities worldwide.

In view the absence of a definable 'population' of the interview respondents, the percentages associated with the views of the interviewees has no statistical significance. Nevertheless, it does

provide a convenient way of representing broad variations between the sentiments of internal and external stakeholders. The stakeholders were chosen to represent a wide range of the relevant stakeholders with the notable omission being trade unions. Furthermore, it is noted that the views of a particular stakeholder does not represent the views of all stakeholders from that group. However, most stakeholder groups have more than one representative, the notable exception being government. Understanding the extent to which the concerns and perspectives are representative would require a more detailed survey and statistical analysis.

1.4. Structure of Dissertation

The dissertation, as illustrated in Figure 1, will be structured as followed:

1. **Chapter 1** introduces the thesis by providing the necessary background to motivate the problem statement. After which the overarching aim and the scope of the project and its three composite parts are discussed.
2. **Chapter 2** reviews and analyses the published literature. Firstly, literature on South Africa's gold industry is discussed, namely its history, impacts and legacies, thus setting the context for the role of sustainability agendas and reporting. Secondly, literature on sustainability reporting is reviewed, covering its history and development, the various sustainability reporting tools, its benefits, roles and purposes, and finally issues relating to its quality. Finally, from this literature review, the various terminologies relating to the quality of sustainability reports are synthesised into a conceptual framework characterising the quality issues and criteria of sustainability reports and illustrating their effect on the functionality and effectiveness in enhancing accountability and transparency. Furthermore, the key research questions are presented.
3. **Chapter 3** outlines the methodology of the case study pertaining to sustainability reporting within the gold mining industry, with a specific focus on environmental issues. This case study consists of a) a desktop study in which sustainability reports of major gold mining companies operating in South Africa are analysed in terms of quality issues, and b) semi-structured interviews with key experts in which their perception and experience of use and quality of sustainability reports is investigated.
4. **Chapter 4 and Chapter 5** present the results and discussion of the desktop study and the semi-structured interviews respectively**.**
5. Finally, **Chapter 6** presents a synthesis of results and concludes on the key research questions. Furthermore, based on the findings from this project it provides recommendations for further studies and industry application.

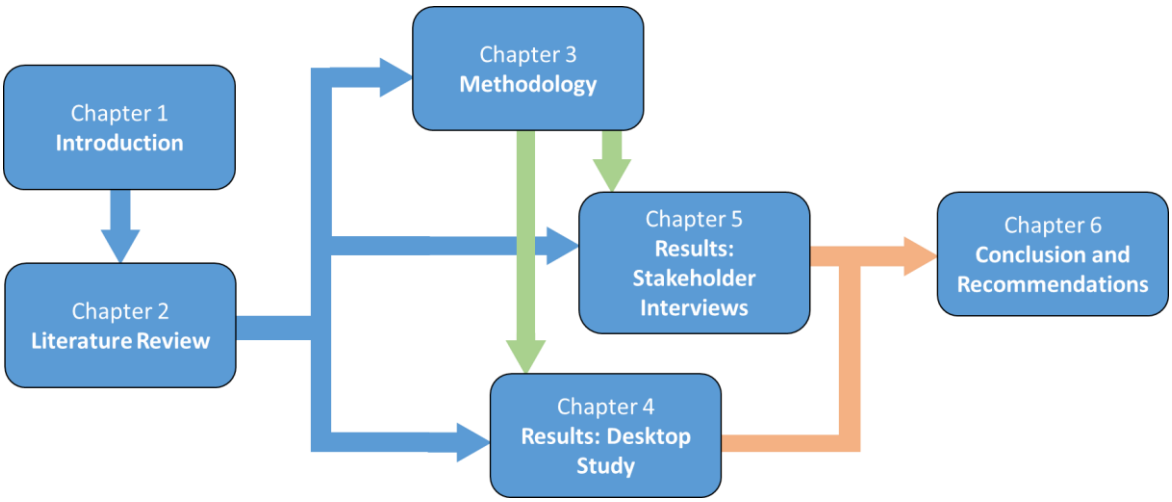

Figure 1: Infographic illustrating the structure of the thesis

Chapter 2

Literature Review

This chapter provides a more detailed review and assessment of the gold mining sector in South Africa (Section 2.1), as well as the development and status quo of sustainability reporting (Section 2.2). The various terminologies concerning quality are then synthesised into a conceptual framework that characterises these quality issues and criteria, and illustrates their effect on the functionality and effectiveness of sustainability reports in driving increased accountability and transparency (Section 2.3).

2.1. The Gold Sector in South Africa

This section provides a review and assessment of South Africa's gold industry. A brief history of the gold industry is provided, highlighting its significance in the development of the country (economically and socio-politically) as well as the associated legacies that continue to impact on the local environment and communities. The current state of the industry and its uncertain future is also discussed.

2.1.1. History and Legacy Impacts

The Witwatersrand region sits on top of a geographical feature called the Witwatersrand Basin which was once "the world's largest gold resource" (Minerals Council South Africa, n.d.). Gold was first discovered here in 1866, a discovery that was a major turning point in the history of this country; transforming an agricultural economy into a mining economy, and opening South Africa up for international trade (Durand, 2012; Rand Refinery, 2013). South Africa subsequently became the largest global gold producer and the discovery of gold initiated the development of many major towns, including Johannesburg, one of the largest and most successful cities in Africa (Durand, 2012; Charikinya *et al.*, 2017; Minerals Council South Africa, n.d.). Cities, towns and inner-city slums developed alongside the development of the mining industry (Naicker *et al.*, 2003; Durand, 2012; Ojelede *et al.*, 2012; Kneen *et al.*, 2015), with Smit (2013) regarding the mining industry as being largely responsible for shaping not only South Africa's economy, but also its socio-political and cultural landscape.

For the past 150 years, the South African mining industry – and especially gold mining - has been a key driver of the country's economy, contributing to economic development through the provision of infrastructure, investments, taxes, royalties, employment, skills and training (Onn and Woodley, 2014; Schonfeld *et al.*, 2014). In 2017, gold producers contributed R1.6 billion in taxes and had 112 200 employees, with employees earnings in 2017 sitting at R29.5 billion (Minerals Council South Africa, n.d.). However, studies by Mudd (2007), Hartnady (2009) and the Chamber of Mines of

South Africa (2017) show that, whilst South Africa has the third largest gold reserves in the world, the ore grade and gold production is declining. In accordance with the figures in Table 1, in 2004 South Africa produced 13.5% of total global gold production, whilst in 2016 (12 years later) South Africa accounted for only 4.4% of the world's gold supply (Chamber of Mines of South Africa, 2017). There is also a clear indication that South Africa's ore is declining in grade (Mudd, 2007). In accordance with Chamber of Mines of South Africa (2017), national ore grade declined from an average of 4.7 g/tonne in 2004 to 2.7 g/tonne in 2015 (Chamber of Mines of South Africa, 2017). Worth noting, however, is that despite declining production and ore grade of South African gold since 1980, the value of the sales (in real terms) were increasing until about 2012 (due to an increasing gold price), and have only relatively recently started to decrease (Table 1).

Table 1: South Africa's gold production versus global gold production, as well as South African sales of gold in real terms normalised to a 2010 value for each year (modified from Chamber of Mines of South Africa (2017), with own calculations for real values of sales (see Appendix A))

	World gold production (tons)	SA gold production (tons)	SA Percentage of total (%)	Sales (R '000 000)	SA Sales in real terms[1] (R '000 000)
2004	2504	337	13.5	29 272	42 064
2005	2560	295	11.5	24 458	33 972
2006	2495	272	10.9	37 069	49 263
2007	2498	253	10.1	36 422	45 177
2008	2430	213	8.8	44 715	49 707
2009	2612	198	7.6	49 046	51 144
2010	2739	188	6.9	53 035	53 035
2011	2838	180	6.3	66 960	63 801
2012	2861	154	5.4	74 017	66 748
2013	3042	160	5.3	57 479	49 020
2014	3131	152	4.8	57 139	45 906
2015	3209	145	4.5	58 627	45 053
2016	3222	142	4.4	63 491	45 897

[1:] SA sales in real terms use the year 2010 as the baseline

The data in Table 1 are consistent with the descriptions by Hartnady (2009) and Mudd (2007) of the local gold mining industry as a shrinking or 'sunset' industry, with many of the currently operating mines being in a precarious position. According to the Minerals Council South Africa more than half of the country's gold industry is marginal at current gold prices, which declined by over 8% from 2016 to 2017 (Minerals Council South Africa, n.d.). This supports Hartnady's (2009) statement that "The glory days of South African gold mining appear to have arrived finally at an ignominious end". One unique challenge facing South African gold mines is the type and location of the ore. South African mines are the deepest in the world, extending below the surface to up to 3,4 km (AngloGold Ashanti, n.d.). This has impacts on energy consumption, as well as on the health and safety of the workers (Johnston, 2012).

Despite production decline, the value of gold sales is still in the top three of the South African mineral commodities, accounting for 15% of mineral sales, and being preceded only by coal (28%) and platinum group metals (21%) (Statistics South Africa, 2018). Whilst Hartnady (2009) claims that the Witwatersrand reserves were already 95% exhausted in 2009, a recent report by Statistics South Africa (2018) estimates that there remains 39 years of accessible gold reserves. And whilst employment has steadily declined since the 1980's, the industry was still responsible for the employment of 116 000 people in 2016 (Chamber of Mines of South Africa, 2017; Minerals Council South Africa, n.d.). Gold mining thus remains a crucial source of income for many communities around South Africa, with up to 10 dependents per employee in the gold industry, and two indirect jobs created per direct-mining-sector job (Minerals Council South Africa, n.d.). Furthermore, the treatment and subsequent reclamation of gold from sulfidic tails is likely to extend the life of the gold mining sub-sector. Surface mining of tailings dumps made up 6.4% of national gold production in 2016, and is predicted to continue to be a major source of gold in the future (Charikinya *et al.*, 2017).

2.1.2. Environmental and Social Impacts

Despite its economic contribution, the legacy of South Africa's gold mining industry is one also associated with historical human rights violations, environmental injustices and economic inequality (Durand, 2012; IHRC, 2016). The vast architecture of apartheid and inequality was directly linked to the power of the various players in the industry, and so the socio-economic development mentioned previously often undermined the quality of life and was at the expense of the poorest and most vulnerable stakeholders (Truth and Reconciliation Commission (TRC), 1998; cited by Sharife and Bond, 2018). There is a wide range of social issues stemming from gold mining that undermine the sustainable development of gold mining communities, such as the exploitation of migrant labourers which resulted in torn family structures and in the absence of a black middle class emerging in mining areas (de Villiers *et al.*, 2014). Likewise the spread of occupational diseases such as tuberculosis (TB), coal workers pneumoconiosis (CWP), silicosis and HIV/AIDS are heavily linked to the mines working conditions and living arrangements in single-sex hostels (Lawrence and Samkin, 2005; de Villiers *et al.*, 2014).

In its wake, the gold industry's environmental legacy is one of abandoned tailings storage facilities (TSFs) and mines (Durand, 2012; Bobbins, 2015; Benchmarks Foundation, 2017; Broadhurst *et al.*, in press). AngloGold Ashanti (2005) reported that in the Witwatersrand area alone there are 270 TSFs covering approximately 400 km^2. Defunct mine shafts and TSFs remain a major source of air, soil and water pollution (Winde and Van Der Walt, 2004; Duruibe *et al.*, 2007; Durand, 2012; Bobbins, 2015). These TSFs and the exposed rock in the old mine shafts contain large quantities of iron pyrite or 'fools gold' (FeS_2), which, when exposed to the oxygen and water, reacts to form an acidic solution (termed acid rock drainage (ARD) or acid mine drainage (AMD)). This acidic effluent then leaches into, and pollutes, underground and surface water systems (see reports by Venter, 1995; McCarthy,

2011; Bobbins, 2015; Broadhurst *et al*., in press). Acidic drainage contains, in addition to high levels of sulphate, elevated concentrations of metals such as manganese, aluminium, iron, nickel, zinc, cobalt, copper, lead, radium, thorium and uranium (Venter, 1995; Coetzee *et al.*, 2006; Durand, 2012). Exposure of plants, animals and humans to such metals, some of them bio-toxic heavy metals, has serious health implications and may even be fatal depending on the concentration and extent of exposure (Venter, 1995; Duruibe *et al*., 2007). Some of the metals present, namely uranium, thorium and radium, are radioactive and carcinogenic (Bobbins, 2015; Ngole-Jeme and Fantke, 2017). In addition to these metals, the TSFs also contain process chemicals, most notably cyanide, which is a potentially fatal substance that causes damage to animal and human cardiovascular and respiratory systems (Agency for Toxic Substances and Disease Registry (ATSDR), 2010; Durand, 2012). In accordance with Durand (2012), pollution of local water resources affects many thousands of people in the vicinity of defunct and active mines, who depend on these polluted rivers, aquifers and ground water systems for drinking and agriculture.

In addition to the AMD-related impacts, wind-blown dust from TSFs also contain elevated concentrations of sulphates, metals, heavy metals, radioactive metals and toxic chemicals (Durand, 2012; Bobbins, 2015; Ngole-Jeme and Fantke, 2017). Wind-blown dust from abandoned, poorly rehabilitated and current TSFs continues to impact on surrounding human settlements and environments (Ojelede *et al*., 2012; Kneen *et al*., 2015). According to a study by Ojelede *et al.* (2012), communities that are outside of the buffer zones can still be at health risk and suffer the environmental consequences from wind-blown dust as wind can distribute particulate matter far distances from the TSFs. Specifically crystalline silica, the mineral that causes silicosis and other lung diseases, can travel upwards of two kilometers in strong winds (Ojelede *et al*., 2012; Kneen *et al*., 2015; cited by Broadhurst *et al*., in press).

Aggravating the health risk of this water, air and soil pollution is the close situation of human settlements to TSFs and defunct gold mines, sometimes within tens of meters of polluted water and TSFs. Despite local and international mining regulations stipulating that a buffer zone must exist that prevents people from residing within 500 meters from TSFs, this is very seldom adhered to (Kneen *et al*., 2015; cited by Broadhurst *et al*., in press). Government subsidy housing (otherwise known as RDP housing) has been built and communities have been relocated (by government) to areas within these buffer zones (Kneen *et al.*, 2015). Tudor Park is one such community that is close to a TSF as a result of a government relocation in 1996 and whose soil has been tested to find elevated levels of heavy and radioactive metals (Cairncross and Kisting, 2016).

Whilst the negative environmental and health consequences of pollution from defunct mine shafts and TSFs are not limited to any group of people, a recent study done by the International Human Rights Clinic clearly showed that it was poor and disempowered communities that experienced most of the pollution impacts (IHRC, 2016; cited by Broadhurst *et al*., in press). Studies by Johnston (2012) and Mudd (2007) have shown that declining ore grades has contributed to an increase in the generation of waste rock and tailings, a decrease in energy efficiency and an increase in resource intensity which

impacts heavily on the environment, communities and the mines financial viability (Mudd, 2007; Johnston, 2012). These challenges are further aggravated by conflicts with mineworker unions over wage disputes (Bond and Mottiar, 2013), declining levels of employment (Behar and Hodge, 2008; Phakathi, 2012), and with environmental impacts and conflicts with informal miners (zama-zamas) (Hartnady, 2009; Debrah *et al*., 2014; Ledwaba and Nhlengetwa, 2016).

2.2. Sustainability Reporting and Reports

This section of the chapter provides a review and assessment of sustainability reporting, including its history and development (Section 2.2.1), the status quo of sustainability reporting tools (Section 2.2.2), voluntary vs mandatory reporting (Section 2.2.3), as well as the purpose, benefits and effectiveness of sustainability reports (Section 2.2.4).

2.2.1. History and Development of Sustainability Reporting

The discussions in Section 2.1 indicate that the gold mining industry is associated with negative social, economic and environmental impacts, which can be attributed to both poor governance as well as financial instability. Governments, the public, finance providers and even company shareholders are all putting pressure on companies to account for, and publically disclose, their impacts and viability in line with the principles of sustainable development. Such pressures are particularly high in the case of the mining industry. Many mining companies, particularly multi-nationals, are reporting on their sustainability performance in publicly available annual reports, commonly termed sustainability reports, using standardised frameworks developed under the auspices of various responsible business initiatives (Lamberton, 2005; Mudd, 2012; de Villiers *et al*., 2014; Siew, 2015).

Sustainability reporting has its roots in the 1970's with the start of social and environmental accounting (Gray, 2000; de Villiers *et al*., 2014). This was due to the emergence of social and environmental activism and rise in social awareness during the 1970's. However, Siew (2015) suggested that this early reporting was largely a compliance process, and did not significantly communicate organisations true performance or indicate genuine commitment to the notion of sustainable development. It was only in the early 90's that the wide-scale adoption of environmental reporting and, in the mid-90s, the rise of social reporting emerged (Gray and Milne, 2004). These all contributed to the paradigm shift in the mid-late 90s that saw the emergence of the triple bottom line (TBL) concept, which called for reporting on the three pillars of sustainability, viz: economic, environmental and social, and the subsequent development of modern-day sustainability reporting practices (Ortas and Moneva, 2011; du Plessis and Bam, 2017). In accordance with a report by KPMG *et al*. (2008), 79% of the global top 250 companies were disclosing sustainability or environmental, social and governance (ESG) information in some form by 2008 (KPMG *et al.*, 2010). In the mining sector specifically, examples of the first mining company environmental reports by WMC Resources Ltd (1995) and Placer Dome Inc. (1997) and Barrick Gold Corp emerged in the late 90s, with these

reports evolving into sustainability reports incorporating social and community issues as well as a new reporting topic, that of occupational health and safety (OHS), in early 2000s (Mudd, 2012; Siew, 2015).

Early forms of sustainability reports used internal reporting and performance assessment schemes and thus the standardisation and consistency of disclosures between companies was low, affecting, amongst many things, comparability (Mudd, 2007 and 2012). In response to calls for consistency and standardisation of company reports, organisations such as the Coalition for Environmentally Responsible Economies (CERES) and the United Nations Environmental Programme (UNEP) started establishing global frameworks for voluntary reporting, such as the Global Reporting Initiative (GRI) which was launched in 1997 (Mudd, 2012). These frameworks have continued to evolve over the past two decades, with a number of different types and forms of sustainability reporting tools now being available (see discussions in Section 2.2.2).

Another prominent and related type of sustainability reporting that has emerged over the last five years is that of integrated reporting, with the International Integrated Reporting Council (IIRC) releasing their integrated reporting <IR> framework in 2013 (International Integrated Reporting Council (IIRC), 2013 cited by Atkins and Maroun, 2015). An integrated report serves a similar function to a sustainability report except it has a much stronger focus on integrating non-financial impacts with financial impacts, and requires companies to demonstrate how they integrate broader sustainability risks into their strategies, risk management and operating policies. Whereas sustainability reports are based solely upon the triple bottom line concept (society, economy and environment), integrated reports, as stipulated by the <IR> framework, also incorporate the concept that sustainable development can be measured by value creation of the six capitals, viz. financial, manufactured, intellectual, human, social and relationship (IIRC, 2013; The Institute of Directors in Southern Africa, 2016). Another key distinction in integrated reporting is that the institutional investors are identified as the primary recipient of integrated reports (IIRC, 2013; cited by Atkins and Maroun, 2015).

2.2.2. Sustainability Reporting Tools

2.2.2.1. Frameworks, Standards, and Ratings & Indices

The rise in popularity of sustainability assessments and reporting has resulted in the development of a plethora of tools and systems that assist with the standardisation, measurement and communication of sustainability performance information (Siew, 2015; du Plessis and Bam, 2017). Sustainability disclosures range from third party assessments to voluntary disclosures to mandatory requirements from governments, stock exchanges or market regulators (Adams and Narayanan, 2007; Struwig and Janse van Rensburg, 2016). Siew (2015) collectively calls these tools 'Sustainability Reporting Tools (SRTs)' and states that their purpose is to assist organisations in achieving their sustainability goals, and are often designed and developed through multi-stakeholder workshops led by national or international organisations. SRTs are categorised into frameworks, standards, and ratings and indices, as shown in Figure 2 (Siew, 2015).

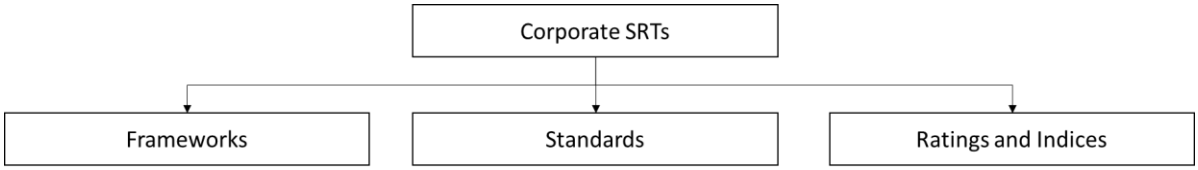

Figure 2: Breakdown of Sustainability Reporting Tools (Siew, 2015)

Frameworks are typically in the form of guidelines, indicators, reporting processes or reporting principles that help corporations disclose aspects of their sustainability performance (Adams and Narayanan, 2007). A well-known example of a reporting framework is the Global Reporting Initiative (GRI) Guidelines. The objective of frameworks are to standardise the reporting of comprehensive and transparent sustainability reports regionally, nationally or internationally (du Plessis and Bam, 2017). Some frameworks define specific indicators for each aspect to be reported against. Indicators aim to simplify the complex interrelationships that exist in the corporate environment between the company, other firms, society and the environment, to a more manageable form of information. Because indicators are so specific, most frameworks consists of many indicators in order to meaningfully measure all the dimensions of sustainability (du Plessis and Bam, 2018).

Standards require more specific and exact disclosures in comparison to frameworks, striving for consistency in order to create local or international standards (Siew, 2015). Disclosures on standards are often more comparable than those from frameworks due to rigorous consistency and standardisation, although the differentiation between frameworks and standards may be somewhat subjective. The International Organisation for Standardisation (ISO) developed the ISO 14000 series of standards that are one of the most prominent set of standards in environmental management globally (Berman *et al*., 2003; Adams and Narayanan, 2007)

Ratings and Indices are often carried out by third party evaluators, referred to by Escrig-Olmedo *et al*. (2010) as environmental, social and governance rating and information provider agencies (ESG IPAs), which rate and list a corporation's sustainability performance against certain sustainability criteria. Indices are often more concise and aggregated than the indicators in frameworks and thus easier to use in comparisons (du Plessis and Bam, 2017). Ratings and indices are becoming increasingly important, due to the rise of responsible financial markets and increasing investor pressure (Escrig-Olmedo *et al*., 2010). Examples of ratings and indices are the FTSE4Good, the Dow Jones Sustainability Index (DJSI) and the Responsible Mining Index (RMI) (Escrig-Olmedo *et al*., 2010; Siew, 2015; Struwig and Janse van Rensburg, 2016; RMF, 2018).

The most commonly applied international SRTs and their classification are listed in Table 2 below (Adams and Narayanan, 2007; Scholtz *et al*., 2014; Siew, 2015; Boston College Center for Corporate Citizenship (BCCCC) and Ernst & Young (EY), 2016; Struwig and Janse van Rensburg, 2016; Clarke, 2017).

Table 2: Table showing the various international SRTs and their classification (BCCCC and EY, 2016; Adams and Narayanan, 2007; Scholtz *et al*., 2014; Siew, 2015; Struwig and Janse van Rensburg, 2016; Clarke, 2017)

Organisation and Tool	Type of Tool: Framework (F); Standard (S) or Index (I)
Carbon Disclosure Project (CDP) tool and framework	F
Global reporting Initiative (GRI) G4 Guidelines	F
International Integrated Reporting Council (IIRC) Framework	F
Organisation for Economic Cooperation and Development (OECD) guidelines	F
Task Force on Climate-related Financial Disclosures (TCFD)	F
United Nations Global Compact (UNGC) Ten Principles	F
United Nations Sustainable Development Goals (UN SDGs)	F
World Business Council for Sustainable Development (WBSCD) Measuring Impact Framework	F
AccountAbility: The AA1000 Series of Standards	S
Global reporting Initiative (GRI) Standards	S
International Council on Mining and Metals (ICMM) Ten Principles	F
International Organization for Standardization ISO26000	S
Sustainability Accounting Standards Board (SASB)	S
World Business Council for Sustainable Development (WBSCD) and World resources Institute (WRI) Greenhouse Gas (GHG) Protocol	S
Dow Jones Sustainability Index (DJSI)	I
FTSE4Good index	I
Responsible Mining index (RMI)	I

Sustainability reporting is a tool within wider performance management systems. While Frameworks, Standards and Ratings & Indices are the form these tools take, there are also varying purposes of such SRTs. Some, such as the UN SDGs, aim to broadly frame the sustainability agenda, whilst others, such as the OECD guidelines, CDP framework and the TCFD, focus on one dimension of sustainability. Only a few focus solely on sustainability reporting as their core purpose, including the GRI G4 Guidelines, the GRI Standards and the IIIRC framework.

Many of the organisations have aligned their SRTs in order to standardise sustainability disclosures and compliance between the different frameworks (United Nations Global Compact (UNGC), 2014). For instance the Global Reporting Initiative (GRI) has established global strategic partnerships with the Organisation for Economic Cooperation and Development (OECD), the United Nations Global Compact (UNGC), the United Nations Environment Programme (UNEP), International Standards Organisation (ISO), and Carbon Disclosure Project (CDP) (GRI, n.d.). Due to its relevance to the mining sector,the GRI is discussed in further detail in the Section below.

2.2.2.2. Global Reporting Initiative Guidelines and Standards

The United Nations Environmental Program (UNEP) and its partners founded the Global Reporting Initiative (GRI) in 1997, with the vision that triple bottom line reporting (social, economic and environmental) would evolve to become as standardised and rigorous as traditional financial reporting (GRI, 2013a). To achieve this, the GRI created a detailed indicator framework, covering factors such

as the companies reporting process, their managerial approach and organisational context, as well as their triple bottom line impacts (Drivdal, 2015). Since its inception, the GRI has launched the G3, G3.1 and G4 Guidelines (considered to be frameworks), and more recently the GRI Standards. All reports created after 1 July 2018 will have to be in accordance with the GRI Standards (GRI, 2016b). The GRI developed a specific mining sector supplement, which provides more relevant support to sustainability disclosure for companies in the mining industry, releasing the pilot version in 2005 and the first final version in 2010 (GRI, 2010; cited by Mudd, 2012). The framework and its supplements were created through a multi-stakeholder consultation process with working groups consisting of "corporate representatives, NGOs, labor groups and society at large" (GRI, 2015; cited by BCCCC and EY, 2016). The GRI is generally considered to offer the most detailed, comprehensive and reliable disclosures on sustainability performance (Mudd, 2012; Carels *et al.*, 2013; BCCCC and EY, 2016; Boiral and Henri, 2017; du Plessis and Bam, 2017). The GRI Guidelines are also deemed to be the global standard for comparability and standardisation, and favoured for their guidance on issues of key relevance or 'materiality' to companies (GRI, 2013a; cited by BCCCC and EY, 2016). As a result, the GRI reporting guidelines are currently the most prominent framework, especially in the mining industry (Morhardt *et al.*, 2002). In accordance with du Plessis and Bam (2017), the GRI Guidelines are currently used by 78% of companies that produce an annual sustainability report.

The GRI Guidelines have also incorporated, and are harmonised with, other distinguished sustainability frameworks and standards, namely the Carbon Disclosure Project, the OECD Guidelines for Multinational Enterprises, ISO 26000, and the UN Global Compact (Ortas and Moneva, 2011; GRI, 2015; BCCCC and EY, 2016). The GRI has also collaborated with the IIRC in terms of harmonising and combining GRI sustainability and IIRC integrated reporting requirements (GRI, 2013c and 2015).

It is important to note that the GRI encourages companies to report according to materiality rather than relevancy (GRI, 2013a and 2013c; GRI and RobecoSAM, 2015). While materiality and relevancy are similar and often used interchangeably, in the realm of sustainability reporting they are distinct. According to the GRI (2013c), material issues or aspects are those that "reflect the organisation's significant economic, environmental and social impacts; or substantively influence the assessments and decisions of stakeholders" (GRI, 2013c). Where relevancy is defined by Cambridge Dictionary as: "the degree to which something is related or useful to what is happening or being talked about" (Cambridge Dictionary, n.d.). Thus, a material issue can be seen as an issue that can have significant social, environmental or social impacts to the company or their stakeholders, while a relevant issue is an issue that is appropriately associated with or topical to the mining industry.

Companies using the GRI Guidelines are required to perform a materiality assessment in order to determine which issues are most material to their business and their stakeholders. GRI and RobecaSAM (2015) use a "materiality matrix" in which the likelihood of impact is plotted against the degree of impact. By plotting various issues on the axes, companies are able to identify the highly material issues. These highly material issues will be what the company chooses to report against.

2.2.3. Voluntary vs Mandatory Sustainability Reporting

Whether a SRT is voluntary or mandatory depends largely on the legislation of the country, or on the reporting requirements of organisational bodies such as stock exchanges or industry groups (BCCCC and EY, 2016). Globally, the majority of sustainability reporting instruments are mandatory as a result of increasing government regulations (KPMG *et al.*, 2010; Bartels *et al.*, 2016). In South Africa, there are a number of Acts and Bills that require companies to report on their sustainability performance in some form, including the Employment Equity Act (1998), National Black Economic Empowerment Act (2003), the Consumer Protection Act (2009) and the Mineral Resources and Petroleum Bill (2009) (KPMG *et al*., 2010; Scholtz *et al*., 2014). Sustainability reporting in the form of dedicated sustainability reports is, however, largely voluntary in South Africa; although for mining companies belonging to the International Council for Minerals and Metals (ICMM) it is mandatory to compile a sustainability report according to the GRI Guidelines or Standards (Fonseca, 2010). Similarly, the Johannesburg Stock Exchange (JSE) requires listed companies to comply with the King IV Code, of which one of the recommendations is to issue an integrated report consistent with reporting guidelines such as the <IR> Framework (Scholtz *et al.*, 2014; Johannesburg Stock Exchange (JSE), 2016; Struwig and Janse van Rensburg, 2016; The Institute of Directors in Southern Africa, 2016). While integrated reporting in itself is not a mandatory requirement for JSE listed companies, following the King IV Code is, and consequently if companies choose not to issue an integrated report the King Code instructs them to explain this decision (South African Institute of Chartered Accountants (SAICA), 2011; Setia *et al.*, 2015; JSE, 2016). The <IR> Framework is the recommended framework by the King IV Code, however the GRI Guidelines are also suggested and used by JSE listed companies in their integrated reports (Scholtz *et al.*, 2014). While South Africa is regarded as having one of the most progressive sustainability reporting culture globally, stock exchanges in more than 20 other countries also encourage companies to disclose their sustainability performance (BCCCC and EY, 2016).

The quality issues associated with sustainability reports (see Section 2.2.4) has resulted in growing calls for the reporting of sustainability reports to become mandatory and for increased legislations and regulations in order to increase consistency and reliability (Gray and Milne, 2004; Hamann and Kapelus, 2004; Dawkins and Ngunjiri, 2008; Ji and Deegan, 2011; de Villiers and van Staden, 2011a; Hummel and Schlick, 2016; RMF, 2018 and 2019). Key to the argument is that company financial reports are largely considered to be consistent and reliable as a result of being so highly regulated (de Villiers and van Staden, 2011b). However, although accepting that there are quality issues, there remains counter arguments against mandatory reporting (KPMG *et al.*, 2010; Stubbs *et al*., 2013; Bartels *et al.*, 2016). A strong argument against mandatory reporting is that it creates a compliance culture instead of a genuine culture of sustainability within a company (Allison-Hope, 2010; Todorova, 2011; Stubbs *et al*., 2013). A study by KPMG *et al*. (2010) raised the concern that mandatory reporting places restrictions on the creativity and innovation of companies in the sustainability space (cited by

Scholtz *et al*., 2014). Other issues concerning mandatory reporting raised by KPMG *et al*. (2010) and cited by Scholtz *et al*. (2014) were that mandatory reporting is too inflexible and too complex due to the variety and diversity of companies and sectors and the absence of a one-size fits all model.

KPMG *et al*. (2010) suggest that a complementary combination of voluntary and mandatory (regulatory) reporting should be employed (Figure 3). This would combine the comparability, objectivity, and standardisation often associated with mandatory reporting with the flexibility and room for innovation and creativity associated with voluntary frameworks (KPMG *et al.*, 2010).

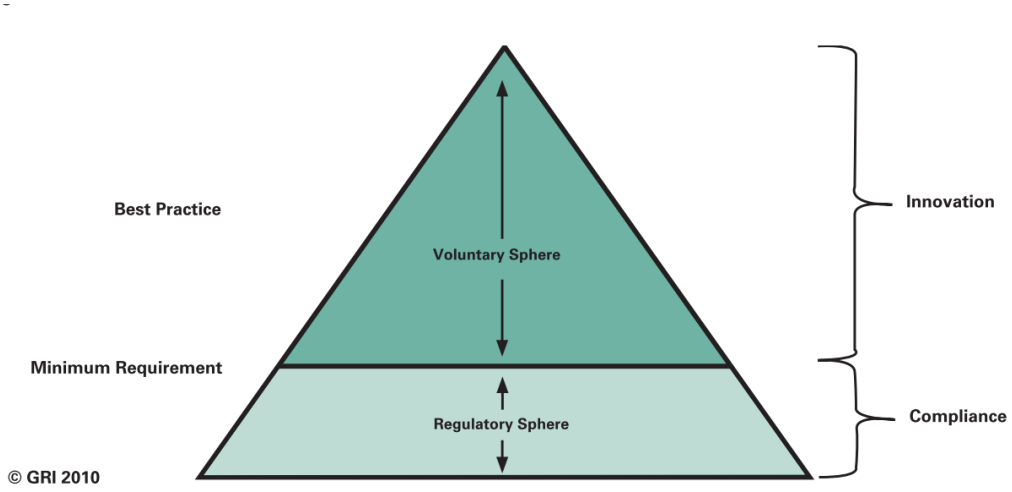

Figure 3: The complementary combination of the voluntary sphere and the regulatory sphere (KPMG *et al*., 2010)

KPMG *et al*.'s (2010) model suggests that there should be a minimum requirement of reporting which is mandatory, and which addresses established issues and sustainability impacts within the industry. This falls into the compliance aspect of reporting, in which the issues and impacts are commonly known and understood and thus can be regulated with confidence and efficiency. The second aspect of the model is the voluntary sphere, in which reporting is not regulated and rather benchmarked against best practice[1]. The voluntary sphere is appropriate for issues and impacts that are not yet fully understood by industry and regulators, and thus need to be left for innovation and best practice to inform how best to measure and communicate these impacts and issues.

2.2.4. Purpose, Benefits and Quality of Sustainability Reporting and Reports

2.2.4.1. Role and purpose

Essentially, sustainability reporting is the process of measuring, monitoring, and communicating a company's sustainability performance to both their internal and external stakeholders (Gilbert *et al*., 2011; Mathibe, 2011). In the same vein, a sustainability report can be regarded as an instrument that is

[1] Best practice is defined as: "a procedure that has been shown by research and experience to produce optimal results and that is established or proposed as a standard suitable for widespread adoption" (Merriam-Webster, n.d.). In this context, best practice refers to reporting by mining companies that is considered best in the field, and whose example should be followed.

used to communicate and monitor both positive and negative information concerning governance, social and environmental issues in line with the company's Triple Bottom Line (TBL) performance (Scholtz *et al.*, 2014).

In this context, the primary purpose of sustainability reporting is widely recognised as being to increase transparency[2] and accountability[3] to stakeholders in terms of a company's sustainability performance (see for example Stubbs *et al*., 2013; Milne and Gray, 2013; Drivdal, 2015; Higgins and Coffey, 2016). In fact a survey by the Boston College Center for Corporate Citizenship (BCCCC) and Ernst & Young (EY) (2016) found that, in the mining and utilities sectors, companies claim to publish sustainability reports primarily to enhance transparency with stakeholders. As transparency, disclosure and accountability are generally considered to be mutually reinforcing (Kolstad and Wiig, 2009; Drivdal, 2015), such purpose is consistent with the GRI definition of sustainability reporting as "the practice of measuring, disclosing, and being accountable to internal and external stakeholders for organisational performance towards the goal of sustainable development" (GRI, 2010; cited by Fonseca *et al*., 2014; Krivačić, 2017).

It is noted that the GRI (2006) and a number of other authors (Gray *et al*., 1996; Gilbert *et al*., 2011; Mathibe, 2011; Stubbs *et al*., 2013; Higgins and Coffey, 2016) make reference to the need to be transparent and accountable to both internal and external stakeholders. External stakeholder groups[4] that are reported to have an interest in the sustainability performance of mining companies include NGOs, community pressure groups (activists), customers, nearby and affected communities, government, indigenous political structures, shareholders, investors and trade unions (Roca and Searcy, 2012; de Villiers *et al*., 2014; Drivdal, 2015; Siew, 2015). One group of stakeholders that are becoming increasingly focal as the key audience are institutional investors (Morhardt, 2010; Siew, 2015; Du *et al.*, 2017). A study done by BCCCC and EY (2016) explain that there is a growth in responsible investing, with investors using sustainability performance as a major criterion for investment decisions.

2.2.4.2. Benefits and drivers

A number of authors have testified to the fact that the increased transparency and accountability that sustainability reporting brings can drive organisational and societal change by providing information that supports the sustainability initiatives and agendas of external stakeholders (Stubbs *et al*., 2013; Drivdal, 2015; Higgins and Coffey, 2016; Boiral and Henri, 2017; GRI, 2017). There is also much literature on the business case for sustainability reporting (Azapagic, 2004; Hamann and Kapelus, 2004; Stubbs *et al*., 2013; BCCCC and EY, 2016; Higgins and Coffey, 2016; Du *et al.*, 2017). Higgins and

[2] Kolstad and Wiig (2009) define transparency as: "timely and reliable economic, social and political information, which is accessible to all relevant stakeholders".
[3] Gray and Milne (2004) define accountability as: "the principle of providing to society the information about which it has a right to know".
[4] Freeman (1984) defines stakeholders as: "groups that can affect, or are affected by, the accomplishment of organisational purpose".

Coffey (2016) explain that corporate perceptions on the strategic advantages for reporting have changed since the mid-90s, with a shift from demonstrating accountability to exploring both direct and indirect benefits and business drivers.

For instance, sustainability reports can play an important role in improving company reputation and legitimising the existence of companies (Solomon and Lewis, 2002). Legitimacy theory, defined by Suchman (1995) as "a generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions", is a popular theory for explaining why companies produce sustainability reports (Solomon and Lewis, 2002; Choi *et al.*, 2014; Hummel and Schlick, 2016; du Plessis and Bam, 2018). Legitimacy theory essentially says that companies choose to disclose sustainability information in order to manage their perceived legitimacy (Suchman, 1995; Choi *et al.*, 2014; Hummel and Schlick, 2016). Hummel and Schlick (2016) also speak of voluntary disclosure theory, which states that companies who have good sustainability performance choose to report essentially to show off their performance to the market, thereby improving their reputation and legitimacy (Hummel and Schlick, 2016).

According to the Global Reporting Initiative (2013a), the process of sustainability reporting can generate an enhanced understanding of the relationship between business and sustainability agendas, optimising performance, and creating the opportunity for companies to become drivers of change through value creation and innovation, by assisting in making companies with goal setting, performance measurement and managing change. More specifically and, as highlighted by Higgins and Coffey (2016), the process of sustainability reporting can play a key role in identifying and developing an understanding and awareness of key sustainability issues. A key theme that comes up is that the reporting process provides insight into sustainability issues that were previously overlooked or traditionally not measured, monitored and reported (International Finance Corporation (IFC) and GRI, 2010; Higgins and Coffey, 2016; Du *et al.*, 2017). Furthermore, from the process of gathering data and constructing the report, the organisation often discovers new ideas about long held practices which leads to improved understanding of challenges and identifying and achieving necessary improvements, such as consumption reduction, productivity, risk mitigation and efficiency (IFC and GRI, 2010; BCCCC and EY, 2016; Higgins and Coffey, 2016). Other types of strategic benefits of sustainability reporting for companies have been reported (Solomon and Lewis, 2002; Morhardt, 2010; BCCCC and EY, 2016; Higgins and Coffey, 2016; Rogers, 2017) to be related to :

(i) Markets: stronger market performance, reduced cost of equity, increased investor confidence and improved competitive position

(ii) Social-license-to-operate: improved reputation, increased consumer and employee loyalty, reduced stakeholder conflicts, and

(iii) Legislative-license-to-operate: warding off regulators and reducing political pressures

These benefits can provide significant competitor advantage, with Du *et al*. (2017) reporting that companies that have superior sustainability performance and communicate this via sustainability reports, also tend to have superior financial performance.

A number of researchers have used data and information in sustainability reports to inform studies on sustainability performance and to identify opportunities to improve such. Johnston (2012), Mudd (2007 and 2008) and van Berkel (2007) used data derived from company sustainability reports to assess impacts associated with mineral production, using life cycle assessment tools and performance indicators such as resource efficiency, emission intensity and eco-efficiency.

Du Plessis and Bam (2017) postulate that public sustainability disclosures can also be used by governments to identify and target industries and projects that have sustainable development potential, without going through the traditional resource intensive processes. Du Plessis and Bam (2017 and 2018) argue that it is possible to use publically disclosed sustainability information to assist in rapid decision-making in the scope phase of potential developmental projects.

2.2.4.3. Limitations and shortcomings of sustainability reports

Despite the above-mentioned benefits, a number of shortcomings and problems with the practical application of reporting frameworks, that affect their effectiveness and functionality in terms of driving improved transparency and accountability, have been reported by various authors (see for example Moneva *et al*., 2006; Mudd, 2008 and 2012; Fonseca *et al*., 2014; Drivdal, 2015; Siew, 2015; Higgins and Coffey, 2016; The Institute of Directors in Southern Africa, 2016; Boiral and Henri, 2017). In accordance with Drivdal (2015) and Higgins and Coffey (2016), the relevance and usefulness of sustainability reports to both internal and external stakeholders will be largely dependent on their quality. Hummel and Schlick (2016) argue that it is only through high quality reporting of sustainability performance information that stakeholders can truly assess the sustainability performance of a company. Their criteria for high-quality reporting is information that is verifiable, reliable, comparable, quantitative and consistent. These criteria are similar to those listed by the GRI (2013b), who define an ideal sustainability report as one that contains information that is accessible, balanced, comparable, consistent, and transparent and that makes abstract issues tangible and concrete. Similarly, Crawford and Williams (2010) list quality criteria as information that is timely, relevant and reliable.

Boiral and Henri (2017) use three theoretical perspectives to investigate the comparability and measurability of information contained in GRI sustainability reports, namely the functionalist, critical and post-modern perspectives. These perspectives are useful in analysing the factors influencing the quality of sustainability reports in terms of their ability to improve transparency and accountability, and are discussed in more detail below.

i. Functionalist perspective

The functionalist perspective assumes that, when aided by rigorous and standardised frameworks, reports can be drafted that allow for the measurement and comparison of sustainability performance.

The functionalist perspective is the most commonly explored in literature and industry (Boiral and Henri, 2017), and is concerned with issues that arise from technicalities in adhering to reporting guidelines, and the rigour of those guidelines and frameworks. Examples of such issues include the lack of quantitative indicators, inadequate disclosure, and elastic compliance to reporting guidelines (KPMG *et al.*, 2010; Boiral and Henri, 2017).

A major critique of sustainability reports that is consistent with the functionalist perspective is the issue of aggregated data, especially by large multi-nationals (Gray and Milne, 2004; Mudd, 2012; Fonseca *et al*., 2013; RMF, 2018 and 2019). Aggregated data refers to data that is grouped for whole companies, many of which have multiple operations in multiple continents, even though mine sites vary considerably between countries. There is a general consensus in literature that disaggregated information is important and more useful (Fonseca *et al*., 2014; du Plessis and Bam, 2017; RMF, 2019). The Responsible Mining Foundation (RMF) conducted a study in which they assessed the sustainability performance for a number of large mining companies against a range of indicators. They released their findings in a report called the Responsible Mining Index (2018) and one of their findings was that site-level data was largely missing in mining companies sustainability reports. The implications of this was that there was very little reporting on issues that were of direct interest to mine-workers, mine-affected communities and other impacted stakeholders (RMF, 2018), thus it does not allow local stakeholders to have the information necessary for their sustainability agendas. Furthermore, aggregated data inhibited the ability to meaningfully assess and compare performance trends and issues, as the aggregation of mine site data thus obscures the site-specific differences.

Apart from data aggregation, a number of authors have also reported that the data and information disclosed by companies in their reports, most of whom had followed the GRI Guidelines, tended to be ambiguous, incomplete, superficial, opaque and non-contextual (Gray and Milne, 2004; Daub, 2007; Fonseca, 2010; KPMG *et al.*, 2010; Drivdal, 2015; Hummel and Schlick, 2016; Boiral and Henri, 2017). This tends to manifest either by companies reports having missing or incomplete disclosures or by companies providing information with no or little detail to contextualise and verify the disclosure. Furthermore, literature also criticised the GRI Guidelines themselves for not being adequately rigorous. Fonseca *et al*. (2014) criticised the GRI Guidelines for hindering contextual disclosures and Boiral and Henri (2017) expressed concern over the general lack of quantitative indicators in the guidelines against which a company could report (Boiral and Henri, 2017). This is consistent with concerns by Mudd (2008) over the lack of sufficiently rigorous reporting requirements in the GRI framework, with specific reference to their guidance on water accounting. As a result, key information required to perform proper water accounting was found not present in GRI-based sustainability reports, particularly pertaining to the "extent of recycled water used, mine site water inventories, the quality of various waters, and impacts on water resources" (Mudd, 2008).

ii. Critical perspective

The critical perspective questions, and is highly critical of, the reliability of the measurement and communicating of sustainability performance. The critical perspective reasons that issues of comparability are political in nature rather than technical or logistical (Boiral and Henri, 2017). Quality issues according to the critical perspective, stem from economic and reputation management factors such as greenwashing (Daub, 2007; Fonseca, 2010) and managerial capture (Owen et al., 2000).

While reputation is a major driver, and can lead to increased reporting, resulting in it being seen to be a positive for the organisation and stakeholders, there are many quality issues and limitations that arise as a result of reputation management and the pursuit of legitimacy. In accordance with Hummel and Schlick's (2016) legitimacy and voluntary disclosure theories discussed in Section 2.2.4, companies that have bad sustainability performance may increase their reporting on low quality information, essentially disguising true performance in positive accounts of their performance in order to protect legitimacy. Low quality information can obscure the organisations real sustainability performance, and functions to maintain legitimacy through the positive image that the sustainability report is painting (Hummel and Schlick, 2016). Companies that have good sustainability performance, on the other hand, will provide high quality and detailed information to prove to the market that they are performing highly, also in pursuit of increased legitimacy and reputation (Hummel and Schlick, 2016).

There are many studies on sustainability reports that are designed to create a positive impression and various terms are used in the literature to describe this sort of reputation management, such as agency theory, greenwashing, managerial capture, reputation and perception management (Gray and Milne, 2004; Hamann and Kapelus, 2004; Fonseca, 2010; KPMG et al., 2010; de Villiers and van Staden, 2011a; Higgins and Coffey, 2016; Boiral and Henri, 2017). Furthermore, these studies claim that companies do not report on their negative performance, despite balanced reporting being a key principle of the GRI. Agency theory and managerial capture both speak to the theory that managers only disclose information that has a perceived benefit to them, often undermining the information needs of affected stakeholders (de Villiers and van Staden, 2011a). Managerial capture implies that the manager has a major role in sustainability reporting and censors what is reported. Similarly, another view is that companies cherry pick information to create a positive perception (Gray and Milne, 2004), or greenwash stakeholders, by disclosing only positive information on their environmental (and social) performance in order to create the perception that they are a sustainable organisation (Boiral and Henri, 2017).

iii. Post-modernism perspective

The third and final perspective introduced by Boiral and Henri (2017) is that of post-modernism which deems sustainability as un-measurable and thus un-comparable. Therefore, regardless of how good the

frameworks and indicators are (functionalist) or how credible and progressive the managers are (critical), sustainability reports cannot measure and communicate sustainability performance.

This perspective is consistent with criticisms that sustainability reporting frameworks and resulting reports are reductionist in their approach, and fail to take into account and synthesise the complexity and the scale of the sustainability agenda (Moneva *et al*., 2006; Fonseca, 2010; Siew, 2015). A further critique is that the GRI guidelines reinforce the idea that sustainable development is about meeting a set of criteria as opposed to a genuine culture of sustainability that is merited on action rather than criteria met (Moneva *et al.*, 2006; Siew, 2015). Dumay *et al*. (2010) refers to this as an "evaluatory trap", in which companies feel that by completing evaluations and meeting criteria they are operating sustainably, regardless of the true scale of their impacts. Sustainability is a complex and interconnected concept that requires various dimensions of consideration, namely the spatial and the temporal (du Plessis and Bam, 2017). Essentially a company's sustainability depends on its sustainability both backwards and forwards in time, as well as in its interactions with local, national, regional and international economies, ecosystems and social systems. The GRI framework in particular is criticised for having retrospective and non-integrated indicators, which neglect the complex interconnected and long-term relations between socio-ecological and socio-economic systems (Gray and Milne, 2002 and 2004; Moneva *et al*., 2006). GRI Indicators are non-integrated because they are categorised into the three spheres of the triple bottom line concept, namely economic, environmental and social, and thus isolate the various aspects of sustainability from one another. Similarly, there is little evidence in sustainability reports of prospective information in which companies anticipate the long-term impacts of their actions (du Plessis and Bam, 2017), nor of companies taking into account historic impacts that have an effect on the health of relevant socio-economic systems and ecosystems. Gray (2006 and 2010) states that sustainability reporting is disconnected from what sustainability actually means and thus how organisations should act in order to be sustainable. This is backed up by Dawkins and Ngunjiri (2008) who says that there is no clear link between corporate social responsibility and corporate social responsibility reporting.

2.3. Summary and Synthesis

The literature review has shown that gold mining operations in the country, both current and defunct, are associated with significant environmental impacts, with concomitant effects on the quality of life of local communities. The sector is thus under considerable pressure from external stakeholders to demonstrate that its operations are in compliance with the sustainability principles across all phases of the mine life cycle.

Sustainability reports are believed to play an important role in mining company's sustainability agendas, with the primary purpose of sustainability reports being to increase transparency and accountability to stakeholders in terms of a company's sustainability performance. The functionality and effectiveness of sustainability reports in terms of increasing accountability and transparency

depends, furthermore, on the quality of the reporting. Despite the perceived importance of high quality reporting, there is an absence of focused and systematic studies on the factors and practices influencing quality, and the subsequent effect of such on the functionality of sustainability reports in the context of different stakeholders, both internal and external. Furthermore, studies to date have largely explored issues of a technical nature and issues of a 'critical' nature, such as those relating to integrity and honesty, in isolation. For these reasons, the theoretical perspectives of Boiral and Henri (2017) discussed in Section 2.2.4.3. are useful, as they allow for the simultaneous characterization of the spectrum of issues that affect the quality and functionality of sustainability reports.

In this regard, a theoretical framework for characterising the various quality issues and their inter-relationships, in the context of enhancing the effectiveness and functionality of sustainability reporting to support transparency and accountability, is proposed. In accordance with this framework, developed on the basis of a critical review and synthesis of the available literature and presented in Figure 4, the key quality criteria for data and information contained in sustainability reports are accessibility, comparability, reliability and relevance or 'materiality'. In turn, these criteria determine the functionality and effectiveness of sustainability reports in driving increased transparency and accountability. Borrowing from the theoretical concepts of Boiral and Henri (2017) [5], the factors influencing these quality criteria are grouped as either functionalist or critical. The functionalist factors include level of detail in terms of granularity and contextualisation, geographic aggregation, completeness of disclosures, clarity of information and reports, and consistency of data and information. Critical factors include issues such as credibility of information, integrity of the company's reports and the level of balance in the reporting.

[5] This framework does not explicitly consider the post-modern perspective proposed by Boiral and Henri (2017), as this perspective debates the measurability of sustainability rather than quality of reporting itself. This perspective is thus considered beyond the scope of the study.

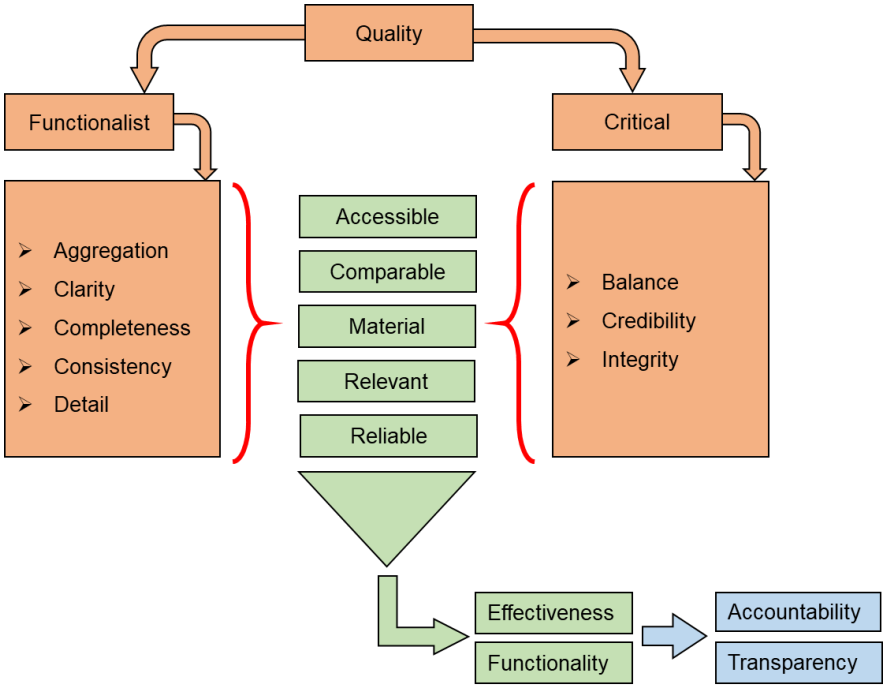

Figure 4: Theoretical framework for characterising the inter-related quality issues in the context of enhancing functionality and effectiveness of sustainability reporting to support transparency and accountability

2.4. Key Research Questions

As discussed in Chapter 1, this study aims to investigate the quality and functionality of sustainability reporting within the gold mining sector in South Africa, with specific emphasis on environmental aspects. In line with this aim and the key findings from the review and assessment of literature, the following research questions are posed in the context of the gold mining industry, and with specific emphasis on the environmental risks and liabilities:

1. What is the current quality of (environmental) sustainability reporting, taking into account the functionalist and critical perspective issues?
2. What is the functionality and effectiveness of current (environmental) sustainability reporting practices in driving increased accountability and transparency?
3. On the basis of the answers to 1 and 2, what deductions can be drawn on the relationship between the quality issues and the functionality and effectiveness of current sustainability reporting practices?

Chapter 3

Methodology

The key research questions developed in Chapter 2 have been interrogated through two discrete studies, taking the form of subsets of the South African gold mining case study, using the quality characterisation framework developed in Chapter 2 as a basis:

(i) In the first instance a desktop study involving a content analysis of sustainability reporting in the local gold mining sector was carried out. The desktop study focused on the reporting against select environmental Indicators from the GRI G4 Guidelines by three multi-national gold mining companies operating in South Africa, namely AngloGold Ashanti, Gold Fields and Harmony. The desktop study adopted a functionalist perspective to assess the quality of reporting, covering issues such as level of detail in terms of granularity and contextualisation, geographic aggregation, completeness of disclosures, clarity of information and reports, and consistency of data and information.

(ii) The second sub-set of the case study involved semi-structured interviews with key internal and external stakeholders on the usefulness and quality of sustainability reporting by the local gold mining sector. This study provided insights into quality issues from both a functionalist and critical perspective, as well as the perceived functionality of sustainability reports. Whilst the specific focus is on environmental sustainability issues, these are closely linked with other sustainability issues, including financial and social issues, and are often managed in an integrated manner in practice. The discussions with stakeholders were thus not strictly limited to only environmental aspects of sustainable reporting.

Further detail on the methodologies applied to these two studies are outlined in Sections 3.1 and 3.2 respectively.

3.1. Desktop Study

The desktop study sets out to assess and compare the sustainability reporting against select GRI G4 environmental Indicators by the three South African gold mining companies, AngloGold Ashanti, Gold Fields and Harmony, for the 2016 calendar year. Despite the GRI Standards being the current version of reporting guidelines offered by the Global Reporting Initiative, only sustainability reports compiled after 1 July 2018 were required to be in accordance with the GRI Standards and thus the Standards had not yet been incorporated by industry at the start of the study in 2017 (GRI, 2016b). Therefore, the GRI G4 Guidelines and not the GRI Standards were used in this study. The Standards remain very similar to the G4 in content, but are different in structure. The new structure is claimed to make it to easier to update the framework, enabling the framework to stay up to date with new developments in the field.

The terminology and instructions have also been simplified, making for easier use (GRI, 2016a). Only the Environmental Aspects of sustainability reports were assessed in this study. The authors acknowledge that sustainability reporting comprises of more than just environmental indicators. However, as shown in Chapter 2, environmental impacts often have direct social consequences, especially on vulnerable and previously disadvantaged people, as well as on those who depend heavily on natural systems for survival. Thus, the Environmental Aspects covered in this study can be seen to have significance for social and health impacts.

3.1.1. Gold Mining Companies

The companies chosen for this study, AngloGold Ashanti, Gold Fields and Harmony, accounted for around 43% of South Africa's gold production in 2015 (Charikinya *et al.*, 2017). Figure 5 below shows the gold production per company for the calendar year 2015.

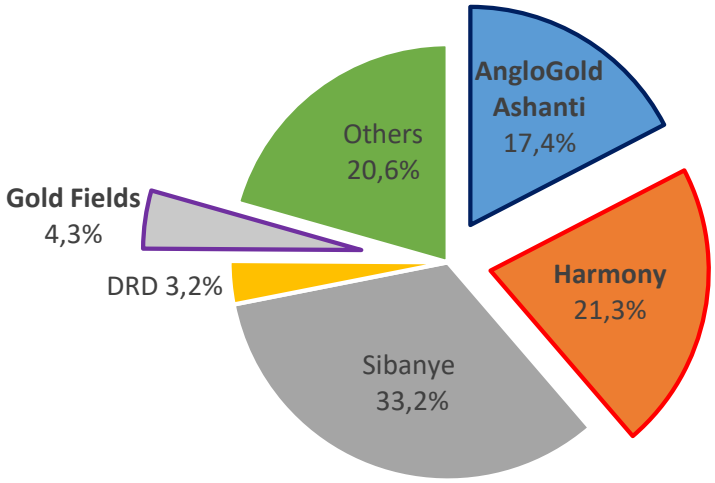

Figure 5: Figure showing that Gold Fields, AngloGold Ashanti and Harmony made up 43% of South African gold production in the calendar year 2015 (Charikinya *et al.*, 2017).

At the time of this study, AngloGold Ashanti had sixteen operations in ten countries (AngloGold Ashanti, 2017a), Gold Fields eleven operations in four countries (Gold Fields, 2017a), and Harmony thirteen operations in two countries, twelve of which were in South Africa and one in Papua New Guinea (Harmony, 2017a). Collectively the three companies have forty operations in twelve different countries. AngloGold Ashanti have three South African operations, two of them are primarily deep level operations while one, Mine Waste Solutions, is a tailings reclamation facility entailing the re-processing of gold tailings to recover gold (AngloGold Ashanti, 2017a). Gold Fields have one South African operation, South Deep, which is the deepest mine in the world (Gold Fields, 2017a). Harmony has twelve South African operations, of which two are tailings reclamation facilities, Surface Dumps and Phoenix, and one, Kalgold, is an open pit operation (Harmony, 2017a).

AngloGold Ashanti and Gold Fields are both members of the International Council of Mining and Metals (ICMM). As a mandatory requirement, they report according to the Sustainable Development Framework (AngloGold Ashanti, 2017a; Gold Fields, 2017a). While Harmony is not an

ICMM member, they also voluntarily comply with the principles of the ICMM (Harmony, 2017). AngloGold Ashanti is a signatory of the United Nations Global Compact, and both AngloGold Ashanti and Gold Fields state that their annual reports serve as the UNGC Communication of Progress (COP) reports. Harmony do not claim to provide a COP report, but do voluntarily comply with the UNGC Principles.

All three company's primary listing is on the Johannesburg Stock Exchange (JSE) but have other secondary listings, namely Australia (AngloGold Ashanti), Berlin (Harmony), Ghana (AngloGold Ashanti), New York (AngloGold Ashanti, Gold Fields and Harmony) and Switzerland (Gold Fields).

3.1.2. Data Collection

3.1.2.1. Data sources

There are four documents involved in compiling a GRI sustainability report. The GRI G4 Guidelines and the Sector Specific Supplements inform the reporting process. The G4 Guidelines contain instructions on what information needs to disclosed, consisting of disclosure requirements that will contextualise the organisation and their reporting process and that outlines the organisations management approach to various sustainability related impacts. Of relevance to this study, the G4 Guidelines also contain explicit Indicators for the economic, environmental, and social Categories. The Sector Specific Supplements contain additional disclosures and Indicators that are specific to the industry relevant to the reporting organisation, which in the case of this study is the Mining and Metals Sector Disclosures.

The resulting documents are the sustainability report and the GRI Content Index. A GRI Content Index (Index) is a document published along with an organisations sustainability or integrated report that serves as the central navigation tool and reference for users (GRI, 2015). The Index outlines reporting details such as the Indicators reported against, the level of assurance of the Indicators, the location of the information in the reports, and the extent of reporting, and is often the first point of reference for users looking for disclosures. Figure 6 illustrates the four documents that are involved in the reporting process.

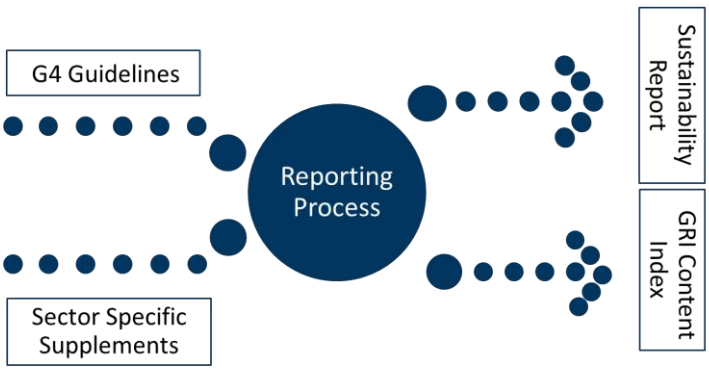

Figure 6: Infographic depicting the documents that are involved in the sustainability reporting process

For the year 2016, AngloGold Ashanti released a sustainability report while Gold Fields and Harmony both released an annual integrated report. Because Gold Fields' and Harmony's integrated reports were published following the GRI G4 Guidelines and had a corresponding GRI Index, their integrated reports were assessed. In addition to the sustainability or integrated reports, all three companies had their Indexes assessed. Thus the documents assessed were: AngloGold Ashanti's sustainability report and Index (AngloGold Ashanti, 2017a and 2017b), and Gold Fields' and Harmony's integrated reports and Index's (Gold Fields, 2017a and 2017b; Harmony, 2017a and 2017b).

3.1.2.2. Data collection process

For each Indicator assessed in this study, the information and data disclosed against it was located using the Index, collected and then categorised. In general, only information referenced in the Index was recorded; however, quantitative information disclosed in clear data tables was also included even if it was not referenced in the Index. Figure 7 below shows the data collection process.

Figure 7: Infographic portraying the method for data collection

The following information was collected and categorised for each of the selected Aspects and the corresponding Indicators on a company-by-company basis:

(i) Detail of reporting: The detail against which the Indicators are reported (granularity of data).

(ii) Level of data aggregation: The extent to which the information was aggregated according to organisational and/or geographical level.

The detail for each Indicator was first categorised into Issues and additional detail on each Issue (sub-level Issues), and then the level of aggregation for the Issues and sub-level Issues was identified. The following sections explain which G4 Indicators are assessed in this study (i) as well as describe and differentiate Indicators from Issues and sub-level Issues (ii).

(i) Indicators

As mentioned previously, only the environmental Category is assessed in this study. Each triple bottom line Category, namely economy, environment and society, contains various Material Aspects[6]. The Aspects included in this study, similar to those included in a study done by Hummel and Schlick (2016) and which are considered the most quantitative as well as relevant to the mining industry, are materials, energy, water, emissions, and effluents & waste. The remaining environmental Aspects not included in this study are bio-diversity, products & services, compliance, transport, overall, supplier environmental assessment, and environmental grievance mechanisms. While some of these Aspects are relevant to the mining industry, the disclosures against these Aspects are not quantitative or tangible, and are thus hard to collect data for and analyse for quality. The twenty-three generic GRI G4 Indicators corresponding to the selected Aspects are outlined in Table 3, where MM3 is an additional sector specific Indicator.

(ii) Issues and sub-level Issues

In order to analyse data according to level of detail, a distinction is made between Issues and sub-level Issues. Issues refer to distinct detail or information that is disclosed against a given GRI environmental Indicator. Sub-level Issues are sub-categories of Issues that further categorise detail. For example, for the Indicator EN1 *Materials used by weight or volume*, one of the Issues was *fossil fuels used* which had the following sub-level Issues: *liquid fossil fuels, LPG,* and *petrol and diesel*, Figure 8.

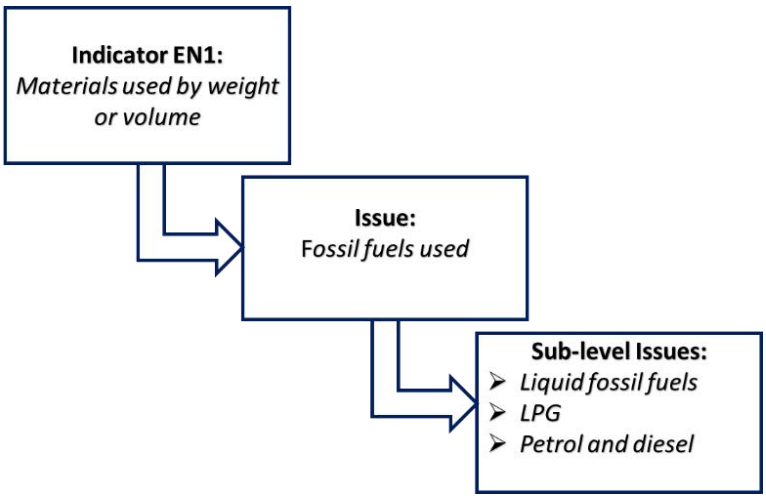

Figure 8: Infographic illustrating Indicators, Issues and sub-level Issues

[6] Material Aspects (Aspects) are defined by the GRI as "issues that are significant to a business's economic, environmental and social impacts and that substantively influence the assessments and decisions of its stakeholders" (GRI, 2013a)

There can be multiple Issues and sub-level Issues for any given Indicator. Issues and sub-level Issues are different to the quality issues (functionalist and critical perspective) that affect the functionality and effectiveness of sustainability reports. Issues are a tool used by the authors to categorise the different granular detail disclosed against each Indicator by the three companies, allowing for greater comparison of detail for each Indicator inter- and intra-companies.

Table 3: List of the environmental Aspects and Indicators assessed in this study

Aspect	G4 Indicator	Description of Indicator
Materials	EN1	Materials used by weight or volume
	EN2	Percentage of materials used that are recycled input materials
Energy	EN3	Energy consumption within the organisation
	EN4	Energy consumption outside the organisation
	EN5	Energy intensity
	EN6	Reduction of energy consumption
	EN7	Reductions in energy requirements of products and services
Water	EN8	Total water withdrawal by source
	EN9	Water sources significantly affected by withdrawal of water
	EN10	Percentage and total volume of water recycled and reused
Emissions	EN15	Direct greenhouse gas (GHG) emissions (Scope 1)
	EN16	Energy indirect greenhouse gas (GHG) emissions (Scope 2)
	EN17	Other indirect greenhouse gas (GHG) emissions (Scope 3)
	EN18	Greenhouse gas (GHG) intensity
	EN19	Reduction of greenhouse has (GHG) emissions
	EN20	Emissions of ozone-depleting substances (ODS)
	EN21	NOx, SOx and other significant air emissions
Effluents & waste	EN22	Total water discharge by quality and destination
	EN23	Total weight of waste by type and disposal method
	EN24	Total number and volume of significant spills
	EN25	Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the basel convention 2 annex I, II, III, and VIII, and percentage of transported waste shipped internationally
	EN26	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharges of water and runoff
	MM3*	Total amounts of overburden, rock, tailings and sludges and their associated risk

* *MM3 (total amounts of overburden, rock, tailings and sludges and their associated risk) is a sector specific indicator.*

3.1.3. Data Analysis

The disclosed data and reporting practices observed for the selected GRI G4 environmental Indicators were assessed for completeness and detail, level of aggregation, and consistency and clarity of reporting (key research question 1). Furthermore, the results of this analysis were evaluated in terms of the potential implications that these functionalist perspective quality issues may have on the functionality

and effectiveness of sustainability reporting in driving increased transparency and accountability (key research question 3).

3.2. Stakeholder Interviews

The semi-structured interviews with internal and external stakeholders set out to investigate stakeholders perceptions, experiences of, and interactions with, sustainability reporting in the South African mining industry. While the focus was on gold mining companies in South Africa and GRI sustainability reports, the respondents also spoke to the broader South African mining industry and reporting practices.

3.2.1. Description of the Interviewees

The stakeholders interviewed were chosen due to their expertise in sustainability reporting in the mining industry. Furthermore, they were chosen in order to give a representation of relevant stakeholders. In total, twenty stakeholders were interviewed and were split evenly into internal and external stakeholders. The number of stakeholders interviewed were not chosen intentionally, but rather occurred as a result of representing the relevant stakeholders in both depth and breadth.

The internal stakeholders (Respondents 1 to 10) included employees within, or contractors working for, two multi-national South African gold mining companies[7] (company A and company B), both of whom produce a GRI annual report. These stakeholders include staff or contractors involved in the compilation of the sustainability reports (Respondents 1 to 6), as well as senior managers and executives who are actively involved in functions relating to sustainable development issues and objectives (Respondents 7 to 10).

The ten external stakeholders (Respondents 11 to 20) included asset managers (Respondents 11 and 12), a government representative (Respondent 13), legal practitioners (Respondents 18 and 19), representatives from community support organisations (Respondents 18, 19 and 20), consultants in the broader sustainability and/or environmental field (Respondents 15, 16 and 17), and a sustainability rating and services provider (Respondent 14). Respondents 11 and 17 are involved in academia, and Respondents 14, 15 and 16 have all been part of a sustainability reporting process. No community members or shareholders were interviewed; however it is believed their voices were represented by the two representatives from community support organisations and the two asset managers respectively. Furthermore, no unions were interviewed which can be considered a limitation. As can be seen there is a wide representation of different external stakeholders, as well as overlaps of sectors and professions that lends depth to the analysis.

[7] It should be noted that these two companies were not necessarily the same companies selected for the desktop study.

Table 4 and 5 on the following two pages, summarises the stakeholders' information, showing their organisation and organisational role for internal stakeholders, and their sector and function for external stakeholders.

Table 4: Table listing the internal stakeholders, their organisation and their role and expertise in the sustainability field

Resp. #	Organisation	Organisational role
1	Gold mining company A	Primary author of the organisations sustainability report. In charge of the communication of the companies sustainability strategy and performance, as well as vice president: sustainability.
2	Gold mining company A	Integral member of the sustainability reporting team. Involved in the sustainable development department of the organisation, specialising in marketing and communication.
3	Gold mining company A	Primary author of the organisations sustainability report. The organisations sustainability-reporting manager.
4	Gold mining company B	Integral member of the organisations sustainability reporting team. Group sustainability manager, with expertise in environmental management.
5	Gold mining company B	Integral member of the organisations sustainability reporting team. Involved in the sustainable development department of the organisation, with specific focus on analytics and reporting.
6	Publishing company	Advisor to the reporting team of company A from a communication, writing and editing perspective.
7	Gold mining company B	Executive vice president: people and organisational effectiveness. Positioned in the people and human capital space of the organisation.
8	Gold mining company B	Vice president: group sustainable development. An experienced environmental manager and a technical expert on the environmental data that is disclosed in the company's sustainability report.
9	Gold mining company A	Vice president: environment. An experienced environmental manager, and thus are a technical expert on the environmental data that is disclosed in the company's sustainability reports.
10	Gold mining company A	Senior audit manager. Involved in sustainability auditing in fields such as local enterprise development and community health.

Table 5: Table listing the external stakeholders, their sector and their role within the sustainability field

Resp. #	Sector	Function
11	Academia and Finance	Academic doing research into sustainable finance and an asset manager who performs quality checks on ESG analysis. Prior expertise in the environmental field and often dealt with the extractive industry.
12	Finance	Asset manager focussing on the environmental and social aspects of the companies ESG portfolios. Has mining companies in the ESG portfolios.
13	Government	Focusses solely on the monitoring of communities affected by the mining industry, looking at governmental departments such as the DMR and the industry itself.
14	Finance	Sustainability rating and services provider with prior experience in compiling sustainability reports. The company rates and assesses the sustainability of financial sector businesses. The assessment uses various sustainability metrics and tools, the GRI included.
15	Environmental consultancy	Consultant. Advises both with company strategy as well as with company's sustainability reports. Specialises in the extractives, infrastructure and energy industries
16	Sustainability consultancy	Independent sustainability consultant to mining companies, with prior experience in compiling sustainability reports for junior gold mining companies.
17	Sustainability consultancy and academia	Sustainability consultant to various companies including those that do mining and mineral processing. Analyses company's sustainability impacts, in particular around climate change and energy.
18	Activism, Legal and NGO	Attorney for a legal non-profit organisation that supports communities and civil society through environmental litigation against companies. Focussed extensively on the mining industry.
19	Activism, legal and NGO	Activist and lawyer. Involved in activism regarding the social and environmental impacts of mining, as well as using legal means to bring companies to account for their impacts. Focussed solely on the social and environmental impacts resulting from the mining and extractives industry.
20	Activism and NGO	Executive director of a non-profit organisation that represents and supports communities and those affected by the mining related impacts. Focussed solely on the social and environmental impacts resulting from the mining and extractives industry.

3.2.2. Interview Process

The interviews were conducted according to the guidelines summarised in Stander and Broadhurst (2019). Expert interviews enable a researcher to gain organisational and field specific insight from stakeholders that are current and important (Braun and Clarke, 2006; cited by Stander and Broadhurst, 2019). Expert interviews allow for questions on 'quasi-technical and organisational matters' to be answered, gaining information that cannot be reached from literature or document reviews or other technical research methods (Braun and Clarke, 2006; cited by Stander and Broadhurst, 2019; Stander *et al*., n.d.). Individual interviews were chosen for confidentiality reasons as there are issues that could be sensitive (Fonseca et al., 2014; Siew, 2015). Therefore non-individual interviews, such as focus groups, were not considered suitable, as people would potentially be reluctant to speak openly about controversial issues. While two interviews occurred with more than one respondent present, they were part of the same company as well as the same stakeholder group. Thus, individual interviews were conducted to allow for confidentiality as well as specific expertise and insight.

The first step in the interview schedule was contacting the respondents via e-mail, and in some instances being introduced to them. Once a respondent had agreed to take part in the study, the respondent was sent the questionnaire, the abstract to this project, as well as supplementary information such as the informed consent form and introduction to the project (see Appendix B for this information). The questionnaires were designed to investigate stakeholders' perceptions, experiences of, and interactions with sustainability reports in terms of quality from both a functionalist and critical perspective, as well as the functionality and effectiveness of these reports. Different questionnaires were designed for the internal and external stakeholders respectively, but each questionnaire had a similar format, consisting of questions that require open-ended answers and of questions that only require the respondent to rate their response (closed answers). The interviews were semi-structured and while guided by the questionnaire, the interviewee allowed the respondents to take control of the conversation and speak on topics that they perceived to be relevant to the study. The questionnaire provided the structure of the interviews, and all questions on the questionnaire were asked in the interview itself. The interviews took between forty-five minutes to an hour and forty-five minutes. All of the interviews were conducted face to face except that with Respondent 11, which was conducted over Skype. With the exception of one interview, all were recorded. Interviews with the majority of the respondents were conducted individually except that Respondent 4 was present at, and participated in, the interviews with Respondents 5,7 and 8.

3.2.3. Data Analysis

Thematic analysis is used in this project as suggested by Stander and Broadhurst (2019). In accordance with these authors, thematic analysis is seen to be the best method for expert interviews as the points of interest are not as latent or hidden as in other methods. Furthermore, thematic analysis is advantageous for researchers with little or no experience with qualitative analysis (Braun and Clarke, 2006; cited by

Stander and Broadhurst, 2019). Thematic analysis is described by Braun and Clarke (2006) as "identifying, analysing and reporting patterns (themes) within the data". It is an iterative process that consist of four stages: 1) familiarisation of data, 2) coding, 3) themes, and 4) reporting.

The interviews were first transcribed by the authors. This required listening to the interviews multiple times which allows one to become familiar with the data. The transcripts contained the answers to all the questions on the questionnaire (see Appendix B). The coding of the data was performed using the programme Nvivo. The coding process was iterative and a concerted effort was made to ensure that the coding and the eventual establishment of themes emerged from within the data, and was not applied to the data. The themes were then reported and discussed against the initial questions that were asked, namely concerning the quality and the usability and usefulness of sustainability reports.

3.3. Ethics

As required by any student undertaking research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town (UCT), the application form for *approval of Ethics in Research (EiR) projects* was signed by the head of department and the primary supervisor of this project and submitted to the ethics committee. The ethical clearance was approved, as the committee was satisfied that the interview process is in compliance with ethical research practices. The approved ethics application form can be found in Appendix C.

The issue of internal participants, some of which are employed by mining companies in the capacity of report writing, giving their opinion on the quality and functionality of sustainability reports may be a source of concern. However, as per the introductory letter and consent form, participation is voluntary and respondents are free to choose what may be included in the study. Furthermore, steps were taken to protect respondents' anonymity:

(i) No names of the individuals or of their organisations are used in either the interview transcripts or the dissertation.

(ii) No pronouns that signify gender are used.

(iii) In discussion about the organisations and individuals, the descriptions attempt to be as generic as possible while still providing the necessary information to contextualise the results.

The data, namely interview transcripts, will be stored within the Department of Chemical Engineering's archive in a way that protects the anonymity of participants, and will not be made available to the general public. Thus, future use of the data for research is permitted in as much as the future user abides by the confidentiality agreement. This issue was spelt out in the consent form by the authors, and thus is seen not to be a problem. The level of confidentiality that will be maintained will hopefully encourage open and honest opinions and the removal of potential bias.

Chapter 4

Results and Discussion

A study on the quality of environmental sustainability reporting using the GRI G4 Guidelines

This chapter presents the results and discussion on the desktop study that was described in Section 3.2. The desktop study sets out to assess and compare the sustainability reporting against select environmental GRI G4 Indicators by three South African gold mining companies, AngloGold Ashanti, Gold Fields and Harmony, for the 2016 calendar year. Focus for this study was on the factors affecting quality from a functionalist perspective i.e. in terms of detail, aggregation, completeness, clarity and consistency of the data and information. Firstly, the information and data presented for each environmental Aspect is presented and assessed for extent and level of detail of reporting and data aggregation (Section 4.1). The reports from the different companies are then assessed and compared in terms of consistency and clarity of the data (Section 4.2). Finally, Section 4.3 summarises, synthesises and contextualises the findings in terms of the functionality and effectiveness of the reports in enhancing transparency and accountability.

4.1. Data Completeness, Detail and Aggregation

The detailed results pertaining to the levels of reporting (extent and detail) and aggregation (LoA) of the disclosed data are presented for each of the 5 Aspects (materials, energy, water, emissions, and effluents & waste outputs) on a company-by-company level in Sections 4.1.1-4.1.5.

4.1.1. Materials Aspect

The Aspect *materials* contains the Indicators G4-EN1: *Materials used by weight or volume*; and EN2: *Percentage of materials used that are recycled input materials*. Table 6 below lists the different quantitative Issues and sub-level Issues reported on by the companies and the level of aggregation (LoA).

4.1.1.1. Extent and detail of reporting

Table 6 below shows that Gold Fields and Harmony reported on both *materials used* (EN1) and *recycled materials used* (EN2) while AngloGold Ashanti only reported on EN1, thus providing no information on recycled materials used. For EN1, the three companies reported on a similar number of Issues but varied in the nature of these Issues, with cyanide being the only EN1 Issue reported on by all companies. For example AngloGold Ashanti did not report on grease or cement; Gold Fields did not report on ore processed/milled or the use of fossil fuels, lubricants or grease; whilst Harmony did not report on the use of explosives, acid, base or cement. Harmony provided sub-level disclosures on the Issue *fossil fuels*

used, differentiating between LPG and petrol & diesel, whilst Gold Fields provided sub-level disclosures on the Issues *base used*: lime and caustic soda and *waste recycled:* plastic; steel; wood; and paper.

Table 6: Summary of quantitative data disclosed for the materials Aspect (where LoA denotes the following Levels of Aggregation: S=Site; G = group). The Issues are in the far left column while the sub-level Issues are listed under the column labelled Disclosure.

Issue	AngloGold Ashanti		Gold Fields		Harmony	
	Disclosure	LoA	Disclosure	LoA	Disclosure	LoA
G4-EN1 - Materials used by weight or volume						
Ore processed/milled	Ore processed	S	-	-	Volume milled	S
Fossil fuels	Liquid fossil fuels	S	-	-	LPG Petrol & Diesel	G G
Lubricants	Lubricants	S	-		Lubricating & hydraulic oil	G
Grease	-	-	-	-	Grease	G
Cyanide	Cyanide	S	Cyanide	G	Cyanide	G
Explosives	Explosives	S	Blasting agents	G	-	-
Acid	Acid	S	HCl	G	-	-
Base	Alkali	S	Lime Caustic Soda	G G	-	-
Cement	-	-	Cement	G	-	-
G4-EN2 - Percentage of materials used that are recycled input materials						
Waste	-	-	Plastic Steel Wood Paper	G G G G	Waste	G
Landfill	-	-	General landfill	G	-	-
Brine	-	-	To lake	G	-	-
Other materials	-	-	Other materials	G	-	-
Waste rock	-	-	-	-	Waste rock	G
Slimes	-	-	-	-	Slimes	G

4.1.1.2. Level of Aggregation (LoA)

Table 6 shows that AngloGold Ashanti reported on all Issues on a site level and Gold Fields reported on all at a group level. Harmony reported mainly on a group level with one Issue (*volume milled*) being reported on a site level.

4.1.2. Energy Aspect

The Aspect *energy* contains the Indicators G4-EN3: *Energy consumption within the organisation*; EN4: *Energy consumption outside the organisation*; EN5: *Energy intensity*; EN6: *Reduction of energy consumption*; and EN7: *Reductions in energy requirements of products and services*. Table 7 below lists the different quantitative Issues and sub-level Issues reported on by the companies for this Aspect and the level of aggregation (LoA) of the data.

Table 7: Summary of quantitative data disclosed for the energy Aspect (where LoA denotes the following Levels of Aggregation: S=Site; C = Country; G = group). The Issues are in the far left column while the sub-level Issues are listed under the column labelled Disclosure.

Issue	AngloGold Ashanti		Gold Fields		Harmony	
	Disclosure	LoA	Disclosure	LoA	Disclosure	LoA
G4 –EN3 - Energy Consumption within the Organisation						
Energy consumption	Total	S	Total	G	Total Direct Indirect	G C[4] C[4]
Electricity consumption	-	-	Total (direct & indirect)	G	Electricity Diesel generated	S G
Fuel consumption	-	-	Total (direct & indirect) Total Diesel	G G	-	-
G4-EN4 - Energy Consumption Outside of the Organisation						
Energy consumed outside the operation	-	-	Total	G	Redundant [5]	-
G4-EN5 - Energy Intensity						
Energy intensity	Total	S	Total	G[2]	Total	S
G4-EN6 – Reduction of Energy Consumption						
Reductions in energy consumption	-	-	Total energy	G, S[3],C[3]	Total electricity	G
G4-EN7 – Reductions in energy requirements of products and services						
-	-	-	- [1]	-	-	-

[1] - *"Indicator is not relevant to the product we produce – gold" (Gold Fields, 2017b);* [2] *- Reported on both (units/tonne processed) and (units/oz produced);* [3] *- Provided group data (G) but also data for Peru (C) and for their South Deep and Tarkwa operations (S), and for their offices in Johannesburg and Accra (S);* [4] *- Reported for Papua New Guinea;* [5] *- Reported on information that did not directly correlate to the Indicator*

4.1.2.1. Extent and detail of reporting

The results in Table 7 indicate that no companies reported quantitative information for *reductions in energy requirements of products and services* (EN7); however Gold Fields did state that "Indicator (EN7) is not relevant to the product we produce – gold" (Gold Fields, 2017b). Furthermore, Gold Fields was the only company to report quantitative information for *energy consumption outside of the organisation* (EN4). Despite stating that they reported against Indicator EN4, Harmony referenced information that was irrelevant and often in the form of long paragraphs.

Gold Fields provided detail on the Indicator EN3 *(energy consumption within the organisation)* by differentiating between energy, electricity and fuel (diesel) consumed. Additionally they provided sub-level disclosures for the Issue *fuel consumption* by disclosing on total fuel (direct and indirect) and total diesel. Similarly, Harmony also provided detail for EN3 by reporting on energy, electricity and diesel consumption. They provided sub-level disclosures for the Issue e*nergy consumption* by disclosing on total, direct and indirect energy consumption, as well as additional detail for the Issue

electricity consumption: electricity and *diesel generated.* AngloGold Ashanti provided little granular detail for the energy Aspect.

4.1.2.2. Level of Aggregation (LoA)

According to Table 7, AngloGold Ashanti reported all energy Issues on a site level, whilst Gold Fields reported almost all Issues on a group level. For *reductions of energy* (EN6), Gold Fields did provide country level data for Peru, and site level data for their South Deep and Tarkwa operations, and for their offices in Johannesburg and Accra. Harmony varied in the aggregation of their data reported, reporting Issues on a site, country and group level.

4.1.3. Water Aspect

The Aspect *water* contains the Indicators G4-EN8: *Total water withdrawal by source*; EN9: *Water sources significantly affected by withdrawal of water*; and EN10: *Percentage and total water recycled and re-used*. Table 8 below lists the different quantitative Issues and sub-level Issues reported on by the companies and the level of aggregation (LoA) of the data.

Table 8: Summary of quantitative data disclosed for the water Aspect (where LoA denotes the following Levels of Aggregation: S=Site; C = Country; G = group). The Issues are in the far left column while the sub-level Issues are listed under the column labelled Disclosure.

Issue	AngloGold Ashanti		Gold Fields		Harmony	
	Disclosure	LoA	Disclosure	LoA	Disclosure	LoA
G4-EN8 - Total water withdrawal by source						
Water use	Total	S	Total	G	Total	S
Water withdrawal by Ground water use	Total	G	Total	G	Total	G
Water withdrawal by Surface water use	Total	G	Total	G	Total	G
Water withdrawal by utility and/or other external water supplier	Total	G	Total	G	Potable Non-potable	G G
G4-EN9 - Water sources significantly affected by withdrawal of water						
Number and size of affected water sources	Water source	S[1]	-[3]	-	Redundant[4]	-
G4-EN10 - Percentage and total volume of water recycled and reused						
Percentage of water reused (%)	Total	S[2]	Total	G	Total	G
Total volume of water reused by the organisation	Total	S	Total	G	Total	G

[1] - Reported for the Niger-Tinkisso Ramsar (Guinea); [2] - Reported all Issues on a site level, although no data was provided for the Obuasi, Navachab, and CC&V operations ; [3]- "No water sources are significantly affected by our water withdrawal"(Gold Fields, 2017b)*; [3] - Reported on information about water and water management but nothing that directly correlated to the indicator*

4.1.3.1. Extent and detail of reporting

Table 8 shows that all companies reported on *total water withdrawal by source* (EN8) and *water recycled and reused* (EN10), with sources of withdrawal reported on including groundwater, surface

water and utility or external water. Only AngloGold Ashanti provided quantitative data on the *number and size of affected water sources* (EN9), although this was somewhat limited. Gold Fields stated that "No water sources are significantly affected by our water withdrawal" (Gold Fields, 2017b), whilst Harmony disclosed redundant and irrelevant information for the Indicator EN9. Harmony provided more information on the Issue *water withdrawal by utility and/or other external water supplier* by differentiating between potable and non-potable water from external sources.

4.1.3.2. Level of Aggregation (LoA)

Table 8 shows that for *total water withdrawal by source* (EN8) AngloGold Ashanti and Harmony reported on total water use on a site level, while water withdrawals by source were reported on a group level. Gold fields reported all Issues on a group level. For EN9 AngloGold Ashanti disclosed information against this Indicator for only one water body in Guinea. In the case of EN10, AngloGold Ashanti reported all Issues on a site level, although no data was provided for the Obuasi, Navachab, and CC&V operations. Gold Fields and Harmony reported all EN 10 related Issues on a group level.

4.1.4. Emissions Aspect

The emissions that are referred to by the GRI G4 guidelines are *greenhouse gas (GHG) emissions* (EN15-EN19), *ozone depleting substances (ODS) emissions* (EN20) and *NOx, SOx and other significant air emissions* (EN21). Other significant air emissions refer to persistent organic pollutants (POP), volatile organic compounds (VOC), hazardous air pollutants (HAP) and particulate matter (PM).

The Aspect emissions contains the Indicators G4-EN15: *Direct (scope 1) greenhouse gas (GHG) emissions*; EN16: *Energy indirect (scope 2) greenhouse gas (GHG) emissions*; EN17: *Other indirect (scope 3) greenhouse gas (GHG) emissions*; EN18: *Greenhouse gas (GHG) emissions intensity*; EN19: *Reduction of greenhouse gas (GHG) emissions*; EN20: *Emissions of ozone-depleting substances (ODS))*; and EN21: *NOx, SOx and other significant air emissions*. Table 9 below lists the different quantitative Issues and sub-level Issues reported on by the companies and the level of aggregation (LoA) of the data.

4.1.4.1. Extent and detail of reporting

Table 9 below shows that none of the companies report on *emissions of ozone-depleting substances (ODS)* (EN20). Additionally AngloGold Ashanti did not report on *other indirect greenhouse gas (GHG) emissions* (EN17) and *reduction of greenhouse gas emissions* (EN19), and Harmony did not report on *NOx, SOx and other significant air emissions* (EN21).

In terms of detail of information, Harmony provided additional information for the Issues *scope 1 GHG emissions* (EN15) and *scope 1 emissions intensity* (EN18) by differentiating between emissions from diesel, explosives and petrol. Similarly Harmony provided more information for the Issue *GHG emissions reductions* (EN19) by differentiating between Scope 1 and Scope 2 GHG emissions

reductions. While AngloGold Ashanti and Gold Fields reported on the Issues *oxides of nitrogen* and *oxides of sulfur* for Indicator EN21, neither of them reported on other significant air emissions.

Table 9: Summary of quantitative data disclosed for the emissions Aspect (where LoA denotes the following Levels of Aggregation: S=Site; C = Country; G = group). The Issues are in the far left column while the sub-level Issues are listed under the column labelled Disclosure.

Issue	AngloGold Ashanti		Gold Fields		Harmony	
	Disclosure	LoA	Disclosure	LoA	Disclosure	LoA
G4-EN15 – Direct greenhouse gas (GHG) emissions (scope 1)[1]						
Direct (scope 1) GHG emissions	Total	C[4]	Total	G	Diesel Explosives Petrol	G G G
G4-EN16 – Energy indirect greenhouse gas (GHG) emissions (scope 2)[2]						
Indirect (scope 2) GHG emissions	Total	C[4]	Total	G	Total	G
G4-EN17 – Other indirect greenhouse gas (GHG) emissions (scope 3)[3]						
Indirect (scope 3) GHG emissions	-	-	Total	G	Total	G
G4-EN18 – Greenhouse gas (GHG) emissions intensity						
GHG emissions intensity (scope 1 & 2)	Total	S	Total	C[5]	Total	S
Scope 1 emissions intensity	-	-	-	-	Diesel Explosives Petrol	G G G
Total scope 2 emissions intensity	-	-	-	-	Total	G
Total scope 3 emissions intensity	-	-	-	-	Total	G
G4-EN19 - Reduction of greenhouse gas (GHG) emissions						
GHG emissions reductions	-	-	Total	G	Scope 1 Scope 2	G G
G4-EN20 – Emissions of ozone-depleting substances (ODS)						
-	-	-	-	-	-	-
G4-EN21 – NOx, SOx and other significant air emissions						
Oxides of nitrogen	Total	G	Total	G	-	-
Oxides of sulfur	Total	G	Total	G	-	-

[1] - Scope 1 GHG emissions "occur from sources that are owned or controlled by the company"(WRI and WBCSD, 2000)*; [2] - Scope 2 GHG emissions occur "from the generation of purchased electricity consumed by the company"* (WRI and WBCSD, 2000)*; [3] - Scope 3 GHG emissions occur "as a consequence of the activities of the company, but occur from sources not owned or controlled by the company" such as the "extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services"* (WRI and WBCSD, 2000)*; [4] - Reported for South Africa; [5] - Reported for South Africa and Peru*

4.1.4.2. Level of Aggregation (LoA)

AngloGold Ashanti reporting varied for different Issues. The Issues *Scope 1* (EN15) and *Scope 2* (EN16) *emissions* were reported only for South Africa, thus excluding Argentina, Australia, Brazil, Ghana, Guinea, Mali, Namibia and USA. *GHG emissions intensity* (EN 18) were reported at a site level, whilst EN21 emissions (oxides of nitrogen and oxides of sulfur) were reported at a group level. Gold Fields reported all Issues at a group level, except for *GHG emissions intensity* (EN18) for which it disclosed data for only South Africa and Peru, thus excluding Australia, and Ghana. Harmony reported on all Issues at a group level, except for *GHG emissions intensity* (scope 1&2) which was reported at a site level.

4.1.5. Effluent & Waste Aspect

The Aspect *effluents & waste* contains the Indicators G4-EN22: *Total water discharge by quality and destination*; EN23: *Total weight of waste by type and disposal method*; MM3: *Total amounts of overburden, rock, tailings and sludge and their associated risk*; EN24: *Total number and volume of significant spills*; EN25: *Weight of transported, imported, or treated waste deemed hazardous under the terms of the Basel 2 annex I, II, III and VIII, and percentage of transported waste shipped internationally*; and EN26: *Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharges of water and runoff.* Table 10 (page 44) lists the different quantitative Issues and sub-level Issues reported on by the companies and the level of aggregation (LoA) of the data.

4.1.5.1. Extent and detail of reporting

All three companies reported on the *total water discharge by quality and destination* (EN22), *total weight of waste by type and disposal method* **(**EN23) and *total amounts of overburden, rock, tailings and sludge and their associated risk* (MM3). Only AngloGold Ashanti did not report on the *total number and volume of significant spills* (EN24). No quantitative data was reported on for EN24 and the weight of transported, imported, or treated waste deemed hazardous (EN25) by any of the companies. Gold Fields provided the following reasons for not reporting on EN25 and EN26 respectively: "Gold Fields does not import, export or transport any waste deemed hazardous under the terms of the Basel Convention Annex I, II, III and VIII" (Gold Fields, 2017b) and "Our discharges are sampled and monitored regularly, in accordance with our permit/licence conditions. We are not aware of any water bodies and related habitats that are protected or have a high-biodiversity value that are significantly affected by any water discharges or runoff" (Gold Fields, 2017b). Harmony provided irrelevant and redundant information for EN26.

In general, little data was disclosed on the Issue *quality of water* (EN22), with conductivity being reported by AngloGold Ashanti and Gold Fields and only pH only reported by AngloGold Ashanti. AngloGold Ashanti also provided more information for the Issues *non-hazardous waste and*

disposal method and *hazardous waste and disposal method* (both EN23) with sub-level disclosures for different categories of waste and their disposal method, disclosing five and eight sub-level disclosures for each Issue. Gold Fields and Harmony also disclosed additional information for the Issue *non-hazardous waste and disposal method* by disclosing seven and two sub-level disclosures for the Issue respectively.

4.1.5.2. Level of Aggregation (LoA)

Table 10 shows that AngloGold Ashanti reported all quality-related data (EN22) at a site level for the following operations: Sunrise Dam, AGA Brazil (Mineracoa), Serra Grande, Iduapriem, Obuasi, Sadiola, Siguiri and West Wits. AngloGold Ashanti reported on EN23 Issues at a group level, and on MM3 Issues at a country level, except for the USA for which they did not report anything for. Gold Fields reported on all Issues at a group level, except for conductivity of water discharged for which it disclosed data for Tarkwa, Cerro Corona, South Deep and Granny Smith operations, and both Issues under EN24 for which it disclosed data on the Tarkwa and Damang operations. Harmony reported on data for EN22 at a site level for the Doornkop and Kusaslethu operations while for EN24 they reported site level data (number of environmental incidents) for all operations, but, due to the nature of the Indicator, they gave detailed disclosure only for the Kusasalethu operation. Harmony reported on all other Issues at a group level.

Table 10: Summary of quantitative data disclosed for the effluents & waste Aspect (where LoA denotes the following Levels of Aggregation: S=Site; C = Country; G = group). The Issues are in the far left column while the sub-level Issues are listed under the column labelled Disclosure.

	AngloGold Ashanti		Gold Fields		Harmony	
	Issue	LoA	Issue	LoA	Issue	LoA
G4-EN22 - Total water discharge by quality and destination						
Quantity of discharge	Total	S[1]	Total	G	Total	S[8]
Destination	Destination	S[1]	-	-	Destination	S[8]
Quality	pH Level Conductivity	S[1] S[1]	Conductivity	S[4]	-	-
G4-EN23 - Total weight of waste by type and disposal method						
Non-hazardous Waste and disposal method	Ferrous metal Non –ferrous metal General waste recycled General waste on-site disposal General waste off-site disposal	G G G G G	General landfill Other materials Steel recycled Plastic recycled Wood recycled Paper recycled Brine to lake	G G G G G G G	Scrap steel Waste recycled[9]	G G
Hazardous waste and disposal method	Battery recycled Battery off-disposal Hydrocarbon recycled Hydrocarbon on-site disposal Hydrocarbon off-site disposal Other[2] recycled Other[2] on-site disposal Other[2] off-site disposal	G G G G G G G G	-	-	-	-
G4-MM3 - Total amounts of overburden, rock, tailings and sludge and their associated risk						
Tailings deposited	Total	C[3]	Total	G	Total	G
Overburden & waste rock	Total	C[3]	Total	G	Total	G
G4-EN24 - Total number and volume of significant spills						
Number & volume of spills	-	-	Reportable incidents	G, S[5]	Reportable incidents	S[10]
Sector specific spills	-	-	Reportable incidents	G, S[5]	-	-
G4-EN25 - Weight of transported, imported, or treated waste deemed hazardous						
-	-	-	[6]	-	-	-
G4-EN26 - Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharges of water and runoff						
-	-	-	[7]	-	Redundant[11]	-

[1] - Sunrise Dam, AGA Brazil, Serra Grande, Iduapriem, Obuasi, Sadiola, Siguiri and West Wits; [2] - Fluorescent lighting and chemical & solvent waste; [3] - All countries but the USA; [4] - Tarkwa, Cerro Corona, South Deep and Granny Smith; [5] - Provided group data (G) but only detailed data was provided for Tarkwa and Damang (S); [6] - "Gold Fields does not import, export or transport any waste deemed hazardous under the terms of the Basel Convention Annex I, II, III and VIII" (Gold Fields, 2017b); *[7] - "Our discharges are sampled and monitored regularly, in accordance with our permit/licence conditions. We are not aware of any water bodies and related habitats that are protected or have a high-biodiversity value that are significantly affected by any water discharges or runoff*" (Gold Fields, 2017b); *[8] - Doornkop and Kusaslethu ; [9] - Steel, plastic, wood and paper; [10] - Provided data for each site (S) but only detailed data was provided for Kusasalethu (S); [11] - Reported on information about water and water management, but nothing that directly correlated to the indicator.*

4.2. Consistency and Clarity of Reporting

The content analysis of the sustainability reports of the three companies, AngloGold Ashanti, Gold Fields and Harmony (Section 4.1), highlighted a number of functionalist perspective quality issues, specifically regarding the extent and detail and the level of aggregation (LoA) of the reporting. In this section the results are discussed in terms of intra- and inter-company consistency (Section 4.2.1.) and reporting practices that affect the clarity of reports (Section 4.2.2.).

4.2.1. Consistency of Reporting

The sustainability reports are assessed for consistency in terms of extent (i.e. completeness) and level of detail of reporting.

4.2.1.1. Extent and detail of reporting

Table 11 summarises the extent and detail of the reporting of the three companies: namely the Indicators reported against (completeness) and the level of detail disclosed (granularity).

Overall, for the five Aspects considered in this paper, the three companies were relatively consistent in the amount of Issues and sub-Issues reported on (granular detail) in their Reports. AngloGold Ashanti reported on twenty-eight Issues with forty sub-level Issues; Gold Fields reported on thirty-four Issues, with forty-six sub-level Issues; while Harmony reported on thirty-two Issues, with forty-three sub-level Issues. However, certain Indicators were reported on in significantly more detail by some companies than others. In general AngloGold Ashanti reported on the fewest listed Indicators, reporting on only thirteen (56%) out of the twenty-three Indicators considered in this study. Gold Fields reported on eighteen (78%) and Harmony reported on sixteen (69%) of these Indicators. Eleven Indicators (48%) were reported on by all three companies: EN1 (*materials used by weight or volume*), EN3 (*energy consumption within the organisation*), EN5 (*energy intensity*), EN8 (*total water withdrawn from source), EN10 (percentage and total volume of water recycled and reused*), EN15 (*direct greenhouse gas emissions (scope 1)*), EN16 (*energy indirect greenhouse gas emissions (scope 2)*), EN18 (*greenhouse gas emissions intensity*), EN22 (*total water discharge by quality and destination*), EN23 (*total weight of waste by type and disposal method*) and MM3 (*total amounts of overburden, rock, tailings and sludges and their associated risk*). There were four Indicators (17%) not reported on by any of the three companies: EN7 (*reductions in energy requirements of products and services*), EN20 (*emissions of ozone-depleting substances*), EN25 (*weight of transported, imported, exported, or treated waste deemed hazardous*[8] *and percentage of transported waste shipped internationally*) and EN26 (*identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organisation's discharges of water and runoff*).

[8] Under the terms of the Basel Convention Annex I, II, III, and VIII.

Table 11: Completeness and granular detail of reporting against the considered Indicators with their correlating Aspects (where figures in brackets indicate the correlating number of sub-level Issues reported against for each Indicator category)

Aspects	G4 Indicator	Total no of Issues reported overall	Total number of Issues and sub-level Issues reported against by individual companies[1]		
			AngloGold Ashanti	Gold Fields	Harmony
Materials	EN1	9	7	5 (6)	5 (6)
	EN2	6	0	4 (7)	3
Energy	EN3	3	1	3 (4)	2 (5)
	EN4	1	0	1	0[2]
	EN5	1	1	1	1
	EN6	1	0	1	1
	EN7	0	0	0	0
Water	EN8	4	4	4	4 (5)
	EN9	1	1	0	0[2]
	EN10	2	2	2	2
Emissions	EN15	1	1	1	1 (3)
	EN16	1	1	1	1
	EN17	1	0	1	1
	EN18	4	1	1	4 (6)
	EN19	1	0	1	1 (2)
	EN20	0	0	0	0
	EN21	2	2	2	0
Effluents & waste	EN22	3	3 (4)	2	2
	EN23	2	2 (13)	1 (7)	1 (2)
	MM3	2	2	2	2
	EN24	2	0	2	1
	EN25	0	0	0	0
	EN26	0	0	0	0[2]
Total		47	28 (40)	34 (46)	32 (43)

[1]-Total number of Issues and sub-level Issues reported against by individual companies shows the level of detail that a company provides for each Indicator, with the first number representing the number of Issues and the number in brackets showing the number of sub-level Issues. [2] *- Redundant info*

Of the 23 indicators considered, AngloGold Ashanti provides more detailed information for only 2 (9%) of the sub-level Issues, compared to 4 (17%) for Gold Fields and 7 (27%) for Harmony. All companies provided granular information on EN23, whilst some of the companies provided sub-level issue information on EN1, 2, 3, 8, 18, 19 and 22. No detailed information on sub-level information was provided on 10 of the 19 indicators considered. AngloGold Ashanti provided more detail in terms of both Issues and sub-level Issues for four Indicators (17%), Gold Fields three (13%), and Harmony four (17%). For the Indicator EN3 (energy consumption within the organisation), Gold Fields reported on more Issues while Harmony reported on more sub-level Issues. This results in Gold Fields having a slightly broader range of issues for the Indicator EN3, while Harmony would have slightly more depth of detail for select Issues.

4.2.1.2. Level of Aggregation

Though reporting on the fewest indicators, AngloGold Ashanti presented the most disaggregated data in general, with site data on all operations being provided on thirteen (33%) out of the forty sub-level

Issues reported and on selected operations for an additional four sub-level Issues (10%). Gold Fields and Harmony, however, reported mainly on a group level. Gold fields reported twenty-six out of the forty-six sub-level Issues (57%) on a group level, with only four sub-level Issues (9%) reported on a site level for selected operations, and no sub-level Issues reported at site level for all operations. Harmony disclosed site data on all operations for six out of forty-three sub-level Issues (14%), while reporting on a group level for twenty-three sub-level Issues (53%). Worth noting however, is that due to the large number of sub-level Issues reported at a group-level for Indicator EN23: *Total weight of waste by type and disposal method,* the results in terms of overall level of aggregation are significantly skewed. AngloGold Ashanti disclosed thirteen sub-level Issues for Indicator EN23, Gold Fields disclosed seven and Harmony disclosed two. Thus, if Indictor EN23 was not considered AngloGold Ashanti would have reported on thirteen out of twenty-seven sub-level Issues (48%) at a site level, and only five (19%) at a group level. Gold Fields would have reported nineteen out of thirty-nine sub-level Issues at a group-level (49%). Harmony would have reported six (15%) and twenty-one (51%) site-level and group-level sub-level Issues respectively.

4.2.2. Clarity of Reports

A number of reporting practices, concerning the clarity of the reports, were identified while collecting the data from the company's sustainability or integrated reports using their GRI Content Index.

Firstly, inconsistencies in referencing were identified as both AngloGold Ashanti and Harmony in a number of instances provided page references for group data whilst actually reporting on site level data, and did not provide references to said data. There were also a number of discrepancies in the self-proclaimed level and extent of reporting, and the actual level and extent of reporting. These discrepancies manifest in two ways. The first is when a company claims to report partially against an Indicator, but discloses as much (or more) information as other companies who claim to report fully. AngloGold Ashanti, Gold Fields and Harmony were all culpable in this regard. The second is when a company claims to report against an Indicator but discloses either no information on the Indicator, or discloses information that is irrelevant to the Indicator. This sort of reporting practice was encountered multiple times when using Harmony's integrated report and Index.

Over-reporting or the reporting of superfluous and irrelevant information by Harmony was also identified. Providing an excessive number of mostly irrelevant references for an Indicator makes finding relevant information difficult, and potentially obscures the impacts the Indicator is intended to address.

Another practice which affected the ease of use of reports is the use of the Index to disclose detailed information, as opposed to in the sustainability or integrated report itself. Gold Fields repeatedly discloses relevant and material data in this way, notwithstanding its compliance with the G4 guidelines. However, the guidelines stipulate that it is not good practice to omit relevant and material information from one's sustainability report and rely solely on the Index for disclosure (GRI, 2015). The flipside is that Gold Fields in fact comprehensively complied with the G4 Guidelines, and reported

on the majority of the qualitative and quantitative information requested. Gold Fields complied with the Guidelines in this way for most of the Aspects, showing good levels of granular detail as well as good levels of consistency with respect to these granular details. The detail being referred to is information such as standards and factors used, assumptions made, and methodologies employed in calculations, thus contextualising the data disclosed.

4.3. Summary and Synthesis

This desktop study assessed the sustainability reporting practices of three South African gold mining companies (AngloGold Ashanti, Gold Fields and Harmony) that report according to the GRI G4 Guidelines. Specifically, the study focused on reporting against environmental Indicators for the Aspects materials, energy, water, emissions, and effluents & waste. The study assessed the quality of the reporting by these companies in terms of the level of data disclosure (extent and detail) and aggregation (Section 4.1), as well as consistency, clarity and ease of use of the reports (Section 4.2). This section summarises and interprets the findings reported in Sections 4.2 and 4.3 in the context of the functionality and effectiveness of sustainability reports in enhancing transparency and accountability.

The reporting on environmental issues is largely incomplete with none of the companies reporting on all 23 Indicators considered, and only 11 of the Indicators being reported on by all three companies. Whilst the level of detail on sub-level Issues varied for the different Indicators and companies, this was generally very low, with detail being provided on between 15 and 38% of the Indicators reported on. This is consistent with the findings of the literature review which identified lack of completeness and the superficial nature of the data in sustainability reports as a major shortcoming in terms of quality (see discussions in Section 2.2.4). On the other hand, detailed disclosure of information which serves to contextualise and verify disclosures, such as standards and factors used, assumptions made and methodologies employed in calculations, can be seen to enhance transparency and functionality. Of the three companies assessed, only Gold Fields reporting practices complied with GRI standards in this regard.

Another key quality issue raised in the literature is that of level of data aggregation. Consistent with reports in the literature (see for Gray and Milne, 2004; Mudd, 2012; Fonesca et al., 2013; RMF, 2018 and 2019), this study showed that, whilst the level of data aggregation both within and between companies varies, the environmental performance data reported in the sustainability reports of the three gold mining companies is largely reported on a group level. As reported by a number of authors (see discussions in Section 2.2.4), the lack of site-level data of adequate quality (both in terms of quantity and level of detail), and the inconsistencies of that data which is reported, makes it difficult to reliably assess and compare the performance trends and issues. This is particularly the case for environmental impacts of mining activities which are largely of local significance and can vary significantly for

different operations within a group. This is turn limits the usefulness and effectiveness in terms of supporting transparency.

Also of importance is the clarity and ease of use of the sustainability reports. Poor reporting practices such as inconsistencies in referencing, misleading claims on the level of reporting (all three companies) and reporting on superfluous or irrelevant information (Harmony) can negatively affect the accessibility of relevant data and be perceived as being misleading by external stakeholders (Fonesca, 2010).

Chapter 5

Results and Discussion

Stakeholder perceptions and experiences

The desktop study presented in Chapter 4 focused primarily on the reporting practices of the gold mining companies with respect to the disclosure against environmental GRI G4 Indicators. This chapter presents the results and discussion from the semi-structured interviews described in Section 3.3, regarding stakeholder (both internal and external) perspectives of, and experiences and engagement with, the sustainability reports issued by gold mining companies operating in South Africa. In line with the objectives of this study, the outcomes of the stakeholder interview are presented in terms of quality (Section 5.1) and functionality (Section 5.2) of the reports. Finally, the results are summarised, synthesised and contextualised in Section 5.3.

5.1. Quality Issues of Sustainability Reports

While the desktop study identified only functionalist quality issues, the semi-structured stakeholder interviews explored stakeholder perspectives from both a functionalist (Section 5.1.1) and critical (Section 5.1.2) perspective. Given its relevance to sustainability reporting (see discussions in Section 2.2.3) and the responses from the interviewees, the role of mandatory reporting in the context of improved quality is also discussed (Section 5.1.3).

5.1.1. Functionalist Perspective

The most prominent functionalist perspective quality issues that were identified in the interviews concerned the level of granular detail and of geographical aggregation of the disclosures. This Section presents the perspectives, concerns and experiences of both the external stakeholders (Section 5.1.1.1) and the internal stakeholders (Section 5.1.1.2) concerning these quality issues.

5.1.1.1. External stakeholders

i. Level of detail

According to Respondents 12 (an asset manager), 16 (an independent sustainability consultant), and 18 (an environmental lawyer and activist), contextual information such as the assumptions made, specialists employed and methodologies used to calculate the disclosed figures and data is often missing from companies' sustainability reports. Respondents 12 and 18 emphasise that not reporting on contextual detail prevents external stakeholders from being able to reconcile how values were calculated. According to Respondent 18, *"*There is not enough background information, so you do not get access to any of the assessments as to how they determine these figures, they do not tell you: "*We use these specialists, we use this methodology*." It is just a figure.*"* Respondent 17, a sustainability consultant who analyses the sustainability impacts of companies and works with government in setting

policies both in the climate change and energy space, is required to make assumptions as a result of missing detail. The granular detail required by Respondent 17 includes the various contributions of electricity, diesel, petrol and explosives to the total CO_2 equivalent value. Respondent 14, a sustainability-rating provider, feels that the level of detail is insufficient in general, stating that sustainability reports are "broad and vague" and "more a public relations tool than factual and detailed".

Respondent 13, a government representative working with communities affected by mining operations, and Respondents 19 and 20, both CEOs of community support organisations (CSOs), explain that there is a lack of detailed disclosures that meaningfully address and account for the impacts of mining operations on nearby communities and environmental systems in particular. Examples of such information are quantifiable accounts and measures of the health impacts of mine dust emissions (Respondent 19) and the economic and societal impacts of water pollution on nearby farmers (Respondent 20). Respondent 20 asserts that the mining companies do not have the capabilities or systems installed to meaningfully or accurately quantify and cost the impacts of their operations.

Mining companies also do not meaningfully interpret the data in terms of the financial implications of the environmental data that they disclose. Respondent 11, an asset manager and academic specialising in sustainable investment, explains:

> Mining companies produce a certain piece of data but they do not facilitate the relevant interpretation of that data. Firstly, because that data is not effectively normalised to indicate the relevance in an appropriate context. Secondly, the data is not necessarily interpreted to illustrate implications for the financial performance and the longer-term value creation by the enterprise.

Respondent 11 is referring to the interpretation of financial implications of data such as GHG emissions in the light of climate change or carbon taxes, or of water usage in the event of a drought or increased water tariffs. Similarly, Respondent 16, a sustainability consultant with prior experience in compiling junior mining company's sustainability reports, would also appreciate interpretation of the data in which the company provides "an analysis as to why it [the data] is important, and what the trend is, and what they [the company] are doing about it". However, Respondent 16 explains that the sustainability debate has not progressed past reporting against easily measurable indicators such as CO_2 emissions or energy and water use. Consequently mining companies still report weakly on more complex issues such as quantifying the impacts of their operations on the livelihoods on nearby communities and farmers, or interpreting the financial implications of relevant environmental issues, such as carbon tax. Contradicting the other external stakeholders, Respondent 15, a sustainability and environmental consultant, believes that detailed disclosures are in fact beyond the scope of a sustainability report, and should be accessed from other platforms.

Respondent 18, an environmental lawyer who maintains that detailed information should be disclosed in sustainability reports, explains that if such detail is not included in the sustainability report,

there needs to be clear directions as to where one can find the information, such as links to relevant documents and data. According to Respondent 18, mining companies do not currently practice this.

ii. Level of aggregation

According to Respondents 14, a sustainability-rating provider, and 17, a sustainability consultant specialising in climate change and energy, there is systematic aggregation of information in the mining sector, resulting in a lack of site level data. Respondent 17 finds that aggregated data is not useful because it inhibits the analysis on local or national greenhouse gas emissions, as well as on the contributions of mining companies to climate change per country. Similarly, Respondent 12, an asset manager, considers the disclosures on water and greenhouse gas emissions too aggregated to be useful. Respondent 12 consequently makes use of Carbon Disclosure Project (CPD) or Water Disclosure project (WDP) reports, which are more disaggregated, "To understand what is happening on sites, because otherwise it is such an aggregated number that it is not meaningful." Respondent 18, an environmental lawyer and activist, explains that mining company's disclosures on rehabilitation funds are aggregated across the group and no indication is given as to how much money is allocated to rehabilitate each operation:

> It is consolidated across the group. So you have no idea how much money is set aside per operation, which means that if there is a figure of 2 or 3 billion that is set aside for Company Z which operates all over the world, how much money is there for a particular mine? As a stakeholder, that is what you want to know. Especially as someone living next to this mine, you want to know is there enough money for this mine when it goes under or when it ends its life.

Respondent 19, also an environmental lawyer and activist, reiterates the limitations of current sustainability reports with regards lack of detailed site level data, explaining that aggregated information does not allow one to identify impacts to surrounding communities and environmental systems at a local level. Both Respondents 18 and 19 explain that without localised reporting it is hard to hold companies to account, and thus is of little use.

5.1.1.2. Internal stakeholders

The majority of internal stakeholders stressed that the issues disclosed, as well as the level of detail and aggregation of the disclosures, is dictated by the materiality of the issue and is a function of the purpose of the sustainability report. Respondents 1, 2 and 3, the core reporting team of Company A, all state that they compile their report according to materiality and that any 'omissions' that may occur are because the information is not deemed material or relevant to the business or their stakeholders. Respondent 3 put it simply by stating: "If it is not material, we will not report on it". Respondent 2 explains that in addition to reporting on issues that are material to the company, the company also

reports on information that is material to stakeholders and society, even if considered not relevant to the mining company itself:

> If it is important to a stakeholder to hear from us on climate change, even though our environmental manager may have different views on the relevance of climate change in the mining industry or in our company, there is still a need to respond to that. Because there is a stakeholder-need for information on climate change, or societal pressure for information on climate change.

Respondents 4 and 5, the core reporting team of Company B, reiterate that any 'missing information' is information that would have been considered immaterial. This sentiment is reiterated in Respondent 4's statement: "Where we have omitted information it is because it is not relevant or not material to our business". Respondents 6, an advisor to a reporting team from an editing perspective, and 8, a senior executive involved in group sustainable development for Company B, both emphasise that materiality determines what is disclosed, and is thus the reason for the inclusion or omission of information.

While most stakeholders, both internal and external, used *relevancy* and *materiality* interchangeably, it was established that they are distinct terms (Respondents 4, 5, 15 and 17) and, as outlined in Section 2.2.2.4, GRI sustainability reports are compiled according to materiality and not relevancy. Respondent 4, an integral member of the reporting team and group sustainability manager for Company B, reiterates this and explained that relevant information can be disclosed in the corresponding GRI Content Index rather than in the sustainability report itself.

Sixty percent of the internal stakeholders (Respondents 1, 4, 5, 8, 9 and 10) as well as external Respondent 15 consider the inclusion of detailed and technical site-specific performance data in sustainability reports to be inappropriate, as such reports are designed to provide mainly qualitative group-level performance information. Respondents 1, 4, 5 and 6 reiterate that sustainability reports are primarily group level reports and should thus provide a group level overview of sustainability performance that paints a picture of the global organisation. Respondent 1, primary author of Company A's sustainability report and vice-president of sustainability, explains that group level reporting "is the essence of the sustainability report." Furthermore, Respondent 9, vice-president of environment at Company A, explicitly states that sustainability reports are not the place for technical information:

> The different fuel types, the different ignition factors…, and the conversion factors. …We are not going to put it in the sustainability report [sic], because it is not the message that we are trying to put out … that this is a scientific study. There is another place for that information which is not the sustainability report [sic].

In a similar vein, Respondents 4 and 5, assert that while many of Company B's stakeholders require specific operational level information, the sustainability report is not the place to disclose such information, and the company will rather engage directly with these stakeholders. Respondents 1 and 2

maintain that external stakeholders should contact companies if they need additional information or detail, reiterating that sustainability reports are not the place for technical and detailed information. Respondent 1, primary author of Company A's sustainability reports, states that if stakeholders information needs are not met *"*then an open and transparent dialogue should be had*"*, while Respondents 2 and 9, acknowledge that it is not always practical for companies to meet all information requests, and external stakeholders may be instructed to *"*go to the regulator*"*.

Fifty percent of the internal stakeholders (Respondents 2, 4, 6, 9 and 10) perceive detailed and disaggregated data to be irrelevant to the majority of their external stakeholders, and explain that this is why certain detail and indicators are missing from sustainability reports. Respondent 2 perceives site level data for different water sources (surface, ground and municipal water) to be immaterial and irrelevant to external stakeholders, arguing that stakeholders require only group level values. Similarly, Respondent 4 states: *"*People do not really need to know what it [an environmental Indicator] is at an operational level versus a regional level, so therefore we do not do it at an operational level*"*. Respondent 9 asserts that the average user of a sustainability report wants group level performance and not country or site level performance. However, Respondents 2 and 9 contradicted themselves saying that disaggregated data is more useful to stakeholders. Similarly, Respondent 1 explains disaggregated data "enables you to look at nuances", while Respondent 8 states: "The more disaggregated the data, the more meaningful the comparisons."

With regards to level of detail, when asked about disclosing contextual detail such as methodologies, assumptions, standards, or emissions factors used, Respondent 6 responds: *"*For a lot of readers, that is not the type of information they are looking for. They are not looking for that level of detail*."* Respondent 9 explains that the company has the ability to report site-level data for the different sources of consumed water, such as surface, ground or municipal, but choose not to because "who cares?", indicating a perceived lack of materiality of such detail. Similarly, with respect to treated water that is then discharged to natural water systems, Respondent 10 argues that external stakeholders only want to know whether the water is clean or not, and are not interested in the quantity.

Finally, Respondents 4 and 5 explain that non-disclosures or lack of detail are attributed to a number of other reasons or combinations thereof, namely oversight, contractual issues to a third party, intellectual property concerns and missing or unavailable data.

5.1.2. Critical Perspective

This section presents results on stakeholder perceptions of and experiences with the quality of sustainability reports in the South African mining sector with respect to their integrity, credibility and balance (honesty) (Section 5.1.2.1). Given its central role in the critical perspective debates, internal stakeholders were questioned on the potential role that reputation management may play in the reporting practices of the mining companies (Section 5.1.2.2).

5.1.2.1. External stakeholders: Integrity, credibility and balance of sustainability reports

In terms of critical perspective quality issues, almost all (90%) of the external stakeholders interviewed had issues and concerns relating to the integrity, credibility and balance (honesty) of sustainability reports, and perceive company's reports to be non-credible, non-objective and misleading. Respondent 11, an asset manager and academic who uses sustainability reports for research and who is a supporter of sustainability and integrated reports, spoke about how mining companies *"*hide bad news*"* or negative sustainability performance, either by not reporting on the information at all, or by aggregating the information. The majority of the external stakeholders (90%) reiterate that companies hide bad news, and perceived mining companies non-disclosures on certain Indicators and impacts to be driven by reputation management and share price (and shareholder) protection (Respondents 13, 14, 15, 16, 17 and 19) and/or an attempt to avoid litigation (Respondents 15, 17 and 20). Furthermore, Respondent 18, a lawyer working for an environmental NGO, explains that companies are guilty of misleading reporting with respect to their environmental impacts and compliance with environmental licenses. Respondent 18 puts the blame on both the companies and the GRI Guidelines, explaining that the GRI requests companies to report on significant fines and non-monetary sanctions for non-compliance. This in turn means very little in the South African context as the Department of Mineral Resources or Environmental Affairs do not issue fines to companies, even if a company is in major non-compliance with environmental or social licenses. Thus, for a company to say that they were inspected by regulators and received no fines or sanctions for non-compliance of the environmental laws does not mean they are in compliance with environmental laws. In fact, Respondent 18 explains that these same companies have been inspected by the Department of Environmental Affairs and were found to be in major non-compliance with their environmental licenses. Similarly, Respondent 15, a sustainability consultant, talks of Company A's misleading reporting, in which they are dishonest about the financial implications of the pollution caused by their operations:

> If you look at their X operations, where we know there is water pollution: stuff coming out of their slimes dam. They keep on saying it is a contingent liability and that they do not know how much money it is going to cost. Which we know is bullshit, they have reports that have told them it is such a big number so they do not say anything.

Respondent 12, an asset manager, claims that companies put a positive slant on most of their disclosures and do not report on their negative impacts, making the reports feel like marketing material. Respondents 12, 15 and 18 consider it common practice for mining companies to neglect reporting on significant environmental violations, but to include disclosures on their positive CSR projects such as photography classes or monetary donations to schools. Respondents 13 and 20 refer to sustainability reports as being a marketing and public relations tools, Respondent 14 calls them a form greenwashing

and *"*documents with fancy packaging that hide the truth*"*, and Respondent 20 refers to them as a *"*propaganda tool*"*.

However, Respondent 15 again refers to the purpose of a sustainability report and emphasises that sustainability reports are not designed to contain truthful reporting on a company's negative sustainability performance, saying: *"*It is not an 'open my [the company's] kimono to all our [their] environmental problems', that is not what it is designed to be.*"*

5.1.2.2. Internal stakeholders: Reputation management and disclosure in sustainability reporting

Literature indicated that critical quality issues are often related to reputation management (see Gray and Milne, 2004; Hamann and Kapelus, 2004; Fonseca, 2010; de Villiers and van Staden, 2011a; Higgins and Coffey, 2016; Hummel and Schlick, 2016; Boiral and Henri, 2017) and hence internal stakeholders were questioned on the extent to which this was a driver for non-dislcosure of information.

The majority (70%) of the internal stakeholders do not consider protection of reputation to be a driver for non-disclosure of information or lack of detail in terms of level of granularity and aggregation. However, Respondents 4, 8 and 9 confirm that reputation protection, not inviting unintended consequences, and protecting the company and their shareholders, are all factors they consider when disclosing sustainability performance information. Additionally, these Respondents contextualise the complex nature of disclosing sustainability performance information as a mining company. Respondents 8 and 9 are both sustainability vice presidents with extensive technical environmental managerial experience, and explained that the mining industry is competitive, has a negative reputation and is heavily distrusted by society, thus limiting what information they can disclose, as this information can be used against the company. Respondent 8 confirms that they do use lawyers, *"*a necessary evil*",* to censor reports for any potential legal issues. Respondent 9 reiterates the legal aspect, emphasising that they are careful not to disclose information that can be used in litigations against the company. Respondent 4, 8 and 9, however, stress that such information could still be requested, and was available via other sources such as the regulators.

5.1.3. The Role of Mandatory Reporting in Improving Quality

Mandatory reporting is a proposed intervention to improve the quality of sustainability reporting. Sixty percent of the external stakeholders (Respondent 13, 15, 16, 17, 19 and 20) believe that sustainability reporting should be mandatory as an attempt to improve the reports quality in terms of integrity and credibility, as well as relevancy and usability. The argument for mandatory sustainability reporting is that it would result in more regular, consistent, honest, and transparent reporting. However, other respondents were hesitant about mandatory reporting. Respondents 12 and 14 are concerned that mandatory reporting creates a box-ticking and compliance culture, and prefer aligning with best practice rather than making it mandatory. Respondent 11 argues that data and information that is established and well understood should be mandatory and regulated, while new information and issues should be

voluntary as they need time adapt to industry norms and become understood by both the regulators and the company. Respondent 13, who works for government, is of the opinion that while mandatory reporting in theory may increase the quality and credibility of sustainability reports, it is not logistically possible. This is because the governmental departments involved (DEA, DMR and DPME) are already over-stretched and under-resourced, and as Respondent 13 says: *"It would be adding extra work to an already over stretched department"*.

5.2. Functionality of Sustainability Reports

Section 5.2.1 presents the perspectives and experiences on the application and relevance of sustainability reports with respect to both internal and external stakeholders, with specific emphasis on the quality issues affecting such. Section 5.2.2 discusses the perspectives and experiences of stakeholders on the engagement process, which emerged as being highly relevant to the functionality of company sustainability reports during the course of the interviews.

5.2.1 Application and Relevance

5.2.1.1. Internal Stakeholders

The interviews with internal stakeholders indicate that sustainability reports are used internally. The internal stakeholders were asked to rate the relevancy of sustainability reports to the various internal stakeholders and the results are presented in Table 12 below.

Table 12: Relevancy of sustainability reports to various internal stakeholders as rated by internal stakeholders

Internal stakeholders	**Number of respondents ranking relevancy of information to different internal stakeholders**				
	1	**2**	**3**	**4**	**5**
Company Directors			20%	20%	60%
Executive management			25%	25%	50%
Senior managers*			17%	17%	66%
Regional and general managers	20%	20%		20%	40%
Plant managers	44%	11%	11%		34%
Mining and process engineers	44%	11%	11%		34%
Operating staff	33%	33%			33%
Where 1= Very irrelevant, 2=irrelevant; 3=moderate relevancy/irrelevancy; 4=relevant; 5=very relevant *Senior managers being group level managers					

Table 12 indicates that sustainability reports are perceived to be relevant to very relevant to the company directors (80% of respondents), executive management (75% of respondents) and senior managers (83% of respondents), and regional and general managers (60% of respondents). In contrast, the relevancy of sustainability reports for plant managers, mining and process engineers, and operating staff are mainly perceived as moderate to negligible relevance. This is consistent with perceptions and experiences that the data is not detailed or real-time enough to be used in making day-to-day operational decisions (Respondents 4, 5, 8, 9 and 10). Respondent 4 explains that internal stakeholders such as

process managers or process engineers do not use their companies annual sustainability report for operational or process functions or for managing environmental and community risks and impacts, because the information disclosed is not detailed or current enough.

While literature was vague on the actual internal uses of sustainability reports, mentioning only that sustainability reports are used internally as a tool for strategic decision-making (Rogers, 2017), the interviews identified that sustainability reports are used for three main purpose, namely as a tool for communication and stakeholder engagement purposes, strategy development, and performance optimisation. These uses are unpacked in more detail in i-iii below. .

i. Communication tool

A major localised internal use of sustainability reports is as a reference during engagements with stakeholders (Respondents 2, 4, 8 and 9). Respondents 4 and 8 both refer to reports as "a useful repository of information" when speaking to the investment community, such as asset managers, shareholders and institutional investors, about the company's sustainability performance. The reporting teams themselves use sustainability reports in engagements with external stakeholders, also mostly the investment community, when asking for feedback and suggestions as how to improve their sustainability reports. Sustainability reports are also important tools in communicating the company's material issues, their ethos, and other qualitative aspects concerning a company's sustainability agenda (Respondents 1, 2 and 5). Respondent 2 sees sustainability reports as a communication tool that is currently undervalued and overlooked, and that can be an important marketing and competitive positioning tool. Respondent 3 explains that sustainability reports also provide data and performance information to various internal stakeholders throughout the organisation; often at a country or group level, particularly used for strategy development (see Section 5.2.1.2)

ii. Strategy development

Many of the internal stakeholders explain that sustainability reports are used internally to facilitate strategic decision making and performance management at an executive and boardroom level (Respondents 2, 3, 7, 8, 11 and 14). Respondent 7, who is on the executive committee of Company B, states that sustainability reports are "part of where we make business decisions"; however Respondent 7 does not explain what these business decisions were. Respondent 4 and 5, key members of Company B's reporting team, explain that directors may use sustainability reports for setting strategy and monitoring certain performance metrics over time, both against itself and against peers. Respondent 11 provides support for the notion that the strategic use of sustainability reports happens at a group level, indicating that the performance Indicators provide an overview of the entire company's performance. Respondent 6, an external reporting advisor to Company A, explains that sustainability reporting plays a role in strategic planning by assisting the company in setting goals and conducting internal checks.

iii. Performance optimisation

Respondents 4, 5, 8, 9 and 10 confirm that the data in sustainability reports is too superficial, retrospective and aggregated to be used as a direct and current measure of operational performance, and the major source of internal data used for operational (and business) functions are the internal data systems (Respondents 4, 5, 8, and 10). These data systems, termed Business Intelligence Systems (BIS), house data that is current and detailed in comparison to the aggregated and retrospective detail in the company's sustainability and integrated reports (Respondent 4, 5, 8 and 10).

Nevertheless, for a number of reasons, the process of reporting or compiling a sustainability report is considered to play an indirect role in optimising company performance (internal Respondents 5, 6, 7, 8 and 9 and external Respondents 11, 12 and 16). Firstly, companies using the GRI Guidelines are required to perform a materiality assessment to determine the issues that are most material to the company. These are referred to as materiality matrixes. The GRI guides companies through this process and is often the catalyst for companies to develop materiality matrixes in the first place (Respondents 4, 5 and 7). Respondent 7 explains the benefits of sustainability reporting and of the subsequent materiality assessment:

> The guidance that you get from a sustainability-reporting point of view pushes you to do things like a materiality assessment, which automatically helps you prioritise and understand some of the risks to your business even better. So it does improve your performance, it can only but do that.

Developing a materiality matrix is hugely valuable for a company and Respondents 12 and 14 explain that companies that have performed materiality assessments tend to outperform companies that have not. Secondly, the reporting process often requires companies to collect data that they were not previously collecting and thus raises awareness to aspects of their performance for the first time. As a result of being equipped with new data, companies can develop new perspectives and solutions to existing issues and practices, as well as identifying risks, areas of concern and room for improvement (Respondents 6, 7, 8 and 9 and external Respondent 16). Respondent 5 explains that monitoring and measuring sustainability performance and the subsequent analysis of trends, assists the company in managing key performance indicators (KPIs). Thirdly, Respondent 6 speaks about the role that the reporting process has in increased accountability with regards to goal setting:

> It is an important process in terms of advancing sustainable development, because the reporting process itself helps them identify gaps. It helps them to set goals, and then they have to report on it [the goals]. Because if they have said something publically, and they say: "we will do this next year", and the next year comes around and they have not done it... It is a way of doing an internal check.

5.2.1.2. External Stakeholders

Three external stakeholder groups emerged regarding the use of sustainability reports; a) stakeholders that use sustainability reports as a source of actual performance information, b) stakeholders that use sustainability reports as an indicator of company commitment and legitimacy or to inform their own reporting practices, and c) stakeholders that do not use sustainability reports.

The external stakeholders that use sustainability reports as a source of actual performance information were Respondents 11, 12, 14, 16 and 17. Respondent 11, an asset manager and an academic who has worked very closely with both the GRI and the IIRC, makes extensive use of company sustainability reports for research on responsible investments in both professional roles. Similarly, Respondent 12, an asset manager for a major investment company who is in charge of the environmental and social aspects of the company's ESG portfolios, uses sustainability reports extensively to inform research. Respondent 14 rates and assesses the sustainability of financial sector businesses, in which the assessment maps companies' performance against various sustainability metrics and tools, the GRI included. In providing this service, Respondent 14 uses sustainability reports for (amongst many things) quantitative metrics and assessing companies own understanding of risk. Respondent 16 is an independent sustainability consultant to mining companies and has prior experience in compiling sustainability reports for junior gold mining companies. Similarly, Respondent 17 is a sustainability consultant to various mining and mineral processing companies, mostly involved with the impacts of companies concerning climate change and energy. Both Respondents 16 and 17 use sustainability reports in their professional capacity.

Respondents 15, 18 and 20 are external stakeholders who use sustainability reports either as an indicator of a mining company's legitimacy, or to inform their own sustainability reporting practices. Respondent 15 owns an environmental consultancy business that specialises in the extractives, infrastructure and energy sectors, and advises companies both with company strategy, including operations, and sustainability reporting. Respondent 15 states that sustainability reports are useful only for reporting purposes and not for the consultancy service of strategic operational interventions: *"*We only use sustainability reports for reporting. For actual advice we go to the operations, we cannot rely on the sustainability reports to do that*"*. Respondent 18 is a lawyer who works at a legal NGO that specialises in environmental and social issues. Respondent 18 uses sustainability reports solely to expose the weaknesses and limitations of said sustainability report, and finds the information contained inside the reports of limited use. Respondent 20, the director of a community support organisation, uses the information contained in sustainability reports to hold mining companies to account, to analyse the company's sustainability and ethical performance, and to verify the information disclosed in the sustainability reports.

Respondents 13 and 19 do not use sustainability reports in any capacity. Respondent 13, a government official who works with communities affected by mining operations, stated that the reports are too company centric and do not meaningfully address the social impacts of mining operations.

Instead, Respondent 13 uses company's Social and Labour Plans (SLP) and Environmental Management Programme Reports (EMPRs). Respondent 13 argues that these reports are more credible, honest, objective as well as community centric. Respondent 19 supports this view, maintaining that reports such as SLPs, EMPRs and Environmental Impacts Assessments (EIAs) contain specialised and technical detail on land capability, land use, surface hydrology, and acid mine drainage, and are prepared by specialists in bio-diversity, flora, fauna, ground water, surface water radiation and dust. Respondent 19 also engaged with mining companies through workshops and mine tours, and involve community members in the engagements. Respondent 19 emphasises that sustainability reports cannot be used in litigation or for legal purposes as they are not detailed or accurate enough, and do not contain relevant information. As a result both Respondents 19 and 20 use other sources for detailed information in their legal work, namely SLPs, EIAs, EMPRs, water licenses reports and compliance reports.

5.2.2. Stakeholder engagement process

A major constraint emerging from the interviews with respect to the relevance and/or materiality[9] of sustainability reports, and thus their application, was the lack of meaningful engagement between with external stakeholders and mining companies. Stakeholder engagement was found to be limited and to need improvement (Respondents 2, 10, 12, 15, 18, 19 and 20). Internal Respondent 2 states that Company A's stakeholder engagement is "anecdotal", whilst external Respondents 12 and 16 perceive stakeholder engagement to be one-way and characterised by the messages companies disclose rather than the questions that they hear. Respondent 15 was of the opinion that companies do not engage with stakeholders at all, and "they just determine materiality themselves".

Conversely, internal Respondents 4 and 5, the key reporting team for Company B, explain that for Company B's materiality assessment process, the company's stakeholder engagement was extensive, and engaged with various internal and external stakeholders, including community members, organised labour, NPO's and regulators. However, Respondent 8, a vice president and environmental manager of the same company, speaks mainly of extensive engagements with investors, analysts and financial organisations, explaining that there is a growing interest of investors in sustainable development issues.

External Respondent 16 argues that the level of engagement varies for different stakeholder groups: "Some stakeholder groups they will do well with, so they probably do quite well with investment analysts, but they probably do really badly with communities." Respondent 16 elaborates

[9] While materiality and relevancy are similar and often used interchangeably, in the realm of sustainability reporting they are distinct. According to the GRI (2013c), material issues or aspects are those that "reflect the organisation's significant economic, environmental and social impacts; or substantively influence the assessments and decisions of stakeholders" (GRI, 2013c). Where relevancy is defined by Cambridge Dictionary as: "the degree to which something is related or useful to what is happening or being talked about" (Cambridge Dictionary, n.d.). Thus, a material issue can be seen as an issue that can have significant social, environmental or social impacts to the company or their stakeholders, while a relevant issue is an issue that is appropriately associated with or topical to the mining industry.

further that there are practical reasons for this, such as the changing interest and information needs of stakeholders such as NGOs and the challenge of communicating technical information with communities. Various other Respondents reiterated that engagement with investors and analysts was prioritised. Respondent 10, a senior audit manager at Company A, perceives the focus of Company A's stakeholder engagement process to be with shareholders and investors, and not with communities or government:

> The focus is on shareholders. I do not think we have actually gone to the communities and asked them. I do not think we have gone to the government and asked them what information they want to see.

Similarly, external Respondents 12, 18 and 19 argue that companies do not engage with community partners, local communities, NGOs, or environmental and social activists, and rather engage with the investment community. Respondent 18 explains that while mining companies do invite well-known environmental and social activist organisations to stakeholder engagement processes, it is often as a compliance exercise, and furthermore "They do not consult with the people who are actually affected by the operations", referring to local communities. Respondent 19 shares a similar sentiment and states "the voices of the marginalised are often overlooked".

Consequently, because of poor stakeholder engagement, the audience of sustainability reports, although perceived to be for a wide range of stakeholders, is limited. Respondent 2 explains that sustainability reports never reach communities and Respondents 4 and 5 assert that only investors, analysts, and to a lesser degree academics, use sustainability reports. Investors were the only stakeholder group to have been mentioned consistently in the interviews, as ninety percent of all the stakeholders interviewed, both internal and external, mentioned investors as an important stakeholder of sustainability reports. Furthermore, Respondents 1, 6, 7, 8, 9, 11 and 14 single out investors as a major stakeholder, while Respondents 4, 5, 10, 15, 18, 19 and 20 explicitly say that sustainability reports are solely used by or created for investors.

5.3. Summary and Synthesis

This study investigated the perspectives of, and experiences with, sustainability reports issued by companies in the local mining sector. This was done by analyzing the interviews with twenty key stakeholders, with respect to the quality as well as the functionality of the sustainability reports.

Many of the external stakeholders experience the current level of detail and aggregation in the sustainability reports to be poor, with ninety and eighty percent of the external respondents expressing dissatisfaction with the two factors respectively. Furthermore, these results agreed with literature that sustainability disclosures are often superficial and non-contextual (Daub, 2007; Fonseca, 2010; Hummel and Schlick, 2016), and that there is a tendency for companies to aggregate data on a group level (Gray and Milne, 2004; Mudd, 2012; RMF, 2018 and 2019). Sustainability reports in the local

mining sector are also experienced to have low levels of integrity and credibility. While the GRI states that sustainability reports are to be balanced, i.e. companies should report on their negative performance as well as their positive performance (GRI, 2013c), South African mining companies are culpable of misleading and dishonest reporting, and largely only disclose information on their positive performance, resulting in their sustainability reports to be perceived as greenwash and as a reputation management tool. These findings were also present in literature (Gray and Milne, 2004; Hamann and Kapelus, 2004; Fonseca, 2010; de Villiers and van Staden, 2011a; Higgins and Coffey, 2016; Hummel and Schlick, 2016; Boiral and Henri, 2017).

The lack of site-level data of adequate quality (both in terms of quantity and level of detail) as well as the lack of integrity, credibility and balance makes it difficult to reliably assess and compare sustainability performance. Furthermore, it makes it difficult to validate the data and fails to take into account the site-specific nature of the impacts of mining operations. Twenty percent of the external stakeholders could not use sustainability reports due to insufficient rigour and detail, as well as credibility of sustainability reports, while a further twenty percent expressed limitations to use. Consequently, sustainability reports could not be used for litigation, meaningful assessments of the impacts or risks of mining operations on environments and communities, or for strategic operational based interventions for sustainability or environmental consultants. This in turn limits their effectiveness in supporting transparency and holding mining companies to account. For internal stakeholders, sustainability reports are too retrospective, aggregated and superficial to be used for management or operational decisions, including managing environmental and social impacts.

Despite the quality issues, eighty percent of the external respondents claim to use sustainability reports in some capacity. Financial advisors and analysts, as well as researchers involved in performance modelling, use sustainability reports as a source of secondary performance information for quantitative performance evaluations and assessments. Sustainability reports are also used by sustainability-strategy and -policy consultants who use the reports to identify opportunities for performance improvement; and by CSO's and community activists who use the reports to assess transparency and credibility, and subsequently to critique and expose companies.

Sustainability reports are also used internally, mostly at an executive level for evaluation of group level Indicators. However, perhaps the greatest benefit to internal stakeholders lies in the actual process of compiling a GRI sustainability report. This process forces companies to perform a materiality analysis and to collect data that they were perhaps not previously collecting. Internal Respondents expressed that this has the potential to reveal unforeseen performance issues and areas for improvement. This observation is consistent with literature reports regarding the benefits of the reporting process in creating awareness and knowledge of sustainability issues within the organisation (Stubbs *et al*., 2013; Higgins and Coffey, 2016), and new ideas about long held practices (BCCCC and EY, 2016). The reporting process itself is therefore an important source of internal transparency and accountability.

Mining companies admit that reputation management plays a large role in the reporting process. Consequently, information that will damage the company's reputation or perceived legitimacy, invite litigation or negatively affect their share price will not be disclosed. However, both internal and external stakeholders reason that sustainability reports are not designed for companies to admit to all their environmental and social wrongdoings, and that it is not practical to expect mining companies to report honestly and openly on all their environmental impacts, as companies need to be responsible to their business and to their shareholders. Furthermore, the results from the stakeholder interviews show that there is a major trust deficit associated with the South African mining industry, a result of the social and environmental injustices and violations committed by the industry (most notably the gold industry) for over a century (See Section 2.1.2). Because of this trust deficit, as well as the highly competitive nature of the mining industry, it can be argued that it is unrealistic to expect mining companies to report openly on their environmental and social impacts.

This study has also highlighted the alternative platforms to which mining companies disclose sustainability performance information, and from which internal and external stakeholders can access more detailed, technical and meaningful sustainability performance information. For instance, internal stakeholders can access the mining company's BI systems, which house extensive operational data and can be accessed remotely from anywhere in the world, and they can also use site-level reports, which contain the current, detailed and technical information required for operational and day-to-day functions. For external stakeholders, reports submitted by mining companies to various regulatory bodies, either government departments or international organisations, are useful platforms for detailed and disaggregated data. The most prominent of these reports include SLPs, EIAs, EMPRs, WULs, compliance reports and Carbon Disclosure Project Reports. It was, however, also noted that accessing reports from the regulators, namely the DMR, is difficult, providing a potential barrier to accessible information. Other platforms for sustainability performance information are industry forums, working groups, site visits and tours, reports from NGO's and first hand testimonies from affected communities.

Worth noting are the two disconnects that emerged pertaining to internal and external stakeholders perceptions of i) the purpose of sustainability reports and ii) the information needs of external stakeholders. While it is evident that some external Respondents are expectant of detailed and disaggregated data it was noted that: (i) sixty percent of internal stakeholders (and external Respondent 15) believe that such detailed and technical information is inappropriate in a sustainability report and perceive sustainability reports to be group level documents that should provide high-level and qualitative information on the companies sustainability performance; and (ii) fifty percent of internal stakeholders explained that external stakeholders do not require detailed, technical and/or disaggregated data and hence mining companies do not provide data of this nature. These two dynamics speak to the disconnect that exists between various external stakeholder groups and the mining companies. Furthermore, they also speak to the level of stakeholder engagement that the companies perform, and to which stakeholders they consult. It was observed that mining companies believe that external

stakeholders need group level and qualitative performance data, which does not address the information needs of stakeholders that are interested in impacts to local communities and environmental systems. It was also apparent that community members, lawyers or representatives of community support organisations are not included in stakeholder engagement processes. Amongst both internal and external stakeholders, there is also a strong perception that sustainability reports are used primarily by the investment community.

Chapter 6

Conclusions and Recommendations

The aim of this study has been to investigate the quality and functionality of sustainability reporting within the gold mining sector in South Africa, with specific emphasis on environmental issues. To this end, a multi-method approach has been applied.

Firstly, publically available literature has been reviewed and critically analysed, with focus on the sustainability issues relating to the South African gold mining sector, as well as the status of sustainability reporting in the mining sector with particular emphasis on quality issues and functionality. Grounded in the literature reviewed, a conceptual framework has been developed that synthesised and characterised the quality factors and the quality criteria of GRI sustainability reports and illustrated their effect on the functionality and effectiveness of sustainability reports in enhancing accountability and transparency (see Section 2.3). Additionally, from the literature review, the following key research questions were developed:

1. What is the current quality of (environmental) sustainability reporting, taking into account the functionalist and critical perspective issues?
2. What is the functionality and effectiveness of current (environmental) sustainability reporting practices in driving increased accountability and transparency?
3. On the basis of the answers to 1 and 2, what deductions can be drawn on the relationship between the quality issues and the functionality and effectiveness of current sustainability reporting practices?

Secondly, the literature review informed, and served a basis for, the subsequent South African case studies which were performed to interrogate the key research questions. The first case study sub-set was the desktop review involving a content analysis of sustainability reporting in the local gold mining sector. The desktop study focused on the reporting against select environmental Indicators from the GRI G4 Guidelines by three multi-national gold mining companies operating in South Africa, namely AngloGold Ashanti, Gold Fields and Harmony. This assessment set out to identify sustainability reporting issues of a technical and logistic nature. The second case study sub-set entailed semi-structured interviews with key internal and external stakeholders in order to determine the perceptions on the experiences, usefulness and quality of sustainability reports in the local gold mining sector, with specific focus on reporting of environmental impacts. This part of the study provided insights into quality issues of both a technical and political nature, as well as the perceived functionality of sustainability reports.

This chapter concludes the first order assessment that was performed on the environmental sustainability reporting within the South African gold mining sector. The key findings from the desktop study and stakeholder interviews are presented in Section 6.1. Concluding remarks on the research,

namely on the nuances and complexity of reporting in the South African mining industry, are provided in Section 6.2. Finally, based on the findings, recommendations are made in Section 6.3.

6.1. Case Study Key Findings

This section presents the key findings from the two case study sub-sets, and in so doing, answers the three key research questions. The quality of environmental sustainability reporting of the South African gold mining sector is discussed in Section 6.1.1, drawing on results from both the desktop study and the stakeholder interviews. Then, the functionality and effectiveness of sustainability reports is discussed in Section 6.1.2, both in terms of application and driving increased accountability and transparency, and is based primarily on the results from the stakeholder interviews. Finally, the effect of the quality issues on the functionality and effectiveness of sustainability reports is presented in Section 6.1.3, with deductions being made from the previous two key findings.

6.1.1. Quality of Environmental Sustainability Disclosures: Functionalist and Critical Perspective Issues

In accordance with the conceptual framework developed from the literature review and analysis, the factors affecting the quality of sustainability reports can be characterised according to two different perspectives: functionalist and critical. The functionalist perspective perceives quality issues arising from technical and practical factors of reporting according to guidelines, whereas the critical perspective perceives quality issues rising from political factors. In general, the desktop study identified functionalist factors, while the thematic analysis of the interviews was able to identify both functionalist and critical factors.

6.1.1.1. Functionalist quality issues

Quality issues pertaining to the clarity, completeness and consistency of reporting against select GRI G4 Indicators were identified in the desktop study. It was found that the reporting on environmental issues is largely incomplete. None of the companies reported on all twenty-three of the Indicators considered, while only eleven of the Indicators were reported on by all three companies. Poor reporting practices, namely referencing inconsistencies in the company's GRI Content Index, misleading claims on the level of reporting, and reporting on irrelevant or superfluous information, affected the clarity of sustainability reports. Inter- and intra-company inconsistencies in terms of Indicators reported on, and the level of detail and aggregation disclosed against each Indicator, were present in all three company's sustainability reports. Quality issues concerning the level of granular detail and geographic aggregation of data and information were prominent in both the desktop study and the stakeholder interviews. The desktop study found low levels of granular detail, with the three companies providing detail on between 15 and 38% of the Indicators reported on. The study also found high levels of geographically aggregated data, where AngloGold Ashanti's reporting was the least aggregated with site level data provided for all of their operations for only thirteen (33%) out of their forty sub-level Issues, while Gold Fields did

not report site level data for all of their operations once. Nearly all the external stakeholders expressed dissatisfaction with the level of detail and the level of aggregation of the disclosures, ninety percent and eighty percent for the respective quality issues. In addition to a lack of disaggregated data and granular detail for each Indicator, company's sustainability reports were found to lack meaningful assessments of the social and environmental impacts of their operations, meaningful normalisation and interpretation of the disclosed data in terms of the financial implications for the company, and information that contextualises and verifies the disclosed data (information that was only disclosed by Gold Fields).

Internal stakeholders perceptions on level of detail and disaggregation is that sustainability reports are not the appropriate platform for detailed, technical and disaggregated data and are instead group level reports that communicate an overview of the company's performance with emphasis on qualitative information.

6.1.1.2. Critical quality issues

Ninety percent of the external stakeholders interviewed raised concerns relating to the integrity, credibility and balance (honesty) of mining company's sustainability reports. Despite the GRI stipulating that companies must report on both positive and negative sustainability performance, external stakeholders explained that it is common for mining companies to neglect reporting on significant environmental impacts or violations, but to include disclosures on their positive impacts. External stakeholders also experienced misleading and dishonest reporting in the mining industry. Missing information is perceived to be a result of mining companies hiding bad news, protecting their reputation and shareholders, and avoiding litigation. For these reasons, sustainability reports are seen as "marketing material", a "public relations tool" or even a "propaganda tool". Similarly, sustainability reports are accused of greenwash and managerial capture. These sentiments point to a significant trust deficit that exists between the public and the mining industry. Two internal stakeholders with significant technical experience and who both hold managerial positions, admitted that, due to societal pressure and the competitive nature of the industry, reputation management plays a prominent role in deciding what information is disclosed in a company's sustainability report, and that the company is thus strategic and deliberate in what they report. However, it was also observed that both internal and external stakeholders reason that it is not practical to expect mining companies to report honestly and openly on all their environmental and social impacts, as companies need to be responsible to their business and to their shareholders

6.1.2. Functionality and Effectiveness of Current Sustainability Reports

The stakeholder interviews provided valuable insight into the *de-facto* applications and users of sustainability reports, as well as insight into the functionality and effectiveness of sustainability reports in driving increased accountability and transparency.

Internally, sustainability reports are used for setting strategy at an executive and board level, and as a communication tool during engagements with certain external stakeholders, particularly

shareholders, asset managers and investors, as well as to communicate qualitative information such as the company's ethos and sustainability journey. The greatest internal benefit of sustainability reports is, however, the reporting process itself, which has the potential to drive change and enhance accountability and transparency within a company. This is because the reporting process forces company's to capture new data, develop materiality matrixes, and publically disclose goals and performance data, all of which have the potential to change often unsustainable ways of operating by revealing unforeseen performance issues, areas for improvement and discover new realisations about long held practices.

Eighty percent of the external stakeholders interviewed use sustainability reports in some capacity. The first group of external stakeholders, comprising of financial advisors and analysts as well as researchers involved in performance modelling, use sustainability reports as a source of quantitative performance data for evaluation and assessment purposes. The second group use sustainability reports to assess sustainability performance, strategy and policy. This group comprises mainly of sustainability consultants, who use the reports to identify opportunities for performance improvement, and CSOs and community activists who use the reports to critique companies, expose weaknesses and to assess transparency and credibility. Twenty percent of the external stakeholders could not use sustainability reports in any capacity, and a further twenty percent experienced limits to use of sustainability reports.

6.1.3. Relationship between Quality Issues and the Functionality and Effectiveness of Sustainability Reporting

The quality criteria for data and information that can enhance the functionality and effectiveness of reports in driving increased transparency and accountability are accessibility, comparability, materiality, relevancy and reliability. These quality criteria are in turn a function of the functionalist and critical quality factors discussed in Sections 6.1.1 and 6.1.2, namely the aggregation and detail, balance, clarity, completeness, consistency, and credibility and integrity of the sustainability reports and the data they contain. It is against these quality factors, and how they affect the quality criteria, that deductions are made on the effectiveness and functionality of sustainability reports.

6.1.3.1. Functionalist quality factors

Twenty percent of the external stakeholders could not use sustainability reports due to insufficient rigour, detail and credibility of sustainability reports, while a further twenty percent expressed limitations to use due to these quality related issues. In particular, external stakeholders considered that these quality issues limited the use of sustainability reports for litigation, meaningful assessments of the impacts or risks of mining operations on environments and communities, and for strategic operational based interventions for sustainability or environmental consultants. This in turn limits their effectiveness in supporting transparency and holding mining companies to account. Similarly, for internal stakeholders, sustainability reports are too retrospective, aggregated and superficial to be used for management or operational decisions, including managing environmental and social impacts, or for

day-to-day operations based functions. If the reports are seen to be of limited or negligible use by stakeholders, they will be less effective in terms of enhancing transparency and accountability.

For certain stakeholders, detail that contextualises the disclosures, such as assumptions made and methodologies and calculations used, increases the reliability and functionality of data, as it allows stakeholders to validate and verify the disclosed data. Detailed and disaggregated data also allows stakeholders to perform more in depth and accurate analyses on specific environmental issues, such as water accounting or global warming contributions. Most of the respondents, both internal and external, agreed that disaggregated is more meaningful and useful to stakeholders, as aggregated data fails to take into account the site-specific nature of the impacts of mining operations.

Reporting practices such as inconsistencies in referencing and misleading claims on the level of reporting which were seen by all three companies in the desktop study, and reporting on superfluous or irrelevant information, which was seen namely in Harmony's reports, affect the clarity and ease of use of sustainability reports. It was suggested by some external stakeholders that mining companies intentionally hide negative sustainability performance within multiple references and lengthy paragraphs, obscuring the relevant information. These reporting practices decrease the functionality and transparency of sustainability reports.

It was seen in the desktop study that the company's sustainability reports had low levels of completeness. However, completeness is a difficult factor to measure and quantify because companies report against the GRI Indicators according to its materiality. Thus for companies using the GRI Guidelines, completeness is not as simple as reporting on all the Indicators, because every company has different material issues. While the internal stakeholders expressed that completeness is tied to materiality, external stakeholders do not feel that the industry has consulted them on what is material to them; showing that a lack of transparency also affects some quality issues.

Inter- and intra-company inconsistencies in the sustainability reports, in terms of the number and types of Indicators reported against, as well as the level of detail and aggregation of disclosures, negatively affect the ability of stakeholders to compare and benchmark companies performance to one another. It is worth noting that mines occur in diverse and inconsistent economic, political, regulatory and geographic climates. This level of complexity is incredibly high and is in itself an inherent limitation to the comparability and consistency of sustainability reports.

6.1.3.2. Critical perspective factors

For stakeholders that focus on the impacts of mining operations on nearby communities and environmental systems, balanced (honest) information is highly material and/or relevant. When companies do not report on their critical and negative sustainability issues, for reasons such as reputation management and protecting their shareholders, it decreases transparency and consequently the accountability of sustainability reports. External stakeholders expressed that subjective and company-centric reporting reduces the usefulness of sustainability reports, while others expressed that

a lack of integrity and reliability in sustainability reports detracts from their usefulness and hence the effectiveness of reports to enhance transparency

6.2. Concluding Remarks and Observations

Sustainability reporting, an established yet growing practice, is said to play an important role in the sustainability agenda of companies. The narrative given by the GRI is that sustainability reports allow for increased transparency and accountability on company's critical sustainability issues, which assists in making the company more sustainable, as well as assisting with external stakeholders' sustainability agendas. This narrative applied to the mining industry is perhaps too simplistic and does not consider the various nuances at hand. Consequently there is no definitive blueprint as to what should be included in a report, how it should be reported, and for whom it should cater. The theoretical, multi-criteria framework developed in this study provided the platform for identifying both the functionalist and critical factors that influence the quality and functionality of corporate sustainability reports. Application of this framework in a multi-method case study, in which the perspectives of stakeholders were used to validate and compliment a detailed content analysis of sustainability reports, provided a more holistic view of the factors influencing the quality and functionality of sustainability reporting (as discussed in Section 6.1), as well as highlighting the complexities and nuances involved. This section outlines important nuances in this regard that have been identified in this research.

(i) The trust deficit – Reporting in the current socio-political environment

As outlined in literature the gold mining industry in South Africa is responsible for significant social and environmental injustices that has resulted in a deep-seated distrust of the industry by society. The critical perspective quality issues that were identified in the interviews illustrate this trust deficit. Faced with a highly skeptical and critical public, companies are faced with a challenge when disclosing information on the company's negative impacts. The interviews with internal stakeholders confirmed that, as a result of the charged socio-political climate and the strong anti-mining rhetoric, reputation management plays a large role in the reporting process and mining companies do not disclose certain information to protect their reputation and shareholders. Thus, information dissemination, transparency and accountability are compromised due to the trust deficit.

(ii) Complexities of voluntary and mandatory reporting

Sustainability reports are voluntary, and will continue to be so until an independent body with enough organisational capacity can enforce regulations to make them mandatory. Regulated or mandatory sustainability reporting is a favored intervention to improve the quality, as reports and disclosures made to regulatory bodies are considered more detailed and honest. However, other than concerns that mandatory reporting will create a compliance culture instead of one of genuine sustainability, the ultimate obstacle is that the government departments involved do not have the capacity or logistical capabilities to regulate sustainability reporting. Thus, the regulating of sustainability reports is not a

practical option in South Africa and companies will continue to disclose information that does not damage their reputation or invite unintended consequences, and will not be balanced or honest accounts of a company's sustainability performance.

(iii) Disconnect between internal and external perceptions

From the results, two disconnects emerged pertaining to internal and external stakeholders perceptions of the purpose of sustainability reports and of the information needs of external stakeholders. While it is evident that some external respondents are expectant of detailed and disaggregated data, the internal stakeholders expressed that sustainability reports are not the place for detailed data, and that external stakeholders do not require detailed disclosures. This indicates that there is a disconnect between the companies and stakeholders, which can be attributed in part to the stakeholder engagement that occurs in the industry. Seemingly, the investment community is the only stakeholder that is properly engaged with, and perhaps are the end-user companies have in mind when compiling their reports. It can also be attributed to various perceptions of what the purpose of a sustainability report is. There are many perspectives on what level of detail and aggregation is appropriate for a sustainability report.

(iv) The measurability and thus comparability of sustainability performance

The question needs to be asked as to whether one can actually compare information on sustainability performance, as each site differs so greatly from one another. For example, each mine has different relationships with and definitions for water, and has unique aquifers and water issues. The reporting on performance indicators for these non-uniform issues complicates the issue of standardised sustainability reporting.

6.3. Recommendations

Based on the findings from the research, the following recommendations are made:

1. Certain stakeholders require current, disaggregated, detailed and official information. While sustainability reports may not be the appropriate platform for such information, it is available in reports that are submitted to regulators, namely Environmental Management Programme Reports (EMPRs), Environmental and Social Impact Assessments (EIA and SIAs), Social and Labour Plans (SLPs) and Water Use Licenses (WULs), as well as compliance notices from the relevant departments. Furthermore, disclosures made to organisations such as the Carbon and Water Disclosure Projects (CDP and WDP) include detailed and technical information. In terms of increasing access to such information, and ultimately increasing transparency and accountability, it is recommended that stakeholders should be able to download all official reports and compliance notices, either from the company's website or from the regulatory body's website. Furthermore, mining companies should provide very clear directions in their sustainability reports as to where this information is located.

2. The term Sustainability Reports or Sustainable Development Reports is misleading. *De facto* sustainability requires a radical shift in perception and action, and sustainability reports are seemingly not useful enough to drive the necessary change. Thus, it is recommended:
   (i) That the GRI and the companies acknowledge the limitations of the reports to ensure that they do not obscure the very real issue of sustainability and sustainable development, of which GRI sustainability reports are falling short in promoting.
   (ii) Further studies are performed on revisiting the role of reporting as part a more comprehensive management system, rather than being an end in itself.

3. Finally, it is noted that the following additional information is required by some of the external stakeholders:
   - Detail that contextualises and verifies the reported values[10];
   - Quantitative and qualitative measurement and subsequent reporting of the social and environmental impacts of mining operations;
   - The interpretation of the Indicators reported on in terms of the financial implications for the business;
   - Site-specific or at least country level data;
   - References or clear instructions as to where detailed and disaggregated information can be located.

   Thus, it is recommended that further studies are performed that investigate the options for and consequences of including this information in company's sustainability reports. Issues that may need to be paid particular attention to are: the risk that the process will become unmanageably burdensome and complex; the effect of such data on a company's performance; the use of such data by stakeholders; and alternative commitments and reporting metrics.

[10] Even though this detail and contextual information is requested for by the GRI, it is not often disclosed.

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Appendix A: Calculations

The South African gold sales in real terms normalised to a 2010 baseline value was calculated using the following calculation:

$$\text{SA gold sales in real terms}_{\text{year x}} = \text{SA gold sales in nominal terms}_{\text{year x}} \times \frac{\text{CPI}_{\text{base year}}}{\text{CPI}_{\text{year x}}}$$

The South African gold sales was found taken from Table 9: South African Gold production & sales (Chamber of Mines of South Africa, 2017) and the Consumer Price Index (CPI) value was taken from Table B1: CPI headline index numbers (Statssa, 2019). The base year was decided to be 2010.

As a worked example, for the year 2004, the South African gold sales in real terms was calculated as following:

$$\text{SA gold sales in real terms}_{2004} = \text{SA gold sales in nominal terms}_{2004} \times \frac{\text{CPI}_{2010}}{\text{CPI}_{2004}}$$

$$\text{SA gold sales in real terms}_{2004} = 29\,272\,188\,000 \times \frac{70{,}7}{49{,}2}$$

$$\text{SA gold sales in real terms}_{2004} = 42\,063\,896\,000$$

Appendix B: Respondents Introduction Documents

B.1 Informed Consent Form

Consent Form

Critical assessment of environmental performance reporting using the GRI G4 Guidelines: A case study on three South African gold mines

MPhil in Sustainable Mineral Development

University of Cape Town

I ……, confirm the following:

1.	I have read the information sheet provided by the researcher and thus understand the projects aims and objectives.	
2.	I am participating in this project voluntarily and understand that I may withdraw from the interview at any time if I so do wish.	
3.	I acknowledge and understand that confidentiality will be maintained.	
4.	I have been asked permission to record this interview and have given my permission.	
5.	I understand that this data is accessible to other researchers only if they honour the confidentiality agreement.	

Participant

Date ……

Signature of participant ……

Name of participant ……

Organisation of participant……

Researcher:

Name: ……

Signature: ……

Date: ……

B.2 Interview Information Sheet

Critical assessment of environmental performance reporting using the GRI G4 Guidelines: A case study on three South African gold mines

MPhil in Sustainable Mineral Development

University of Cape Town

Hello I am David Viljoen and am conducting research towards a Masters of Philosophy specialising in Sustainable Mineral Resource Development in Africa. I am researching environmental sustainability reporting practices in South African gold mining companies and would like to invite you to participate in the project.

This research aims to investigate the quality and relevance of the disclosures of environmental sustainability information in the context of the South African gold mining industry. This will be achieved by firstly conducting a desktop study and content analysis on the environmental sustainability disclosures for three gold mining companies operating in South Africa and, secondly, by interviewing stakeholders to determine their perspectives and experiences on company reporting, with particular emphasis on relevance, usefulness and quality of information.

The purpose of this research is to determine whether current sustainability reporting techniques are effective at communicating environmental sustainability information with key stakeholders. I am looking to evaluate the usefulness and relevancy of environmental disclosures in sustainability reports to various stakeholders, as well as their perspectives of the quality of the reporting.

I would like to emphasise that your participation is voluntary. There will be no negative consequence if you choose not to participate. If you choose to participate, please note that you may withdraw at any time. However, I would be grateful if you would assist me by allowing me to interview you.

The interviewing process will take between 30 to 45 minutes. It will not require any costs and will be done where is most convenient to you. The first section of the interview will require you to complete questions in which you use a rating system to answer the questions. The second part of the interview consists of questions which require you to answer them verbally. **With your permission, I will record this interview.**

There will be no direct benefits to you as the participant, but we will make the findings of the research project available to you in written form (as a dissertation and papers) on request.

I do not foresee any harm to you as a participant. **You as a participant may state what you will or will not allow to be used in the research.**

Your name and company name will not be disclosed in the research paper. Through this, we ensure that confidentiality is maintained. The data that is collected from the interviews will transcribed and subsequently analysed for themes using a programme called NVivo. **Please note** that this data will be accessible to other researchers only if they honour the confidentiality agreement. If you so wish, the transcribed interview can be sent to you as well as the final dissertation.

B.3 Questionnaires for External Stakeholders

Stakeholder details

Name of Participant: …….
Organisation: …….
Date of interview: ……..

1. With which stakeholder group(s) do you belong or are associated? .....

.....

2. Do you use sustainability reports for environmental information?

Yes	No

3. Please answer the following:

	Never	Seldom	Often	Very often
How often do you use a company's sustainability report for environmental information?				
How common is it that you use a company's GRI Index in conjunction with their SR[1]?				

[1] - Where SR= Sustainability Report= Any report that contains the GRI (Global Reporting Initiative) required information

4. When you are looking for environmental information what is your rational for referring to a company's sustainability report? .....

.....

Relevance

1. What environmental issues do you consider relevant to your interests, particularly in terms of the gold sector? .....

.....

2. Following on from the previous question, can you rate the relevance to you of the following environmental aspects:
   - Where 1 is *least relevant* and 5 is *most relevant*
   - You can have the same relevancy for as multiple aspects

	1	2	3	4	5
Materials aspects					
Energy aspects					
Water aspects					
Emissions aspects					
Effluents & Waste aspects					

3. Of the environmental aspects above that are highly relevant to, can you name some specific information disclosures that you require or is of relevance to you: .....

.....

4. Are your environmental information needs (those mentioned in the previous questions) addressed or catered for in the current sustainability reports?

5. Following on from the previous question, please rate how satisfied you are with the amount of disclosed environmental information that is specifically relevant to you?
   - Where 1 is dissatisfied and 5 is completely satisfied.

	1	**2**	**3**	**4**	**5**
General (Environmental Info)					
Materials aspects					
Energy aspects					
Water aspects					
Emissions aspects					
Effluents & Waste aspects					

6. What relevant environmental information is **present** in sustainability reports?

7. What relevant environmental information is **missing** from sustainability reports?

8. Following on from the previous questions, please answer the following question:

	Never	**Very seldom**	**Very often**	**Always**
How often do you find the information that you are looking for in SRs*?				

*Where SR= Sustainability Report= Any report that contains the GRI (Global Reporting Initiative) required information

9. What is your opinion on the environmental disclosures or information that *supposedly* meets the needs of your stakeholder group?

10. What is your definition of good quality disclosures/reporting?

11. What environmental information is reported on well?

12. What is your perception on the level of stakeholder engagement to determine what environmental information is of materiality to the different stakeholders?

Usability of environmental reporting

1. Can you comment on the level of detail of disclosures on an environmental indicator or issue, and whether the present level of detail is sufficient to fulfil your function?

2. Environmental data can be reported on at site or company level.
   - Can you comment on the disclosure of information at group or company level versus at a site level, and list the negatives and positives of either.

3. What is your experience with the level of detail and level of aggregation of environmental data in sustainability reports?

4. Following on from the previous question, please answer the following question.
   - Where 1 is *dissatisfied* and 5 *completely satisfied*.

	1	**2**	**3**	**4**	**5**
How satisfied are you with the level of detail of disclosures in the SRs?					
How satisfied are you with the level of aggregation of disclosures in the SRs?					

5. Following on from the previous questions, please answer the following:

	Never	**Very seldom**	**Often**	**Always**
How often is material information disclosed in an irrelevant or un-usable form?				

6. What is your experience with the general usability of sustainability reports? Does it feel like it was created for the end user?

7. Following on from the previous question, please answer the following questions.
   - Where 1 is *not at all* and 5 *definitely*.

	1	**2**	**3**	**4**	**5**
Does it seem like the SR was made for the end user?					
Does it feel like the data was collected and reported in a way that it was meant for the end user?					

General

1. In what way does sustainability reporting progress/promote sustainable development?
   - Where "*Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs*" or whatever variation of this definition you are most comfortable.

2. Following on from the previous question, please answer the following question
   - Where 1 is *not important at all* and 5 *very important*

	1	**2**	**3**	**4**	**5**
How important a role do you think SRs play in advancing sustainable development?					

3. In what way does sustainability reporting progress/promote environmental stewardship?
   - Where "environmental stewardship refers to responsible use and protection of the natural environment through conservation and sustainable practices".

4. Following on from the previous question, please answer the following question.
   - Where 1 is *not important at all* and 5 *very important.*

	1	**2**	**3**	**4**	**5**
How important a role do you think SRs play in advancing environmental stewardship?					

5. Do you think that sustainability reporting disclosures, such as those outlined by the GRI, should be voluntary or mandatory?

6. What environmental information specific to your stakeholder group or profession should be mandatory?

7. Why do you think companies do not disclose certain information (environmental) in their sustainability reports?

B.4 Questionnaires for Reporting Team

Stakeholder details

Name of Participant: ……..
Organisation: ……
Date of interview: ……..

1. What is your job title and job description? ……

2. With which stakeholder group/s do you belong or are associated? ……

General

1. How does your company use the environmental data from its own sustainability reports? ……

2. Following on from the previous questions, please rate your perception of the relevance of environmental sustainability data to the following internal stakeholders:
   - Where 1 is *irrelevant* and 5 is *relevant*

	1	**2**	**3**	**4**	**5**
Company directors					
Executive management					
Senior managers					
Regional and general managers					
Plant managers					
Mining and process engineers					
Operating staff					

3. Please rate the relevance of the environmental sustainability data in current SD reports in fulfilling the following internal functions:
   - Where 1 is *irrelevant* and 5 is *relevant*

	1	**2**	**3**	**4**	**5**
Benchmarking best practice					
Monitoring performance improvement and challenges					
Improving stakeholder engagement					
Marketing company (competitive edge)					
Identifying company risk					

4. How important is the GRI Index? How much of a priority is it to the organisation?

5. Following on from the previous question can you rate the importance of the GRI Index for your organisation:

   - Where 1 is *unimportant* and 5 is *essential*

	1	**2**	**3**	**4**	**5**
How important is the GRI Index					

6. Please comment on reporting using the GRI G4 Guidelines. Do you find the guidelines conducive to creating good quality and relevant sustainability reports?

Materiality

1. For which stakeholders does the company prepare the environmental information in their sustainability reports?

2. For each of these stakeholders, briefly describe their environmental information needs and what they use the information for:

3. How are these information needs accounted for in the reporting process?

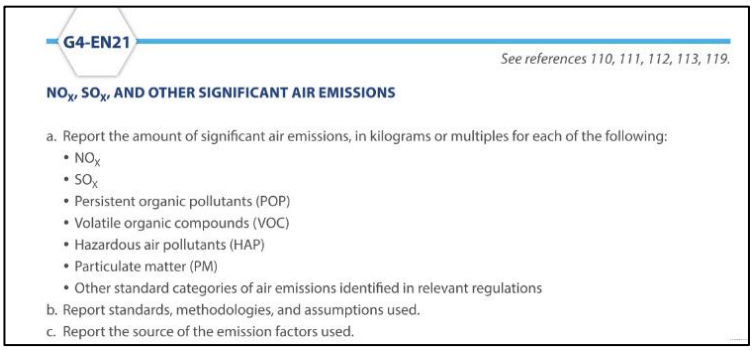
4. Does the company consult directly with stakeholders? If yes, which ones and how? Please briefly describe the stakeholder consultation process:

5. How does the company prioritise differing stakeholder needs?

Level of detail

1. How is it chosen what environmental Indicators to report on and not?
   - Is it a process outlined by the GRI or is it an internal AGA process?

2. When reporting on an Indicator, for example G4-EN21:



G4-EN21

See references 110, 111, 112, 113, 119.

NO_X, SO_X, AND OTHER SIGNIFICANT AIR EMISSIONS

a. Report the amount of significant air emissions, in kilograms or multiples for each of the following:
   - NO_X
   - SO_X
   - Persistent organic pollutants (POP)
   - Volatile organic compounds (VOC)
   - Hazardous air pollutants (HAP)
   - Particulate matter (PM)
   - Other standard categories of air emissions identified in relevant regulations

b. Report standards, methodologies, and assumptions used.

c. Report the source of the emission factors used.

In the 2016 (and 2017) SD report, XXX only reported on NOx and SOx emissions and not on POPs, VOCs, HAPs and PM. Nor were the standards, methodologies, assumptions or source of emissions used reported on.

2.1. Please comment on why certain requested information is not reported on? .....

.....

2.2. What stops the company from disclosing all the information requested? .....

.....

3. Can you comment on challenges in access to data for reporting purposes? Is access to information a limitation in reporting? .....

.....

4. Following on from previous questions please rate your response to the following reasons for omissions of the information requested by the GRI.
   - Where 1 is strongly disagree and 5 is strongly agree.

	1	**2**	**3**	**4**	**5**
Information or data is not available					
Protecting company reputation					
Risk management					
Omissions are due to irrelevant requests by the GRI					
Following all requests is impractical due to time constraints					
Following all requests is impractical due to resource constraints					
Following all requests is impractical as it would result in reports that are too detailed and long					

5. From previous interviews, some stakeholders perceptions of missing information in company reports is that it is a strategic decision to protect the reputation of the company. Can you share anything on this from the point of view of a mining company?

6. When comparing sustainability reports of various SA gold mining companies, the companies reported on each Indicator with varying level of detail.

   6.1. What could be the reasons for the varying level of detail?

   6.2. What effect do you think this has on stakeholders?

   6.3. Are other company's reports looked at or does your company consult with other gold mining companies for ideas of what to report on and what level of detail to report on?

Level of aggregation

Similarly, the level of aggregation of data varies both inter and intra company's reports. In the 2016 SD report, Company XXX gives water use by source as aggregated group level data.

1. Why does the company report on an Indicator at a company level as opposed to site level or even national level?

2. Is site level data more or less useful than group level data? For stakeholders? For the company?

3. Why did the company report total water use as site level data, but did not disaggregate the water use into the different sources?

Level of reporting

1. How is it decided whether the company has reported fully or partially?

2. What is the use of partial disclosures for stakeholders?

3. Why did the company choose the core option for reporting instead of comprehensive?

B.5 Questionnaires for Internal Stakeholders

Stakeholder details

Name of Participant: …….
Organisation: …….
Date of interview: ……..

1. What is your job title and job description? ……

2. With which stakeholder group/s do you belong or are associated? ……

General

1. How does your company use the environmental data from its own sustainability reports? ……

2. Following on from the previous questions, please rate your perception of the relevance of environmental sustainability data to the following internal stakeholders:
   - Where 1 is *irrelevant* and 5 is *relevant*

	1	**2**	**3**	**4**	**5**
Company directors					
Executive management					
Senior managers					
Regional and general managers					
Plant managers					
Mining and process engineers					
Operating staff					

3. Please rate the relevance of the environmental sustainability data in current SD reports in fulfilling the following functions:

   - Where 1 is *irrelevant* and 5 is *relevant*

	1	**2**	**3**	**4**	**5**
Benchmarking best practice					
Monitoring performance improvement and challenges					
Improving stakeholder engagement					
Marketing company (competitive edge)					
Identifying company risk					

4. Do you consult or work with the GRI G4 Guidelines when collecting and managing environmental data?

Yes	No

5. If yes, do you find the guidelines conducive to collecting meaningful and relevant information?

6. How much of a priority is establishing or improving monitoring and management systems to capture relevant and material data for stakeholders?

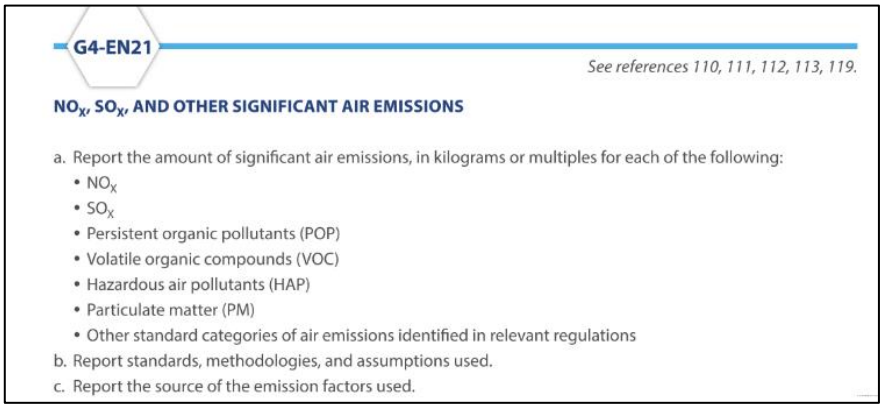
Data collection and preparation

1. How do you choose what environmental information to prepare?

2. Are you aware for which stakeholders you are collecting and preparing the environmental data, and subsequently what their information needs are?

3. If no, do you think you would collect and prepare environmental data differently if you were aware of them and their information needs? Please explain:

4. For the Indicator G4-EN21, In the 2016 (and 2017) SD report, Company XXX only reported on NOx and SOx emissions and not on POPs, VOCs, HAPs and PM. Nor were the standards, methodologies, assumptions or source of emissions used reported on.



G4-EN21

See references 110, 111, 112, 113, 119.

NO_X, SO_X, AND OTHER SIGNIFICANT AIR EMISSIONS

a. Report the amount of significant air emissions, in kilograms or multiples for each of the following:
- NO_X
- SO_X
- Persistent organic pollutants (POP)
- Volatile organic compounds (VOC)
- Hazardous air pollutants (HAP)
- Particulate matter (PM)
- Other standard categories of air emissions identified in relevant regulations

b. Report standards, methodologies, and assumptions used.
c. Report the source of the emission factors used.

Using this indicator as an example:

4.1. Please comment on why certain requested information is not reported on?

4.2. What stops the company from disclosing all the information requested?

5. Can you comment on challenges in access to data for reporting purposes?

6. Following on from previous questions please rate your response to the following reasons for omissions of the information requested by the GRI.

   - Where 1 is strongly disagree and 5 is strongly agree.

	1	**2**	**3**	**4**	**5**
Information or data is not available					
Protecting company reputation					
Risk management					
Omissions are due to irrelevant requests by the GRI					
Following all requests is impractical due to time constraints					
Following all requests is impractical due to resource constraints					
Following all requests is impractical as it would result in reports that are too detailed and long					

7. From previous interviews, some stakeholders perceptions of missing information in company reports is that it is a strategic decision to protect the reputation of the company. Can you share anything on this from the point of view of a mining company? .....

8. When comparing sustainability reports of various SA gold mining companies, the companies reported on each Indicator with varying level of detail.

8.1. What could be the reasons for the varying level of detail? .....

8.2. What effect do you think this has on stakeholders? .....

8.3. Do you ever look at other company's reports or consult with other gold mining companies for ideas of what environmental data and in what detail to collect and report? .....

Level of aggregation

Similarly, the level of aggregation of data varies both inter and intra company's reports.

In the 2016 SD report, Company XXX gives water use by source as aggregated group level data.

1. Why does the company report on an Indicator at a company level as opposed to site level or even national level? .....

2. Is site level data more or less useful than group level data? For stakeholders? For the company?

---

3. Why did the company report total water use as site level data, but it did not disaggregate the water use into the different sources?

B.6 Date of Interviews

Internal Stakeholders

Respondent #	Date
1	15/08/2018
2	17/08/2018
3	16/08/2018
4	20/08/2018
5	20/08/2018
6	21/08/2018
7	20/08/2018
8	20/08/2018
9	16/08/2018
10	14/08/2018

External Stakeholders

Respondent #	Date
11	23/07/2018
12	23/07/2018
13	14/08/2018
14	31/07/2018
15	15/08/2018
16	13/08/2018
17	31/07/2018
18	2/08/2018
19	13/08/2018
20	17/08/2018

Appendix C: Ethics Clearance

Application for Approval of Ethics in Research (EiR) Projects
Faculty of Engineering and the Built Environment, University of Cape Town

APPLICATION FORM

Please Note:
Any person planning to undertake research in the Faculty of Engineering and the Built Environment (EBE) at the University of Cape Town is required to complete this form **before** collecting or analysing data. The objective of submitting this application *prior* to embarking on research is to ensure that the highest ethical standards in research, conducted under the auspices of the EBE Faculty, are met. Please ensure that you have read, and understood the **EBE Ethics in Research Handbook** (available from the UCT EBE, Research Ethics website) prior to completing this application form: http://www.ebe.uct.ac.za/ebe/research/ethics1

APPLICANT'S DETAILS		
Name of principal researcher, student or external applicant		David Viljoen
Department		Chemical Engineering
Preferred email address of applicant:		VLJDAV003@myuct.ac.za
If Student	Your Degree: e.g., MSc, PhD, etc.	MPhil
	Credit Value of Research: e.g., 60/120/180/360 etc.	120
	Name of Supervisor (if supervised):	Ass-Prof. Jennifer Broadhurst
If this is a researchcontract, indicate the source of funding/sponsorship		NRF SAARCHI: Minerals Beneficiation
Project Title		Critical assessment of sustainability reports : A case study on SA gold mines

I hereby undertake to carry out my research in such a way that:

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

SIGNED BY	Full name	Signature	Date
Principal Researcher/ Student/External applicant	David Viljoen	Signature Removed	18 Jan 2018

APPLICATION APPROVED BY	Full name	Signature	Date
Supervisor (where applicable)	Jennifer Broadhurst	Signature Removed	20 March 2018
HOD (or delegated nominee) Final authority for all applicants who have answered NO to all questions in Section1; and for all Undergraduateresearch (Including Honours).	Click here to enter text.	Signature Removed	23/03/2018
Chair : Faculty EIR Committee For applicants other than undergraduate students who have answered YES to any of the above questions.	R Behrens	Signature Removed	20 Apr 2018

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